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2013

### 2013-2014 Undergraduate Course Description

Rochester Institute of Technology

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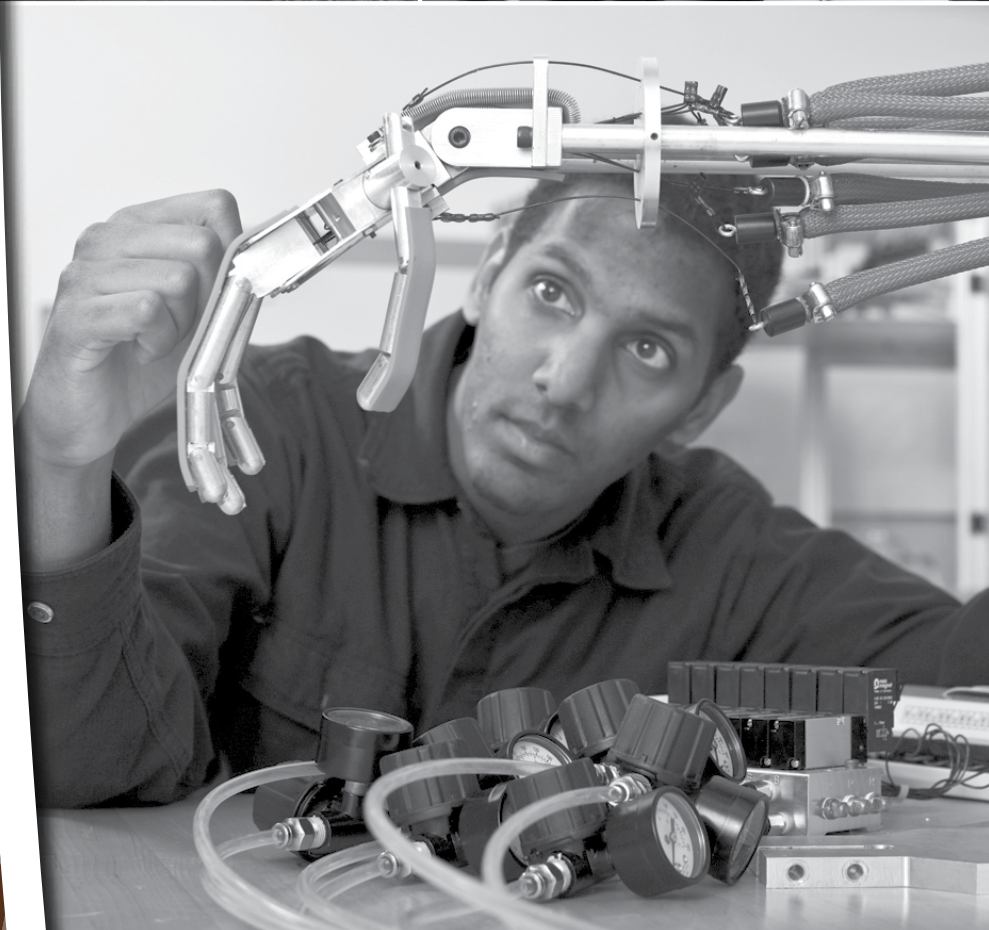
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# R·I·T

## UNDERGRADUATE COURSE DESCRIPTIONS

2013-2014



# Rochester Institute of Technology

## 2013–14 University Calendar

† The Add/Drop period is the first six class days, excluding Saturdays, Sundays, and holidays of the fall and spring semesters.

\* Friday of the 12th week of classes

\*\* Friday of the 8th week of classes

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3M-P1466-8/13-COM-MRM

### Fall Semester (2131)

**August 20 - 25**  
New Student Orientation

**August 26**  
Day, evening, and online classes begin  
First day of 6-day Add/Drop period†

**August 31**  
Saturday classes begin

**September 2**  
Labor Day (no classes); University offices closed

**September 3**  
Last day of 6-day Add/Drop period†

**September 4**  
First day to drop from classes with a grade of W

**October 14**  
Columbus Day (no classes); University offices open

**October 15**  
Classes follow a Monday schedule

**November 15**  
Last day to drop from classes with a grade of W\*

**November 27**  
No classes - University offices open

**November 28-29**  
Thanksgiving Holiday (no classes); University offices closed

**November 30**  
No Saturday classes

**December 2**  
Day, evening, and online classes resume

**December 7**  
Saturday classes resume

**December 11**  
Last day, evening, and online classes

**December 12**  
Reading Day (prepare for exams)

**December 14**  
Last Saturday classes

**Dec. 13, 16, 17, 18, 19**  
Final exams

**December 20**  
Residence halls close

**Dec. 20 - Jan. 1**  
Holiday break; University closed

**December 23**  
Final grades due

### Intercession (2133)

**January 2**  
Day, evening, and online classes begin  
First day of Add/Drop period

**January 6**  
Last day of Add/Drop

**January 7**  
First day to drop from classes with a grade of W

**January 10**  
Last day to drop from classes with a grade of W

**January 22**  
Last day of classes

**January 23**  
Final exams

**January 24-27**  
Break between Intercession and spring semester

### Spring Semester (2135)

**January 20**  
Residence halls open

**January 27**  
Day, evening, and online classes begin  
First day of 6-day Add/Drop period†

**February 1**  
Saturday classes begin

**February 3**  
Last day of 6-day Add/Drop period†

**February 4**  
First day to drop from classes with a grade of W

**March 24 - 28**  
No classes (spring break); University open

**March 29**  
No Saturday classes

**March 31**  
Day, evening, and online classes resume

**April 25**  
Last day to drop from classes with a grade of W\*

**May 14**  
Last day, evening, and online classes

**May 15**  
Reading Day (prepare for exams)

**May 17**  
Last Saturday classes

**May 16, 19, 20, 21, 22**  
Final exams

**May 23**  
Convocation and Commencement ceremonies

**May 24**  
Commencement ceremonies

**May 26**  
Memorial Day; University closed

**May 27**  
Final grades due

**May 27 - 30**  
Spring/Summer break

### Summer Sessions

#### 10-week Summer Session (2138)

**June 2**  
Day, evening, and online classes begin  
First day of 6-day Add/Drop period†

**June 7**  
Saturday classes begin

**June 9**  
Last day to Add/Drop classes

**June 10**  
First day to drop from classes with a grade of W

**July 4**  
Independence Day (no classes); University closed

**July 25**  
Last day to drop from classes with a grade of W\*\*

**August 8**  
Last day, evening, and online classes

**August 9**  
Last Saturday classes

**August 13**  
Reading Day (prepare for exams)

**August 11, 12, 14, 15**  
Final exams

**August 18**  
Final grades due

**August 18 - 22**  
Summer/Fall break

#### 5-week Summer Session I (2138)

**June 2**  
Day, evening, and online classes begin  
First day of 6-day Add/Drop period†

**June 7**  
Saturday classes begin

**June 9**  
Last day to Add/Drop classes

**June 10**  
First day to drop from classes with a grade of W

**June 24**  
Last day to drop from classes with a grade of W (4 weeks)

**July 3**  
Last day of classes (final exams held)

**July 4**  
Independence Day (no classes); University closed

#### 5-week Summer Session II (2138)

**July 7**  
Day, evening, and online classes begin  
First day of 6-day Add/Drop period†

**July 12**  
Saturday classes begin

**July 14**  
Last day to Add/Drop classes

**July 15**  
First day to drop from classes with a grade of W

**August 1**  
Last day to drop from classes with a grade of W (4 weeks)

**August 8**  
Last day of classes (final exams)

# Course Number Index

RIT course numbering: Throughout this bulletin and in registration materials that are published every semester, courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).

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# Course Descriptions

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses, published by the Office of the Registrar. Prerequisites and/or corequisites are noted in parentheses at the end of the course description.

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### Civil Engineering Technology

**CVET-140** **Materials of Construction**  
A study of common construction materials in civil engineering with particular emphasis on Portland cement concrete and asphalt cement concrete. Aggregates, Portland cement, and asphalt cement (each an ingredient in the concretes) are studied extensively. Mass-volume relationships are explored in relation to these materials. An overview of laboratory testing procedures for evaluating these materials is provided. Important properties of masonry, steel, and wood products are also discussed. (Corequisite CVET-141 Materials of Construction Lab) **Class 2, Credit 2 (F)**

**CVET-141** **Materials of Construction**  
The Construction Materials Laboratory will be taken concurrently with CVET-140. Standard laboratory tests will be performed for evaluating the properties of aggregate, Portland cement concrete, asphalt cement concrete, and mortar. Mix design procedures for Portland cement concrete and asphalt cement concrete will be learned and used. An introduction to green building materials will be provided. (Corequisite CVET-140 Materials of Construction) **Lab 2, Credit 1 (F)**

**CVET-150** **Computer Aided Design and Drafting**  
Introduction to engineering graphics as a means of communication in the technical fields. The course is laboratory oriented and provides the student with basic skills to create and edit professional 2D and 3D drawings with this comprehensive first course in the use of computer aided design and drafting (CADD) software for (mechanical, architectural and civil drawings). The course assumes no prior knowledge of engineering drawing or CADD. **Class 1, Lab 3, Credit 3 (S)**

**CVET-160** **Surveying**  
Introduction to fundamentals of surveying. Topics include: note taking; differential leveling; vertical and horizontal measurement; traversing; topographic mapping; horizontal, vertical, compound and reverse curves; earthwork; and GPS/GIS. (Corequisite CVET-161 Surveying Lab) **Class 3, Credit 3, (F)**

**CVET-161** **Surveying Laboratory**  
Students apply the fundamentals of surveying to field exercises using modern surveying equipment. Field exercises include differential leveling, cross sections, traversing, topographic mapping, horizontal curve layout, vertical curve design, earthwork estimation, use of data collectors, and GPS/GIS. (Corequisite CVET-160 Surveying) **Lab 2, Credit 1, (F)**

**CVET-170** **Elements of Building Construction**  
Elements and details of building construction, both residential and commercial, are explored. The course does not focus on design, but rather on specific building components, and on how these components work together to create a functional building. Some of the topics include: foundations, wood light frame, heavy timber frame, steel, concrete, masonry, glass, roofing, cladding systems, and interior finishes. The role of building codes in design and construction is introduced. "Green" building materials and systems are also introduced. **Class 3, Credit 3 (S)**

**CVET-180** **Civil Engineering Graphics**  
The objective of this course is to develop in the student an understanding of plans and drawings in civil engineering projects such as site development, structures, hydraulic structures, water and wastewater transport and treatment facilities, and transportation facilities. Students will also understand how related disciplines: architecture, mechanical and electrical engineering, and landscape architecture; are incorporated into construction drawings. Students develop an understanding of the technical and legal purpose of plans and how to assemble them. (Corequisite CVET-181 Civil Engineering Graphics Lab) **Class 2, Credit 2 (F)**

**CVET-181** **Civil Engineering Graphics Lab**  
The purpose of this course is to provide students with hands on learning of fundamental and innovative tools in the area of civil engineering graphics. Students will apply information from the corequisite to understand how construction drawing sets and drawing components are organized and generated. Spreadsheet methods will be used to solve design problems and building information modeling software will be introduced in the DDL computer lab. (Corequisite CVET-180 Civil Engineering Graphics) **Lab 2, Credit 1 (F)**

**CVET-210** **Statics**  
An introduction to the analysis of static structures covering free-body diagrams, forces, moments, vectors, equilibrium, friction, and analysis of structures and truss members. Applications are drawn from civil engineering technology. (PHYS-111 College Physics I) **Class 2, Recitation 2, Credit 3 (S)**

**CVET-220** **Strength of Materials**  
Study how forces and moments affect axial, shearing, and bending stresses and deflections of structural members. The relationships between stress and strain, for both axial and torsional loading, are explored. Beams, shafts, and columns are analyzed and designed based on stress and deformation. Combined stress states are analyzed, including using Mohr's circle. Statically indeterminate problems are evaluated. Euler's equations and column design principles are studied and applied. (CVET-210 Statics) **Class 3, Recitation 2, Credit 4 (F)**

**CVET-230** **Elementary Structures**  
Applications of the principles of statics and strength of materials to the analysis and design of basic structural elements in buildings such as beams, T-beams, columns, slabs, and footings. Topics include analysis of gravity loads in buildings, along with analysis and design of both structural steel and reinforced concrete members found in buildings. The Allowable Stress Design approach (ASDC) is used for steel, while the ACI code is used for concrete. Design and analysis of steel connections are covered also. (CVET-220 Strength of Materials) **Class 3, Credit 3 (S)**

**CVET-240** **Elementary Soil Mechanics**  
An introduction to soil mechanics and its application to problems encountered in civil engineering design and construction. Major topics include soil properties and classification, weight-volume relationships, compaction/ground improvement, groundwater flow, stresses in soils, settlement analysis, and shear strength. (CVET-210 Statics, CVET-220 Strength of Materials; corequisite CVET-241 Elementary Soil Mechanics Lab) **Class 3, Credit 3 (S)**

**CVET-241** **Elementary Soil Mechanics Lab**  
The Soil Mechanics Laboratory will be taken concurrently with CVET-240. Standard laboratory tests will be performed for evaluating the properties of soils including gradation, plasticity, compaction, permeability, compressibility, and shear strength. (Corequisite CVET-240 Elementary Soil Mechanics) **Lab 2, Credit 1 (S)**

**CVET-250** **Hydraulics**  
A study of the principle physical properties of liquids, hydrostatic pressure and forces, buoyancy and flotation, Bernoulli's Law, Conservation of Energy and Mass, and the concept of momentum. These fundamentals are applied in the analysis and design of closed conduit systems, open channel flow, pumps and pump selection and storage facilities. Rainfall runoff relationships and applications to storm water management are also introduced. (CVET-210 Statics, Corequisite CVET-251 Hydraulics Lab) **Class 3, Credit 3, (F)**

**CVET-251** **Hydraulics Lab**  
Experimental study of principle physical properties of liquids and major laws of fluid mechanics. Students will conduct several experiments that illustrate the theory and design principles taught in lecture. (Corequisite CVET-250 Hydraulics) **Lab 3, Credit 1 (F)**

**CVET-300** **Land Development Computer Applications**  
The purpose of this course is to provide the student with an introduction to Civil 3D software and how to use the application and its tools to create standardized civil engineering and drafting projects. The course enables students to complete transportation, site, sewer, storm drain, and subdivision projects quickly, while using the tools to dynamically link and generate automatic design updates. (CVET-150 Computer Aided Design and Drafting, CVET-160 Surveying, CVET-180 Civil Engineering Graphics) **LEL 4, Credit 3 (F)**

**CVET-330** **Structural Analysis and Dynamics**  
Introduction of classical and modern computational techniques to analyze statically determinate and indeterminate structures. Introduction of basic principles of engineering dynamics. Topics include beams, 2D trusses, 2D frames, cables and arches, moving loads and influence lines, approximate methods, moment distribution, kinematics of particles, kinetics of particles and vibrations. Computer-aided structural analysis using commercial structural analysis software is involved. (CVET-230 Elementary Structures) **Class 4, Credit 4 (F)**

**CVET-400** **Transportation Engineering**  
This course exposes students to the fields of highway, traffic engineering, airport and rail engineering. The areas of administration, planning, design, construction, maintenance and operation are covered. After the introductory material is presented, stress is put on specific skills needed in these fields, including highway, rail and airport standards; geometry and alignment; traffic signal timing and design, drainage; earthwork; safety standards; and structures. (CVET-300 Land Development Computer Applications; corequisite CVET-401 Transportation Engineering Lab) **Class 2, Credit 2 (S)**

**CVET-401** **Transportation Engineering Recitation**  
Students apply the fundamentals of highway design in the planning and design of a curbed highway, parking lot, and the necessary storm water management facility. Students will use Auto CAD Civil 3D software as well as traffic engineering software that is commonly used at transportation agencies. (Corequisite CVET-400 Transportation Engineering) **Lab 2, Credit 1 (S)**

**CVET-412** **Pavement Design**  
This elective course provides detailed coverage of the engineering aspects of asphalt and Portland cement concrete pavement design, bringing together relevant concepts from construction materials, soil mechanics and transportation engineering. The course includes design of new pavements and also addresses the topics of the assessment, rehabilitation, and recycling of existing pavements. In addition to focusing on highway/roadway pavements, an overview of airport pavements is presented. Problems are attacked in a practical manner, utilizing design guides and expertise from national organizations and state highway departments. (CVET-140 Materials of Construction, CVET-141 Materials of Construction Lab, CVET-240 Elementary Soil Mechanics, CVET-241 Elementary Soil Mechanics Lab) **Class 3, Credit 3 (S)**

**CVET-414** **Traffic Analysis**  
The fundamentals of traffic engineering, traffic operation and control are covered. The design of intersection control is covered. Topics included are, driver/vehicle characteristics, traffic control devices, traffic stream characteristics, statistical applications in traffic engineering, traffic volume studies and characteristics, vehicle routing, speed changes, speed reduction zones, fixed time signal control and related topics. (CVET-400 Transportation Engineering) **LEL 4, Credit 3 (S)**

**CVET-421** **Land Use Planning**  
The environmental and social aspects as well as the engineering and cost considerations of land-use planning are covered. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wetlands, other planning and control tools, solar access planning, and urban revitalization. Students are involved in an independent project consisting of a concept design for a subdivision or other land-use project. Extensive use is made of field trips and attendance at appropriate meetings or work sessions. (CVET-150 Computer Aided Design and Drafting, CVET-300 Land Development Computer Applications) **LEL 4, Credit 3 (F)**

**CVET-422** **Resource Recovery and Waste Management**  
An introduction to the civil engineering aspects of dealing with resource recovery and "waste" management, with a focus on source reduction and beneficial resource recovery. Topics covered are the history of the problems, the resulting societal reaction and legislation, and present day handling, minimizing, and recovering or disposing of materials historically treated as "wastes." Emphasis is placed on those aspects in which the civil engineer plays a prominent roles such as material recover facilities, municipal solid waste landfills and hazardous waste permanent storage facilities, land application of municipal wastewater biosolids, composting, and other resource recovery and environmental protection engineering projects. Use is made of lectures, reading materials, outside speakers, field trips, and certain projects. (Fourth-year status) **Class 3, Credit 3 (F)**

**CVET-423** **GIS for CETEMS**  
This course examines the fundamentals of geographic information systems and their application in the fields of civil engineering and environmental management. It emphasizes the application of GIS technology to problems such as, but not limited to, water resource management, asset management, environmental impact assessments, urban planning, and transportation. (Fourth-year CETEMS student or department permission) **LEL 4, Credit 3 (S)**

**CVET-431** **Structural Design—Steel**  
Design of structural members and frames and their connections in steel structures. Topic include principles of structural design, structural loads and systems, steel grade and shapes, tension members, columns, non-composite and composite beams, beam-columns, column base plates, bolted connections and welded connections. The use of AISC Steel Manual is emphasized and a comprehensive group design project is assigned. Some computer work is involved. (CVET-330 Structural Analysis and Dynamics) **Class 3, Credit 3 (F)**

**CVET-432** **Structural Design—Reinforced Concrete**  
Design of members and frames of reinforced concrete. Topics include principles of structural design; properties of concrete and reinforcement; design of slabs, beams, columns and footings; and introduction to pre-stressed concrete. Emphasis is on the use of the ACI code, and a comprehensive group design project is assigned. Some computer work is involved. (CVET-330 Structural Analysis and Dynamics) **Class 3, Credit 3 (S)**

**CVET-433** **Structural Timber Design**  
Design wood structures. Topics include properties of structural lumber, design of wood structural members including beams, columns, beam-columns, trusses, studs, plywood diaphragms and shear walls, and design of structural member connections. Emphasis is on the use of NDC Wood Design Package. A comprehensive group design project. Some computer work is involved. (CVET-330 Structural Analysis and Dynamics) **Class 3, Credit 3 (F)**

**CVET-434** **Design of Highway Bridges**  
Design concrete and steel bridges. Topics include types of bridges; design loads on bridges; design of prestressed concrete girders using CONSPAN; design of steel girders using MDX; design of reinforced concrete deck; design of abutments and wing walls; design of foundations; and introduction to multi-span bridges. Emphasis is on the use of the AASHTO LRFD code and bridge design software, and a comprehensive group design project is assigned. Some computer work is involved. (CVET-330 Structural Analysis and Dynamics, CVET-431 Structural Design-Steel, CVET-432 Structural Design-Reinforced Concrete) **Class 3, Credit 3 (S)**

**CVET-435****Prestressed Concrete**

This course focuses on the fundamental concepts of prestressed concrete design. Topics include prestressing systems, types of prestressing, materials used in prestressed concrete, analysis and design of pre- and post-tensioned systems, design of connections, losses in prestress. Emphasis is given on the use of the current industry standards and a design project. (CVET-330 Structural Analysis and Dynamics) **Class 3, Credit 3 (F)**

**CVET-436****Masonry Structures**

This course focuses on the fundamental concepts of structural design with masonry elements. Topics include historical perspective of masonry technology, materials used in masonry construction, general design requirements for masonry, structural design of unreinforced and reinforced masonry elements, masonry construction practices, repairs and improvements to masonry walls. Emphasis is given on the use of the building codes for masonry structures and a comprehensive group design project. (CVET-140 Materials of Construction, CVET-141 Materials of Construction Laboratory and CVET-330 Structural Analysis and Dynamics) **Class 3, Credit 3 (F)**

**CVET-440****Foundation Engineering**

Study of the geotechnical engineering aspects of foundation design. Focus is on bearing capacity analysis and spread footing design, mat foundations, pile capacity and pile foundation design, drilled shafts, lateral earth pressures and retaining wall design, and an introduction to slope stability analysis. (CVET-240 Elementary Soil Mechanics) **Class 3, Credit 3 (F)**

**CVET-441****Soil Retention and Stabilization Methods**

In this course students will develop skills for the selection, design, and construction of specialized soil retention and soil stabilization systems used in geotechnical engineering. The systems and techniques covered will include specialty retaining walls including anchored bulkheads, MSE walls, and segmental walls; temporary excavation support systems including soldier pile and lagging and steel sheet piling with tieback anchors or internal bracing; soil improvement and reinforcement including wick drains with preload, stone columns/aggregate piers, and geosynthetics/geogrids; and other current ground improvement techniques including grouting. (CVET-440 Foundation Engineering) **Class 3, Credit 3 (S)**

**CVET-450****Principles of Water and Wastewater Treatment**

An introduction to water and wastewater treatment, interpretation of analyzed physical, chemical, and biological aqueous characteristics associated with the design and operation of treatment processes. Fundamental principles and applications of physical, chemical, and biological processes employed in the treatment of drinking water and sanitary wastewater will be covered. Fundamental components and design procedures for storm water and sanitary sewer systems will be introduced. (CVET-250 Hydraulics, CHMG-122 Chemistry of Water and Wastewater) **Class 3, Credit 3, (S)**

**CVET-451****Design of Water and Wastewater Treatment Facilities**

Hydraulic, biological, and chemical principles of water and wastewater treatment processes are applied to the design of municipal treatment works. Process, plant design, and construction elements are stressed. (CVET-450 Principles of Water and Wastewater Treatment) **Class 3, Credit 3 (S)**

**CVET-452****Groundwater Hydraulics**

Groundwater movement analysis and engineering design applications. Topics include construction dewatering, groundwater remediation, flow-net analysis, flow analysis to wells and trenches, design of groundwater collection systems, pump selection, and groundwater's interaction with engineered structures. Application of groundwater computer software. (CVET-250 Hydraulics) **Class 3, Credit 3 (S)**

**CVET-453****Storm Water Management**

This course focuses on the fundamental design concepts of surface water hydrology and how these concepts are applied to the management of storm water for municipal and development projects. Topics include rainfall/runoff relationships, groundwater hydrology, hydrographs, soil erosion and sediment control, storm sewer design, and green infrastructure. Practical engineering procedures, using desktop and state-of-the-practice hydraulic and hydrologic software, are introduced to analyze existing conditions and design new solutions. (CVET-250 Hydraulics) **Class 3, Credit 3 (S)**

**CVET-461****Construction Cost Estimating I**

An introduction to direct cost estimating for construction projects. The estimating techniques covered include quantity take-off, labor productivity, and pricing (labor, material, and equipment). Drawings, sketches, and specifications are used as a basis for developing quantities involving site work, concrete, masonry, steel, carpentry, and finishes. Students also use software tools to aid in developing takeoff quantities. Different estimate structures and various types of estimates are examined. Direct and indirect construction costs are explored along with approaches for estimating overhead costs and profit. (CVET-170 Elements of Building Construction) **LEL 4, Credit 3 (F)**

**CVET-462****Construction Project Management**

An introduction to construction management. Project administrative roles and relationships among the various project team participants are explored. Topics include specifics of construction project start-up including procurement, project buyout, and job site layout and control. Subcontracts and relationship with subcontractors are explored. Construction related documentation including contract documents, submittals, information requests, change orders, progress payments, bonds, insurances and project closeout is discussed. Safety, quality, and project closeout are also covered. (CVET-170 Elements of Building Construction and CVET-461 Construction Cost Estimating I) **Class 3, Credit 3 (S)**

**CVET-464****Construction Planning, Scheduling, and Control**

This course covers planning, organization, scheduling, and control of construction projects. The components of construction project planning are examined. Students are exposed to and gain practice in using both the arrow-diagramming method and the Critical path Method (CPM) in scheduling and monitoring the progress of construction projects. Cost control and resource allocation/resource management are explored. (Fourth-year status) **LEL 4, Credit 3 (F)**

**CVET-465****Contracts and Specifications**

This course includes a fundamental overview of contract law, followed by the application of this material in the contracts for construction. Subsequently, the student is exposed to construction specifications. Substantial use is made of actual documents such as those of the New York State Department of Transportation, The Construction Specification Institute and trade standards such as ANSI, ASTM, and others. Students are required to develop and assemble a mock-up set of contract documents. Arbitration, design-build, and partnering are discussed. (Fourth-year status required) **Class 3, Credit 3 (F)**

**CVET-499****Civil Engineering Technology Co-op**

One semester or summer block of appropriate work experience in a related industry. (CVET-140, CVET-141, CVET-150, CVET-160, CVET-161, CVET-180, and CVET-210) **Class 0, Lab 0, Credit 0 (F, S, Su)**

**CVET-500****Civil Engineering Technology Capstone**

A capstone course in Civil Engineering Technology. This course builds on and integrates the engineering concepts developed in prior course work into the complete design of a major civil engineering project. The course will require a written and an oral presentation of the completed design to include, where appropriate, plans and specifications. (Fifth-year CET students or department permission) **Class 3, Credit 3 (F, S)**

**CVET-505****Sustainable Building Design and Construction**

Course material will focus on the design, engineering, and construction of sustainable buildings and how the construction manager guides the project team to meet the owner's objectives of a sustainable facility. Students will explore the primary differences and similarities between the different "green" building rating systems, including the Leadership in Energy and Environmental Design (LEED) rating system, developed by the U.S. Green Building Council. (CVET-170 Elements of Building Construction) **Class 3, Credit 3 (F)**

## Computer Engineering Technology

**CPET-121****Computational Problem Solving I**

This is the first course in a two-course sequence in computational problem solving of engineering and scientific problems. The problems solved will stress the application of sequence, selection, repetitive, invocation operations and arrays. The development of proper testing procedures to ensure computational accuracy will be stressed. Students, upon successful completion of this course, will be able to analyze introductory engineering and scientific problems, design, code, test, and document procedural software solutions. **LEL 4, Credit 3 (S)**

**CPET-141 Digital Fundamentals**  
An introduction to digital electronics, emphasizing the concepts that are fundamental to any digital system: number systems, truth tables, Boolean algebra, Karnaugh maps, combinational and sequential logic, digital arithmetic, TTL/CMOS logic families and SSI, MSI and PLD device implementation. Students, upon completion of this course, will have the necessary skills to analyze and design introductory combinational and sequential logic circuits. (Corequisite CPET-142 Digital Fundamentals Laboratory) **Class 2, Credit 2 (F)**

**CPET-142 Digital Fundamentals Lab**  
Laboratory work to complement the lecture material covered in Digital Fundamentals. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. Students, upon completion of this course, will have the necessary skills to analyze, design, and implement introductory combinational and sequential logic circuits. (Corequisite CPET-141 Digital Fundamentals) **Lab 2, Credit 1 (F)**

**CPET-201 Microcontroller Systems**  
This course studies the structure and applications of microcontroller systems. Emphasis will be on: hardware architecture and structures, programming, memory organization/mapping, system timing, typical peripherals and interfacing, the interrupt structure, input/output methods, small system design and applications. On successful completion of the course students will have the necessary skills to design, analyze, program and document basic microcontroller systems. (CPET-121 Computational Problem Solving I, CPET-141 Digital Fundamentals, CPET-142 Digital Fundamentals Lab; corequisite CPET-202 Microcontroller Systems Laboratory) **Class 2, Credit 2 (F)**

**CPET-202 Microcontroller Systems Laboratory**  
This course implements the techniques and concepts developed in Microcontroller Systems. Emphasis will be placed on the use and applications of an Integrated Developers Environment (IDE) system and microcontroller design, programming, debugging, simulation, implementation and demonstration of basic microcontroller systems using the features of Single Board Computer Development System (SBC). Students on successful completion of the course will have the necessary skills to analyze, design, program, debug, simulate and implement basic microcontroller systems. (CPET-121 Computational Problem Solving I, CPET-141 Digital Fundamentals, CPET-142 Digital Fundamentals Lab; corequisite CPET-201 Microcontrollers Systems) **Lab 2, Credit 1 (F)**

**CPET-241 Digital Systems Design**  
After a review of concepts covered in Digital Fundamentals and Digital Fundamentals Laboratory, this course will present modern digital design techniques. Topics will include: advanced digital circuits, programmable logic devices, finite state machines, hardware description languages and implementation technologies. Students, upon completion of this course, will have the necessary skills to analyze, and design advanced combinational and sequential logic circuits targeted for programmable logic devices. In addition, students will be introduced to hardware description languages and exposed to digital logic systems fabrication methodologies and processes (CPET-141 Digital Fundamentals, CPET-142 Digital Fundamentals Laboratory; corequisite CPET-242 Digital Systems Design Laboratory) **Class 3, Credit 3 (S)**

**CPET-242 Digital Systems Design Lab**  
Laboratory work to complement the lecture material covered in Digital Systems Design. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. Students, upon completion of this course, will have the necessary skills to analyze, design, and implement advanced combinational and sequential logic circuits targeted for programmable logic devices. In addition, students will be introduced to a hardware description languages and exposed to digital logic systems fabrication methodologies and processes. (CPET-141 Digital Fundamentals, CPET-142 Digital Fundamentals Laboratory; corequisite CPET-241 Digital Systems Design) **Lab 2, Credit 1 (S)**

**CPET-321 Computational Problem Solving II**  
This is the second course in a two-course sequence in computational problem solving of engineering and scientific problems. The problems solved will stress the application of data structures and object oriented classes. Data encapsulation, data management, and design robustness will be stressed. Students, upon successful completion of this course, will be able to analyze complex engineering and scientific problems, design, code, test, and document object-oriented software solutions. (CPET-121 Computational Problem Solving I) **LEL 4, Credit 3 (F)**

**CPET-341 Hardware Description Language**  
This course is a more in depth coverage of current logic design and verification methodologies using a modern hardware description language (HDL). Topics include: coding for different levels of abstraction; implementation of arithmetic circuits and finite state machines; hierarchical designs; reusable component design; data and control path; best coding practices; design constraints and verification. Students, upon completion of this course, will have the necessary skills to analyze and design advanced hardware descriptions of combinational and sequential logic circuits using design and verification best practices and methodologies. (CPET-241 Digital Systems Design, CPET-242 Digital Systems Design Laboratory; corequisite CPET-342 Hardware Description Language Lab) **Class 2, Credit 2 (F)**

**CPET-342 Hardware Description Language Lab**  
Laboratory work to complement the lecture material covered in Hardware Description Language. The laboratories are designed to illustrate concepts, reinforce analysis and design skills, and develop instrumentation techniques associated with the lecture topics. Students, upon completion of this course, will have the necessary skills to analyze, design, and implement advanced hardware descriptions of combinational and sequential logic circuits using design and verification best practices and methodologies. (CPET-241 Digital Systems Design, CPET-242 Digital Systems Design Laboratory; corequisite CPET-341 Hardware Description Language) **Lab 2, Credit 1 (F)**

**CPET-461 Real-Time Operating Systems**  
This course will provide students with an introduction to operating systems theory, and practical problem solving approaches to real-time systems. An embedded real-time operating system is used as the foundation for a variety of programming projects. Students, upon successful completion of this course, will be able to understand the operation and describe the various components of an operating system. They will be able to evaluate design trade-offs and selection criteria for different types of operating systems, and demonstrate the ability to write multiple process that run together within an embedded, real-time operating system. (CPET-201 Microcontrollers Systems, CPET-202 Microcontrollers Systems Lab, CPET-321 Computational Problem Solving II) **LEL 4, Credit 3 (S)**

**CPET-481 Networking Technologies**  
This course provides a practical study of voice and data communications from the point of the OSI seven-layer and the TCP/IP five-layer protocol model. Both traditional circuit switched telecommunications as well as IP based communications are studied. This course covers the operation of the lower four layers in detail by examining some of the foundation laws of physics including Nyquist and Shannon as well as selected protocols. Emphasis is placed on data internetworking, local-area networking and wide-area networking. This course is a problem based course in that students apply the learning to various computer and networking mathematical problems and are assessed on their ability to solve the problem. (MATH-171 Calculus A, STAT-145 Introduction to Statistics I) **Class 3, Credit 3 (F)**

**CPET-499 Computer Engineering Technology Co-op**  
One semester or summer block of appropriate work experience in a related industry. Students are required to complete a poster and presentation and participate in the ECTET Co-op presentation evening at the completion of each co-op experience. (EEET-299 EET Career Orientation, CPET-201 Microcontrollers Systems, CPET-202 Microcontrollers Systems Laboratory, CPET-321 Computational Problem Solving II) **(F, S, Su)**

**CPET-561 Embedded Systems Design I**  
This is an embedded systems architecture and design course. Microprocessor, as well as system level design principles will be analyzed from both a hardware and software perspective. Assembly language and C are used to develop software applications for a 32-bit embedded processor. Application software emphasizes interrupt driven operation and peripheral interfacing. A hardware description language is used to design and debug embedded components for an FPGA-based system. Students, upon successful completion of the course, will be able to design and debug hardware and software systems, evaluate design trade-offs and choose the best design solution, and perform functional and timing analysis of an embedded system. (CPET-201 Microcontrollers Systems, CPET-202 Microcontrollers Systems Laboratory, CPET-341 Hardware Description Language, and CPET-342 Hardware Description Language Lab with a grade of C or better) **Class 2, Lab 1, Credit 4 (S)**



**CPET-563****Embedded Systems Design II**

This project based course is the culmination of the curriculum capstone experience for the computer engineering technology program. This course will be focused around a project that includes: product ideation, project/resource management techniques and best practices; system level specification, modeling, partition and design; team collaboration and communication; best documentation practices; industry level coding practices; hardware and software co-design methodologies; design reuse and intellectual property creation; design verification and validation; and design sign-off. Students, upon successful completion of the course, will have an industry-like embedded system product design experience, starting by developing the vision for a product, including the voice of the customer, and progress through the phases to develop a complete product prototype with professional documentation. In addition the students will: track and present their progress; participate in design and code reviews; demonstrate their product and highlight product differentiation. At the end of the course students will give a formal presentation, product demonstration, deliver professional documentation, go over lessons learned and suggest future improvements. (CPET-561 Embedded Systems Design I with a grade of C or better) **Class 2, Lab 2, Credit 3 (S)**

## Electrical Engineering Technology

**EEET-111****DC Circuits**

Develops the skills to analyze and design practical DC circuits used in electronic devices. Topics include resistance with circuit techniques of Ohm's Law; current and voltage division; simplification of series, parallel, series-parallel circuits; bridge and ladder networks; Kirchhoff's source conversions, branch analysis; Thevenin and Norton theorems; superposition theorems and nodal analysis. Inductance and capacitance are introduced and transient circuits are studied. (Corequisite MATH-111, EEET-112) **Class 2, Credit 3 (F)**

**EEET-112****DC Circuits Lab**

Develops skills and practice in the design, fabrication, measurement and analysis of practical DC circuits used in electronic devices. Topics include the measurement relative to: resistance, current, and voltage with circuit techniques of Ohm's Law; current and voltage division; simplification of series, parallel, series-parallel circuits; bridge and ladder networks; Kirchhoff's Laws; power; and transient circuit behavior. Laboratory verification of DC analytical and techniques is included. Printed circuit board (PCB) design, fabrication, and assembly is also included emphasizing the development of soldering skill proficiency. (EEET-111 DC Circuits, MATH-111 Precalculus) **Lab 2, Credit 1 (F)**

**EEET-121****AC Circuits**

Develops the skills to analyze and design practical AC circuits used in electrical systems. Topics include network theorems, reactance and impedance, AC power and power factor, resonance, maximum power transfer, frequency response, and bandwidth. (EEET-111 DC Circuits and EEET-112 DC Circuits Lab with C or better; corequisite EEET-122 AC Circuits Lab, MATH-171 Calculus A) **Class 3, Credit 3 (S)**

**EEET-122****AC Circuits Lab**

Develops skills and practice in the design, fabrication, measurement and analysis of practical AC circuits used in electrical systems. Topics include network theorems, reactance and impedance, AC power and power factor, resonance, maximum power transfer, frequency response, and bandwidth. (EEET-111 DC Circuits and EEET-112 DC Circuits Lab with C or better; corequisite EEET-121 AC Circuits, MATH-171 Calculus A) **Lab 2, Credit 1 (S)**

**EEET-211****Electronics I**

Develops the knowledge and ability to design active electronic circuits using diodes, bipolar and field effect transistors. Emphasis is placed on device characteristics and specifications, biasing circuits and transistor modeling. Applications of class A, B and D amplifiers including frequency response and thermal analysis are studied. (EEET-121 AC Circuits, EEET-122 AC Circuits Lab; corequisite EEET-222 Electronics I Lab) **Class 3, Credit 3 (F)**

**EEET-212****Electronics I Lab**

Provides experience in the design, prototyping, measurement and analysis of diodes and transistors circuits. Emphasis is placed on understanding device characteristics and specifications, while building and troubleshooting biasing circuits and transistor modeling. Applications of class A, B and D amplifiers including frequency response and thermal analysis. (EEET-121 AC Circuits, EEET-122 AC Circuits Lab; corequisite EEET-211 Electronics I) **Lab 2, Credit 1 (F)**

**EEET-215****Circuits and Electronics**

Develop the skills to analyze introductory DC and electronic circuits used in electronic devices. Topics include resistance with circuit techniques of Ohm's Law; current and voltage division; simplification of series, parallel, series-parallel circuits; multiple operational amplifier applications including: current sources, strain gauge amplifiers, differential amplifiers and comparator circuits. (MATH-111 Precalculus; corequisite EEET-216 Circuits and Electronics Laboratory) **Class 2, Credit 2 (F)**

**EEET-216****Circuits and Electronics Laboratory**

Students, upon completion of this course, will be able to use laboratory tools to analyze and troubleshoot DC and basic electronic circuits. They will be able to operate a power supply, multi-meter, function generator and oscilloscope. (Corequisite EEET-215 Circuits and Electronics) **Lab 2, Credit 1 (F)**

**EEET-221****Electronics II**

Develops the knowledge and ability to design active electronic circuits, such as audio amplifiers, using op-amps. The operational amplifier and its applications are covered in detail. Applications include: math operations like integration and differentiation, comparator circuits and signal conditioning. The effects of op-amp limitations, both DC and AC, are studied. (EEET-211 Electronics I and EEET-212 Electronics I Lab with grades of C or better; corequisite EEET-222 Electronics II Lab) **Class 2, Credit 2 (S)**

**EEET-222****Electronics II Lab**

Provides experience in the design, prototyping, measurement and analysis of op-amp circuits. Circuits include: microphone pre-amps, integration and differentiation, comparator circuits and signal conditioning. (EEET-211 Electronics I and EEET-212 Electronics I Lab with grades of C or better; corequisite EEET-221 Electronics II) **Lab 2, Credit 1 (S)**

**EEET-225****Electronic Amplifiers**

Develop the skills to analyze and design electronic circuits. Topics include: semiconductor theory, diodes, transistors and multiple operational amplifier applications including: current sources, strain gauge amplifiers, differential amplifiers and comparator circuits. (EEET-121 AC Circuits; corequisite EEET-226 Electronic Amplifiers Laboratory) **Class 2, Credit 2 (S)**

**EEET-226****Electronic Amplifiers Laboratory**

Students, upon completion of this course, will be able to use laboratory tools to analyze and troubleshoot electronic circuits. They will be able to operate a power supply, multi-meter, function generator and oscilloscope. (EEET-122 AC Circuits Lab; corequisite EEET-225 Electronic Amplifiers) **Lab 2, Credit 1 (S)**

**EEET-241****Electrical Machines and Transformers**

Develops the knowledge and ability to analyze and specify motors, generators, and transformers for use in systems such as wind turbines and electric vehicles. Topics include efficiency, energy conservation, power factor, magnetism, electromagnetic force, fields, armatures, commutators, rotors, stators, brushes, starters, controllers, DC machines, AC motors, alternators, single phase and three phase dynamos, three phase circuits, phasors, transformer properties, isolation, efficiency, and voltage regulation. (EEET-121 AC Circuits, EEET-122 AC Circuits Lab; corequisite EEET-242 Electrical Machines and Transformers Lab) **Class 2, Credit 2 (S)**

**EEET-242****Electrical Machines and Transformers Lab**

Provides experience with motors, generators and transformers. Topics include power factor, magnetism, electro-magnetic force, fields, armatures, commutators, rotors, stators, brushes, starters, controllers, DC machines, AC motors, alternators, single phase and three phase dynamos, three phase circuits, phasors, transformer properties, isolation, efficiency, and voltage regulation. (EEET-121 AC Circuits, EEET-122 AC Circuits Lab; corequisite EEET-241 Electrical Machines and Transformers) **Lab 2, Credit 1 (S)**

**EEET-247****Microprocessors and Digital Systems**

Applications of a contemporary microcontroller will be used to teach Engineering Technology students digital logic, assembly programming and microprocessor interfacing. This course is intended as a service course for non-electrical majors who have not taken digital fundamentals course. (MATH-111; corequisite EEET-248) **Class 2, Credit 2 (S)**

**EEET-248****Microprocessors and Digital Systems Laboratory**

Laboratory applications teaching microcontroller fundamentals. Topics include digital logic, assembly programming and microprocessor interfacing. The laboratories for this course combine real hardware with an assembler and terminal emulator. (MATH-111; corequisite EEET-247) **Lab 2, Credit 1 (S)**

**EEET-251****Clean Energy Power Systems**

An alternative energy course that will cover all types of available sources such as hydroelectric power, wind energy, combustion turbines, active and passive solar, photovoltaic systems, fuel cells, combined heat and power systems, biomass, geothermal, ocean and nuclear energy. Power electronic components (inverters and converters) and components necessary for connection to the electrical power grid will be discussed. Alternative energy storage systems will be analyzed. Also, economics, global warming, government regulations and tax initiatives for clean energy products will be discussed. (COS-PHYS-111 or COS-PHYS-211; corequisite CPET-252) **Class 2, Lab 0, Credit 2 (F)**

**EEET-261****Fundamentals of Audio Engineering**

This course provides a fundamental study of the technology and practice used in recording, editing, mixing, production, and distribution of sound. Topics include microphone types, selection and application; the mixing console, mixing techniques and introduction to Signal Processing equipment and associated techniques, an introduction to the concepts relating to digital audio technology such as sampling, the Nyquist theorem, alias frequencies, quantization, dynamic range, compression and their applications will be covered. Topics include basics of digital audio, session creation, importing media, introduction to MIDI, recording techniques, editing, mixing, and mastering. (MATH-111 Precalculus) **Class 3, Credit 3 (S)**

**EEET-299****EET Career Orientation**

This course is an introduction to the cooperative educational placement process at RIT, the programs in the department and RIT resources. Topics include engineering technology vs. engineering, review of resources available at RIT, the cooperative education placement process, and the ethical expectations of employers for co-op students and RIT during a job search. **Class 1, Credit 0 (S)**

**EEET-311****Communications Electronics**

Develops the knowledge and ability to design communication electronics, such as AM/FM radios using transistors and integrated circuits. This course applies the concepts of circuits and electronics to basic analog communication circuits for amplitude and frequency modulation. Topics studied are RF Amplifiers, Fourier Analysis, AM and FM transmission and reception, phase-locked loops, synthesizers, oscillators, DSB and SSB communication systems, antennas and EM wave propagation. (EEET-221 Electronics II and EEET-222 Electronics II Lab with grades of C or better; corequisite EEET-312 Communications Electronics Lab) **Class 2, Credit 2 (F)**

**EEET-312****Communications Electronics Lab**

Provides experience in the practice and application of the concepts of circuits and electronics to basic analog communication circuits for amplitude and frequency modulation in a laboratory environment. Construction and measurement are emphasized. Topics studied are RF amplifiers, Fourier analysis, construction of an AM and/or FM receiver, oscillators, filters, and circuit simulation. (EEET-221 Electronics II and EEET-222 Electronics II Lab with grades of C or better; corequisite EEET-311 Communications Electronics) **Lab 2, Credit 1 (F)**

**EEET-321****Signals, Systems and Transforms**

Develops the analytical skills to design, develop and simulate analog and digital filters, control systems and advanced electronic circuits such as those used in robotics, digital communications and wireless systems. Continuous-time and discrete-time linear, time-invariant, casual systems are examined throughout the course. Topics include: Fourier series, the Laplace transform, signal sampling and the z-transform. Advanced circuit analysis techniques include circuit characterization in the s-plane. MATLAB is introduced and used extensively; PSPICE is utilized for circuit simulation. (Two hour recitation period, scheduled after the weekly classroom meetings)(EEET-121 AC Circuits, EEET-122 AC Circuits Lab, MATH-211 Elements of Multivariable Calculus and Differential Equations; corequisite STAT-145 Intro to Statistics I) **Class 3, Rec 2 Credit 4 (F)**

**EEET-351****Solar Photovoltaic Applications**

This course addresses the practical application of solar cells to producing electricity for commercial, residential, utility-scale, and electric vehicle charger installations. The course begins with an introduction to the characteristics of the sun as an energy source. Next, the construction of solar cells and their performance characteristics are discussed. System design for battery backup and grid connected systems is then explored. Options for integration of PV systems within the building architecture are discussed and the influence of codes and standards on system design and system cost are examined. (COS-PHYS-111 or COS-PHYS-211; corequisite CPET-352) **Class 2, Lab 0, Credit 2 (S)**

**EEET-352****Solar Photovoltaic Applications Lab**

An integrated set of laboratory exercises provides hands-on operational experience with photovoltaic cells and systems and reinforces key concepts from the accompanying solar photovoltaic applications course. (PHYS-111 or PHYS-211; corequisite CPET-351) **Class 0, Lab 2, Credit 1 (S)**

**EEET-353****Fuel Cell Systems**

An introduction to fuel cell technology and fuel cell systems, covering theory, operation, and application. Begins with the fundamental principles of fuel cells, developing the key equations governing performance and establishes a framework for evaluating environmental and economic benefits of fuel cell systems. High and low temperature fuel cells are covered including Polymer-Electrolyte Membrane (PEM) hydrogen, methanol, phosphoric acid and solid oxide fuel cells. Integration of fuel cells with electric power and building thermal systems is examined. An integrated set of laboratory exercises provides hands-on operational experience with fuel cells and reinforces key concepts from the course. (PHYS-111 Physics I or PHYS-211 University Physics I; corequisite EEET-354 Fuel Cell Systems Lab) **Class 2, Lab 0, Credit 2 (S)**

**EEET-354****Fuel Cell Systems Lab**

An integrated set of laboratory exercises provides hands-on operational experience with fuel cells and reinforces key concepts from the co-requisite course EEET-353 Fuel Cell Systems. (PHYS-111 Physics I or PHYS-211 University Physics I; corequisite EEET-353 Fuel Cell Systems) **Class 0, Lab 2, Credit 1 (S)**

**EEET-361****Modern Audio Production**

Sound, voice, music, and effects play a critical role in telephone communication systems and in entertainment systems. Development of integrated multi-channel acoustic information is a complex process. This course Provides an intermediate level study of the technology used in recording, editing, mixing and mastering audio. Students are introduced to core concepts and skills necessary to operate a system running large sessions with up to 48 tracks. Students will develop an appreciation of, and the requisite skills to create, organize, mix, filter, process, enhance and coordinate sound information in digital format. Topics include MIDI, virtual instruments, filtering, processing for sound enhancement, editing and adjusting time bases, mixing and mastering, and audio production. Students will develop critical listening skills as well as technical skills. (EEET-261 Fundamentals of Audio Engineering) **Class 3, Credit 3 (S)**

**EEET-421****Design and Innovation**

Provides a structured environment in which to apply engineering knowledge and develop project management skills to ensure project success. The course will lay a foundation in: engineering economics, ethics, project management tools, cost and schedule trade-offs, design reviews, best practices in design engineering. (EEET-221 Electronics II, EEET-222 Electronics II Lab, CPET-201 Microcontroller Systems) **Class 2, Lab 2, Credit 3 (F)**

**EEET-425****Digital Signal Processing**

Develops the knowledge and ability to process signals using Digital Signal Processing (DSP) techniques. Starts with foundational concepts in sampling, probability, statistics, noise, fixed and floating point number systems and describes how they affect real world performance of DSP systems. Fundamental principles of convolution, linearity, duality, impulse responses, and discrete Fourier transforms are used to develop FIR and IIR digital filters and to explain DSP techniques such as windowing. Students get an integrated lab experience writing DSP code that executes in real-time on DSP hardware. (EEET-321 Signals, Systems and Transforms) **LEL 5, Credit 4 (S)**

**EEET-427****Control Systems**

Develops the knowledge of control system concepts and applies them to electronic, optical and mechanical systems. Systems are characterized and modeled using linear systems methods, focused with a controls perspective. Impulse responses, step responses, and transfer functions are reviewed. Principles of stability and damping are developed and applied to the specification and design of open and closed loop compensators used to deliver specified input-output performance. Students get an integrated lab experience designing compensators in the analog domain for electronic and electro-optic systems, and in the analog and digital domains for electromechanical systems. (EEET-321 Signals, Systems and Transforms) **LEL 5, Credit 4 (S)**

**EEET-431****Transmission Lines**

Develops the knowledge and ability to analyze and design high frequency signal transmission media as applied to digital and RF systems. Topics include the propagation of electromagnetic waves on wire media; transmission line voltage, current, loss and impedance; graphical methods for analysis; transmission lines as circuit elements, application of the general transmission line equation as derived from the LC distributed model. (EEET-321 Signals, Systems and Transforms; MATH-211 Elements of Multivariable Calculus and Differential Equations; corequisite EEET-432 Transmission Lines Lab) **Class 2, Credit 2 (S)**

**EEET-432****Transmission Lines Lab**

Provides experience in measurement and data interpretation related to propagation of signals on transmission lines and examines the use of transmission lines as circuit elements. (EEET-321 Signals, Systems and Transforms; MATH-211 Elements of Multivariable Calculus and Differential Equations; corequisite EEET-431 Transmission Lines) **Lab 2, Credit 1 (S)**

**EEET-441****Power Systems I**

Basic elements of a power system, energy sources, substation configuration, load cycles, balanced and unbalanced three-phase circuits, power factor correction, transmission line configurations and impedance, transformers and the per unit system are studied. Load flow and economic operation are introduced. (EEET 241 Electrical Machines and Transformers and EEET-242 Electrical Machines and Transformers Lab or EEET-215 Circuits and Electronics and EEET-216 Circuits and Electronics Lab) **Class 3, Credit 3 (F)**

**EEET-461****Introduction to Acoustics**

This course introduces the student to sound as both a physical and psychological phenomenon. The course explains the nature of sound in terms of acoustic pressure and provides an overview of how humans receive and perceive sound. Sound waves are also introduced, starting with the development of the acoustic wave equation and its solution for plane and spherical waves with harmonic sources. The concepts of acoustic intensity and acoustic impedance are presented. The course also includes study of basic sound sources as well as the absorption, reflection, scattering and diffraction of sound by various physical structures. (MATH-172 Calculus B, PHYS-111 College Physics I) **Class 3, Credit 3 (F)**

**EEET-499****Electrical Engineering Technology Co-op**

One semester or summer block of appropriate work experience in a related industry. Students are required to complete a poster and presentation and participate in the ECTET Co-op presentation evening at the completion of each co-op experience. (CPET-201 Microcontroller Systems, CPET-202 Microcontroller Systems Lab, or EEET-311 Communications Electronics, EEET-299 EET Career Orientation) **Credit 0 (Fall, Spring and Summer)**

**EEET-525****Wireless RF Systems**

Develops the knowledge and ability to apply representative regulatory requirements for wireless mobile and fixed radio frequency communication systems. Topics include: the radio frequency mobile wireless environment, the common wireless systems, and regulatory aspects related to deployment of the wireless infrastructure. (EEET-311 Communications Electronics, EEET-312 Communications Electronics Lab) **Class 3, Credit 3 (S)**

**EEET-531****Fiber Optic Technology****Fiber Optic Telecommunications Technology**

This course presents the basic technologies of fiber-optic telecommunications systems including optical fiber, light sources and modulators, photodetectors and receivers, and passive components such as optical mux/demux and couplers. Students will learn the principle of operation of these technologies as well as gain practical hands-on experience in the laboratory. Students will also learn how to design and assess a fiber-optic link impaired by attenuation and dispersion. (EEET-231, MATH-211 Elements of Multivariable Calculus and Differential Equations or MATH-231 Differential Equations, and MATH-172 Calculus B or MATH-182 Project-Based Calculus II, or permission of instructor) **Class 3, Credit 3 (F, S)**

**EEET-541****Power Systems II**

Load flow and economic operation of power systems are studied. The symmetrical component method of three-phase circuits is used for electrical fault analysis. Power system relay protection, supervisory control, power quality and system stability are discussed. (EEET-441 Power Systems I) **Class 3, Lab 0, Credit 3 (S)**

**EEET-561****Audio Power Amplifiers**

Develops knowledge of audio power amplifier design and audio signal measurement methods. Covers digital and analog amplifiers from high power (concert halls) to low power (cell phones and handheld digital media devices). Topics include digital sound synthesis using class D switching amplifiers, analog amplifiers, distortion, noise, stability, filtering, heat sinking, efficiency, and low power modes. (EEET-221 Electronics II; corequisite EEET-425 Digital Signal Processing) **Class 2, Lab 1, Credit 3 (S)**

**Electrical/Mechanical Engineering Technology****EMET-290****Mechanics for EMET**

This course provides an introduction to the analysis and design of structures and machines. Students learn to calculate stresses and deflections in axially loaded members, beams, shafts and columns. Topics include statically indeterminate problems, thermal stress, stress concentration, combined stress by superposition and Mohr's Circle, thin-walled pressure vessels, columns and structure stability. The fundamentals of kinematics and kinetics of particle motion are developed including the study of Newton's Laws of Motion, energy methods, impulse and momentum. Students also gain experience with laboratory equipment, experimental methods, team work, project management and communications as they complete laboratory and project assignments. (MCET-220 Principles of Statics with grade of C or better) **Class 3, Rec 1, Credit (S)**

**EMET-419****Experimental Methods for EMET**

This is a course in development of experiments, laboratory techniques and the preparation of laboratory reports. Experiments utilize principles of statics, strength of materials, dynamics, electronics and instrumentation. Students work independently and in groups to prepare formal and informal reports and an oral presentation. (EMET-290 Mechanics for EMET, COMM-203 Effective Technical Communication, STAT-145 Intro to Statistics I) **Class 3, Rec 1 Credit 3 (F, S)**

**EMET-499****EMET Co-op**

One semester of experience in a job related to the student's major. (ENGT-299 Career Orientation and 3rd year status.) **Credit 0**

**Engineering Technology****ENGT-110****Undeclared Engineering Technology Seminar**

This seminar course is designed to introduce students to the technical disciplines in the School of Engineering Technology. Students will learn about the various programs through informational sessions led by faculty from the various programs, tours, presentations by current students and alumni, and assignments developed to assist the students with exploring the different career options. Assignments will be completed both individually and in small teams. Students will be required to demonstrate oral and written communication skills. **Class 1, Lab 1, Credit 1 (F)**

**ENGT-299****Career Orientation**

This course is an introduction to the cooperative educational placement process at RIT, the programs in the department and RIT resources. Topics include engineering technology vs. engineering, review of resources available at RIT, the cooperative education placement process, and the ethical expectations of employers for co-op students and RIT during a job search. **Class 1, Credit 0 (S)**

**Environmental Sustainability, Health and Safety****ESHS-100****Environmental Sustainability, Health and Safety Seminar**

This course will present the key concepts of environmental sustainability, health and safety through experiential learning and the perspective of professional practitioners. Through a series of field trips, presentations, and discussions, students will learn how EHS professionals function in the work environment. **Class 3, Credit 3 (F)**

**ESHS-150****Principles of Environmental Sustainability, Health and Safety**

This course presents an overview of the principles of environmental sustainability, health and safety that allows to think critically about current environmental sustainability, health and safety issues. (First or second-year standing or permission of instructor) **Class 3, Credit 3 (S)**

**ESHS-200****Environmental Geology**

An introduction to geology from an environmental geology perspective, including topics related to sustainability of geologic resources. Basic geology topics include earth materials and internal forces. Environmental topics include erosion, mass wasting, river systems, and environmental sampling. Sustainability of earth resources is explored, including strategic and industrial minerals, and the long-term viability of fossil fuels. ESHS majors must take ESHS-201 Environmental Monitoring and Measurement I. **Class 3, Credit 3 (F)**

**ESHS-201****Environmental Monitoring and Measurement I**

This laboratory course provides students with skills used in geologic investigations and investigations of contaminated sites. Students will learn to describe and analyze surficial and shallow subsurface geological features, and to plan, execute, and interpret sampling events. (ESHs majors must take ESHS-200 Environmental Geology) **LEL 3, Credit 2 (F)**

**ESHS-225****Construction Safety**

This course is designed to cover construction health and safety hazards and will study the OSHA regulations in depth. Students get to handle and investigate construction safety issues. The OSHA standards addressing trench excavation, scaffolding, temporary electric circuits, fall protection, HAZCOM, underground construction are studied. (PHYS-111 College Physics I) **Class 3, Credit 3 (S)**

**ESHS-250****Introduction to Hydrology**

This course will cover most subdisciplines within the broad field of hydrology. Students will learn the theoretical background, and practical applications of selected aspects of the science including the hydrologic cycle, surface water calculations, vadose zone flow, ground-water hydraulics, groundwater monitoring, water chemistry and ground-water contaminant transport. The class culminates in an investigation of a mock contaminated site in which the students apply aspects of all of the above mentioned topics. Hydrology has important applications for environmental managers, and these applications will be highlighted in the class. (ESHs majors must take ESHS-251 Environmental Monitoring and Measurement II) (PHYS-111 College Physics I, ESHS-200 Environmental Geology) **Class 3, Credit 3 (S)**

**ESHS-251****Environmental Monitoring and Measurement II**

This laboratory course provides students with skills used in hydrologic investigations and investigations of contaminated sites. Students will learn field skills to support surface water investigations, groundwater investigations, and investigations of contaminated sites. Students will also learn to specify sampling any chemical analysis for contaminated sites, and to use common air and water quality field analytical instruments. (ESHs majors must take ESHS-250 Intro to Hydrology) **Rec 1, Lab 3, Credit 2 (S)**

**ESHS-310****Solid and Hazardous Waste Management**

An examination of strategies and technologies to move an organization toward environmental sustainability, including: resource use reduction, material substitution, process and product modification, and waste minimization; and for handling and managing wastes including: treatment, storage, transport and disposal storing solid and hazardous waste. Associated environmental impacts, regulatory concerns, technical feasibility and costs are considered. (ESHs-150 Principles of Environmental Sustainability, Health and Safety, CHMG-112 General Organic Biochemistry II or permission of instructor) **Class 3, Credit 3 (S)**

**ESHS-320****Occupational Safety**

This course is an overview of the occupational safety management tools and techniques utilized in today's industry. Topics examined include OSHA requirements, recordability and safety indices; guarding; electrical and material handling; welding, fire prevention; excavation; medical surveillance and worker's compensation; inspection techniques and auditing; committees; incentives and voluntary programs. (ESHs-150 Principles of Environmental Sustainability, Health and Safety, CHMG-111 General Organic Biochemistry I, PHYS-111 College Physics I or permission of instructor) **Class 3, Credit 3 (S)**

**ESHS-330****Industrial Wastewater Management**

This course investigates characteristics and sources of industrial wastewaters, related environmental impacts, regulatory implications, and technical considerations of current treatment and disposal methodologies. Students learn to identify appropriate methods, technologies and sequences for source reduction, treatment and pretreatment, direct discharge and management of treatment residuals. (ESHs-150 Principles of Environmental Sustainability, Health and Safety, CHMG-112 General Organic Biochemistry II or permission of instructor) **Class 3, Credit 3, (F)**

**ESHS-340****Occupational Health**

This course will provide students with the fundamentals of industrial hygiene and public health. Emphasis will be on the toxicological effects of various chemical, biological and physical insults on the body; monitoring and personal sampling for these substances and personal protection and controls against such substances (ESHs-150 Principles of Environmental Sustainability, Health and Safety, CHMG-112 General Organic Biochemistry II, MEDS-102 Human Biology II or permission of instructor; corequisite ESHS-341 Occupational Health Lab) **Class 3, Credit 3(F)**

**ESHS-341****Occupational Health Lab**

Hands-on practical hazardous material response. Students who complete the course will receive OSHA HAZWOPER 40 hour certification. (Corequisite ESHS-340 Occupational Health) **Lab 1, Credit 1 (F)**

**ESHS-350****Air Emissions Management**

This course will present an overview of industrial air pollution management; its sources, methods of reduction, control and management. Students will become familiar with the history of air pollution, the chemistry and effects of pollutants, regulations and standards, and control technologies; as well as developing analytical and quantitative skills necessary in air emissions management decision-making. (ESHs-150 Principles of Environmental Sustainability, Health and Safety, CHMG-112 General Organic Biochemistry II or permission of instructor) **Class 3, Credit 3 (S)**

**ESHS-460****EHS Accident Causation and Prevention**

Historical and modern accident and incident causation models and theories will be covered. Students will learn how to identify and prevent unsafe acts and conditions that can lead to accidents and incidents. The application of management system controls, including operational controls to prevent accidents and incidents will be reviewed. In addition, students will learn how to investigate accidents and incidents and how develop accident and incident investigation written programs. (ESHs-320 Occupational Safety and fourth- or fifth-year standing or department permission) **Class 3, Credit 3 (F)**

**ESHS-480****EHS Law**

An overview of environmental, health and safety (EHS) related law with an emphasis on legislative law. Topics include a review of the historical and modern sources for EHS law, the emergence of administrative law and the responsibilities of the separate branches of government. Major EHS related legislation will be covered. (Open only to fourth or fifth year ESHs majors or permission of instructor) **Class 3, Credit 3 (S)**

**ESHS-500****Social Responsibility and Environmental Sustainability**

This course will introduce social responsibility concepts and approaches presented in key documents like the ISO 26000 Social Responsibility Standard and the Universal Bill of Human Rights, and will explore the web of relationships in which an organization or a community exists, with the objective of providing the foundational knowledge necessary to plan a strategy for closing the gap between the activities, products and services of the organization or community and the ecosystem within which it exists. (Fourth-year status in ESHs or permission of instructor) **Class 3, Credit 3 (F)**

**ESHS-501****Fire Protection**

Introduces fundamental concepts in protection of industrial workers and property from fire and explosion. Fire chemistry, control of ignition sources in industry, and properties of combustible materials are discussed. Fire detection and extinguishment are covered along with building construction for fire prevention, life safety, fire codes and related topics. **Class 3, Credit 3 (F)**

**ESHS-515****Corporate EHS Management**

Presents the fundamentals of how companies manage their environmental, health and safety (EHS) issues. EHS motivations and strategies for corporate environmental management will be explored. Organizational considerations for managing corporate EHS programs will be identified. Total quality management and its applications to corporate EHS problem solving will be introduced. The basic elements of EHS management systems will be reviewed. EHS training and corporate EHS reporting will also be examined. (Open only to fifth-year Environmental Sustainability, Health and Safety majors, ESHS-460 EHS Accident Causation and Prevention, ESHS-480 EHS Law, or permission of the instructor) **Class 3, Credit 3 (S)**

**ESHS-530 Mechanical and Electrical Controls and Standards**  
Discussion of machine safety with emphasis on hazard analysis, risk estimation, safeguarding techniques, and electrical safety. Particular attention will be paid to applicable OSHA, ANSI, NFPA, and EN standards as they relate to wood, metal, films and automation. Elements of the course will change regularly to reflect emerging issues in industry. **Class 3, Credit 3 (F, S)**

**ESHS-544 Remedial Investigation and Corrective Action**  
Describes the sequence of events required to investigate, conduct feasibility studies and identify appropriate corrective actions at hazardous waste sites. Explains the process flow logistics, concepts and rationale behind each action. Explores current issues of how clean is clean? Students learn to develop conceptual site characterization plans; effective RI/CA proposals; review and evaluate work plans, procedures and operations plans, and contingency plans (ESHS-310 Solid and Hazardous Waste Management, ESHS-330 Industrial Wastewater Management, ESHS-350 Air Emissions Management or permission of instructor) **Class 3, Credit 3 (S)**

**ESHS-550 Project Management**  
This course has been designed to give the student an overview of the fundamental concepts of modern project management. Areas of focus include the project life cycle (PLC), the project management body of knowledge (PMBOK), program evaluation review technique (PERT), critical path method (CPM) and various budgeting and resource allocation techniques. Discussion of project management organizations, negotiation and conflict resolution and project termination will be included, along with an introduction to Project Management Institute (PMI) and Microsoft Project for Windows. (ESHS enrollment) **Class 3, Credit 3 (S)**

**ESHS-590 Capstone Project**  
This is a faculty-designed capstone team project course for ESHS seniors. It presents students with one or more identified EHS need(s) and challenges them to work together to plan, schedule and carry out a project to design and develop socially responsible and environmentally sustainable solutions. The project may vary from offering to offering reflecting current trends and developments. (ESHS-500 Social Responsibility and Environmental Sustainability and fifth-year standing in ESHS) **Class 3, Credit 3 (S)**

## **Hospitality Tourism Management Food Management**

**FOOD-111 Food Identification and Assessment**  
The focus of this course is on experiencing essential aspects of important food categories. The experiences will include tasting and touching the foods, describing the sensory characteristics of each, observing aspects of production and preparation, and hands-on opportunities for cooking. The food items will be related to the nutrition guidelines of the USDA and to current and anticipated food trends and issues. Projects, videos, and guest speakers will be used to maximize student learning. Because foods are rarely eaten alone, information on pairing of various food items with each other and with wines will be included. Food categories will include fruits, vegetables, meats, seafood, dairy products, oils, chocolate, breads, pasta, grains, and rice. Common specifications, safety issues, cultural connections, and information on processing will be covered as appropriate to each category. **Lec/Lab 4, Credit 3 (F, S)**

**FOOD-121 Principles of Food Production**  
Introduction to the basic principles involved in the preparation of high quality food. Topics include product identification, market forms, varieties, availability, composition, standards of quality, preparation techniques, and function of foods and ingredients. Standard methods of preparation will be introduced. Professionalism in appearance and work habits, self-organization, management, teamwork, and techniques for efficient food production are stressed. Uniforms, lab fee, and knife set are required. **Lec/Lab 6, Credit 3 (F, S)**

**FOOD-123 Sanitation and Safety**  
A discussion of current problems confronting the industry as a result of the most recent legislative developments as they relate to food safety and health around the globe. Material will focus on current regulations as per the latest Food Codes. Topics include Hazard Analysis Critical Control Point (HACCP) procedures, kitchen safety, and facility sanitation. Students will take the National Restaurant Association ServSafe Examination upon completion of the course and receive a ServSafe certificate if they score 75 or better. **Class 1, Credit 1 (F)**

**FOOD-151 International Food Distribution**  
The course will focus on the economic geography of food production and the associated economics of physical distribution and market structure. Special emphasis will be placed on examining the impact multinational food companies have on international distribution channels. The sourcing, purchasing and synergy strategies of multinational companies will be considered in conjunction with the economic principles supporting strategy formulation. Special emphasis will be placed on the role of commodities, food processing, packaging, and retail operation in the value-added chain. **Class 3, Credit 3 (F)**

**FOOD-153 Foods of the World**  
This course is an introduction to the foods of many regions of the world. Indigenous ingredients and geographical influences on the development of each regional cuisine are included. Food customs and special food preparation techniques of the various cultures are addressed. A lab fee is required. **Lec/Lab 2, Credit 2 (F, S)**

**FOOD-161 Wines of the World I**  
This course is an introduction to global wine history, vineyard methods, production techniques, grape characteristics, sensory evaluation, marketing and distribution. A lab fee is required **Lec/Lab 2, Credit 2 (F, S)**

**FOOD-162 Wines of the World II**  
This course builds on what was learned in Wines of the World I. More in depth exploration of global wine history, vineyard methods, production techniques, grape characteristics, sensory evaluation, marketing and distribution. Like its sister courses, Beers of the World, Foods of the World and Wine and Food Pairing, there are weekly tastings and recommendations on pairings. This provides practical applications for daily use in personal and business situations. A lab fee is required. **Lec/Lab 2, Credit 2 (F, S)**

**FOOD-165 Wine and Food Pairing**  
This course is an introduction of pairing food with wine and other beverages. Students will experience "What grows together, goes together," and discover how regional wines and food pairings have a natural affinity for one another. Students will design their own menu and keep a tasting journal. This course experience includes sampling of food and wine, cooking demonstrations, and guest speakers. Lab fee required. **Lec/Lab 2 Credit 2**

**FOOD-171 Introduction to Viticulture and Viniculture**  
An in-depth, hands-on exploration of vineyard practices, grape growing and winemaking techniques. This course focuses on the cool-climate, Finger Lakes wine region and includes several visits to local vineyards, wineries and businesses for hands-on experiences. Possible participation in aspects of harvest, processing of fruit and winemaking processes while learning from industry leaders. Speakers will illuminate how decisions are made involving start-up, finances, the science involved in production, marketing and more in their various industries. There will be tastings of grapes, unfinished and finished wines. A group winemaking project allows further exploration. A lab fee is required. **Lec/Lab 3, Credit 3, (F)**

**FOOD-173 Beverage Fermentation and Distillation**  
Exploration of traditional and emerging trends in fermentation and distillation of beverages. In addition to in-class lectures, group and individual presentations, this course will include visits to local businesses for hands-on experiences involving beer, wine and spirits. Speakers will illuminate how decisions are made involving start-up, finances, the science involved in production, marketing and more in their various industries. There will be tastings of wines, beers and spirits. An individual innovative project allows in-depth exploration of wine, beers and spirits in or outside their own field of interest. This provides practical applications for daily use in personal and business situations. A lab fee is required. **Lec/Lab 3, Credit 3 (F)**

**FOOD-175 Marketing Wine, Beer, and Spirits**  
This course will focus on understanding how to develop a marketing strategy and plan to bring products to market. The specific focus will be on marketing wine, beer and spirits. In addition to understanding how to build a marketing plan, this class will also analyze the trends within wine, beer, and spirits. There are field trips, guest speakers and tastings of wine, beer and spirits throughout the course. This provides practical applications for daily use in personal and business situations as well as co-op and job opportunities. A lab fee is required. **Lec/Lab 3, Credit 3 (S)**



**FOOD-223** **Food and Beverage Management**  
An introductory course covering the basic principles involved in the management of food and beverage operations. Topics include food and beverage marketing, menu planning, nutrition principles, staffing, food cost, production and preparation procedures, service and design. Both commercial and non-commercial food operations will be discussed. **Class 3, Credit 3 (S)**

**FOOD-224** **Serving Alcohol Safely**  
Responsible alcohol service is an issue that touches businesses, guests and their communities. It is a vital part of running a successful hospitality operation. Students can earn the National Restaurant Association's ServSafe Alcohol certificate. **Class 1, Credit 1 (S)**

**FOOD-226** **Restaurant Operations**  
Entry-level production and service skills for line positions currently used in the hospitality industry. Laboratory assignments are in the operation and maintenance of Henry's, an RIT full-service restaurant modeled after industrial, hotel, and restaurant operations. Students are assigned on a rotating basis to positions based on defined job descriptions in production and service. (FOOD-121 Principles of Food Production and FOOD-123 Sanitation and Safety) Uniforms required. **Class 0, Lab 12, Credit 4 (F)**

**FOOD-251** **Commodity Market Analysis**  
Commodity Market Analysis is dedicated to developing a thorough understanding of commodity groups, their supply and demand characteristics, associated import/export policies and the contractual environment. Students will be introduced to the sources of commodity information and trading systems and the economic function of commodities. Various commodities and world events influencing them will be followed throughout the semester. **Class 1, Credit 1 (S)**

**FOOD-325** **Food Innovation and Development**  
Students will explore their creativity through instructor- and student-planned food experiments involving sensory and objective evaluation of food quality, recipe development, problem-solving, experimental design, and written and oral communication of research. Individual research projects focus on assessing new ingredients or technologies, creating new products, and/or evaluating the marketability of a new product. (FOOD-121 Principles of Food Production; third-year status, or permission of instructor) Uniforms and lab fee required **Lec/Lab 6, Credit 3 (F, S)**

**FOOD-413** **Restaurant Management**  
This course is designed to develop entry-level competence in food system management. Students will operate a restaurant with full beverage service. The student will display knowledge and skilled gained from previous course prerequisites as they rotate through managerial positions. The student will be exposed to four major areas: The planning function, organizational function, leadership function, and control function. Computer (micros) utilization will be integral part of the course. (FOOD-226 Restaurant Operations) **Lab 12, Credit 3 (F, S)**

**FOOD-454** **Food Processing Quality and Integrity**  
Traditional and contemporary processing methods will be introduced with emphasis on applications to food retail operations. The effect of these technologies on the storage life and sensory qualities of the products will be examined along with common modes of loss of quality in foods. Students will be introduced to industry-standard quality assurance measures. **Class 3, Credit 3 (S)**

**FOOD-508** **Beers of the World**  
An introduction to Beers: History, the brewing process, distribution systems, production, flavor characteristics, partnering with foods, handling and serving techniques. Beers produced from the major beer brewing centers of the world will be tasted and compared with similar brews from different countries. The way alcohol is processed in the human body is considered as well as the economic impact of brewing and distributing beer will be explored. A lab fee is required. **Lec/Lab 2, Credit 2 (F, S)**

**HSPT-181** **Principles of Food, Hotel, and Tourism Operations**  
This course introduces the student to the terms and concepts associated with the food, hotel, and tourism industries. The following distinctive operations will be explored; resorts, restaurants, catering, institutional foodservice, transportation, attractions, and events. The fundamental service philosophy behind the service sector will be introduced. **Class 3, Credit 3 (F)**

**HSPT-116** **Selected Topics**  
This is an innovative course not currently in the approved curriculum. When the topic and course outline are approved by the department chair, the course will be available to students for registration. The course may be taken more than once since many topics can be offered under this course number and title. **Class 1-3, Credit 1-3 (F, S)**

**HSPT-131** **Hotel Management and Operations**  
This course introduces the student to the distinctive nature of the hospitality industry. Students learn about the various venues of business in the hospitality industry with a main focus on a 300-room full-service hotel operation. Students analyze hotel case studies at the RIT Inn with the interaction of RIT Inn management. The course blends classroom learning with applied learning. Students focus on the business management of hotels by learning the specific terminology and language that relates to successful hotel management and leadership. **Class 3, Credit 3 (F)**

**HSPT-212** **Franchising in the Service Sector**  
Franchising has been a successful method for business expansion. This course covers the advantages and disadvantages of franchising as well as the factors in obtaining, developing, and operating a franchise operation that meets specific customer needs. Legal and financing issues are also covered. Major project developing a franchise plan is required. **Class 4, Credit 3 (S)**

**HSPT-219** **Independent Study**  
This course provides for independent study in approved subject areas that have specialized value to students. Proposals for independent study must be approved by a supervising faculty member prior to registration. This course may be taken more than once for 1-3 credits. **Credit 1-3 (All semesters)**

**HSPT-232** **Hospitality Real Estate and Facilities Management**  
Students will learn the criteria that owners and developers follow in developing hotel concepts and locating them in key markets where they will succeed. Students will also learn the steps in site selection, working with the trades in the construction phase, and turning the operation over to management. At the operation phase an engineering and maintenance department will be created to keep the property running efficiently and effectively for guest and employee safety and for cost efficiency. Special topics covering replacement and renovation will be addressed. The management incentives for creativity and innovation in technology and best practices will be a concurrent theme. (HSPT-131 Hotel Management and Operations) **Class 3, Credit 3 (F)**

**HSPT-234** **Negotiation and Conflict Resolution**  
Everything in our lives today is a negotiation, from resolving conflicts with family members, dorm mates and fellow students to employees, employers and organizations. This is complicated by the fact that we live in a global environment facing intercultural issues daily. This course will identify the students' preferred styles of negotiation, how to identify the strategies and styles of others and most importantly how to work innovatively with the other person in a conflict to establish a resolution to the problem. The course deals with competitive negotiations and collaborative negotiations, and how to engage successfully in each type. **Class 3, Credit 3 (S)**

**HSPT-235** **International Destinations**  
This course introduces the student to the most famous travel destinations outside the United States. Specific emphasis is placed on understanding the cultural and political differences present at these locations and what makes them unique. Students explore the role governments and the media play in generating destination appeal. How international destinations are growing and declining as it relates to the industries of hospitality and tourism are explored, with emphasis on working abroad. **Class 3, Credit 3 (F)**

**HSPT-244** **Meeting and Event Management**  
As companies and associations continue to grow they find their members are an increasingly diverse group from many geographic areas. While texting and email are ways to keep informed, the need to meet and discuss, in real time, what needs to be done has actually increased. Meetings today help us celebrate meaningful events, change the way people behave, motivate employees to perform better and solve problems by bringing together ideas from many different cultures. The meeting and event planner of today must know how to plan, execute and evaluate any event to show value to the stakeholders. This course shows the student how to go about doing this, from writing a purpose and goals for the meeting to financial break downs and gathering feedback, all while staging the event of a life time, over and over again! **Class 3, Lab 0 Credit 3 (S)**

**HSPT-246 Casino Management**  
This course is designed to give students an introduction to the casino environment. Students will have a strong working knowledge of casino operations and the interrelationship of the casino with other major departments (lodging, food, beverage, entertainment, etc.). Topics include casino marketing strategies, gaming regulations, economic impact issues, history of gaming in America, design and layout of casinos, surveillance, back-office procedures, and gaming regulations. This course will teach casino games. **Class 4, Credit 3 (S)**

**HSPT-248 Project Management for Events**  
This course is responsible for the development, planning and implementation of the department of hotel, tourism management's annual black tie dinner to benefit the RIT Hospitality Education fund. This event, known as the "Puttin' on the Ritz," is managed and staffed entirely by students as a way to showcase and practice the skills learned while attending RIT's hospitality program. Students gain a greater understanding of the aspects associated with project management for upscale fine dining events. **Class 2, Lab 2, Credit 3 (F)**

**HSPT-281 Service Management in a Global Economy**  
There are almost no businesses today that do not require some sort of service delivery package for the consumer. This course focuses on how a business identifies, qualifies, and measures a service as the main product of its operations. While a tangible product may also be involved, this class focuses on the service component. As companies globalize the need to provide service at different levels is compounded by the need to consider alternate distribution systems. This course follows service from its conceptual start, through its packaging, delivery and quality control systems. We also consider the implications of the experience economy. **Class 3, Credit 3 (S)**

**HSPT-284 Hospitality Industry Sales and Marketing**  
This course introduces the student to the application of marketing concepts in hotel, food and beverage, and visitor industry operations. Included are hotels, restaurants, catering establishments, and clubs. This is accomplished by defining the marketing function, promotional strategies, marketing plan organization, sales office work flow, customer contact methods, and servicing procedures for attracting and exceeding customer needs in an increasingly competitive and changing economic environment. (HSPT-181 Principles of Food, Hotel, and Tourism Operations) **Class 3, Credit 3 (S)**

**HSPT-334 International Resort Management**  
The course gives the student an understanding of how resorts and their recreational amenities are developed as tourist and business destinations. Focus is on the planning, development, operation, design, and special needs of golf, ski, marina, tennis, and spa operations. As part of this study, students select a specific type of property and analyze the methods used to develop, manage, and innovate the property's service offering. **Class 3, Credit 3 (S)**

**HSPT-336 International Risk Assessment and Hospitality Law**  
This course introduces the student to contract, tort, bailment and agency law as they relate to the hospitality industry and apply to international operations. It also explores the role of insurance and contracts in accepting, transferring or avoiding risk. The course covers the legal rights and responsibilities of patrons and owners as they relate to public accommodations, providers of transportation and livery and common law. The course focus is on civil rather than criminal law. It enables students to develop a preventative attitude toward liability and assumption of responsibilities. **Class 3, Credit 3 (F)**

**HSPT-345 Venue Management**  
This course provides students with an understanding of the unique management issues facing the operation of the following entertainment venues: sports stadiums, performing arts centers, race tracks, and conventions centers. Students will use local venues as case studies and conduct site visits to sports team facilities, concert venues and the city convention center. Local promoters will expose students to booking and legal process of attracting entertainment to a venue. **LEL 3, Credit 3 (F)**

**HSPT-372 Hospitality Entrepreneurship in the Global Economy**  
Entrepreneurship in hospitality and tourism is recognized as providing many benefits, including economic growth, job creation, and innovation, to regions and economies. This course will provide an introduction and overview to entrepreneurship in the hospitality industry and the creation of new enterprises at the national, firm and individual levels. Various models and case studies from the world of hospitality will be employed to analyze opportunities and to provide real world, global hospitality examples of relevant issues. Venture financing and entrepreneurial strategies for hospitality businesses will receive particular attention. Significant time will be devoted to translating entrepreneurs' (students') visions and identified hospitality-related opportunities into creating a business plan. This business plan will provide a blueprint for starting and running a new hospitality enterprise. The focus will be on developing a viable "real world" hospitality venture with practical considerations that is supported by financial modeling and projections. (ACCT-110 Financial Accounting) **Class 3, Credit 3 (F)**

**HSPT-374 Hospitality Enterprise Management And Growth**  
Enterprises in hospitality and tourism pass through many stages as they grow from a start-up to a mature organization. This course highlights what must be accomplished during each stage to ensure that hospitality business development is continued and sustainable. The critical point of the course is to give students an in-depth understanding of tools and skills necessary to create and grow a successful new tourism or hospitality enterprise with potential to expand. Students will actively discuss concepts and possible alternatives in operating hospitality- and tourism-based enterprises. (HSPT-372 Hospitality Entrepreneurship in the Global Economy ) **Class 3, Lab 0, Credit 3 Spring**

**HSPT-381 Technology in Service Systems**  
Predicting the future... Adapting to change... Connecting and communicating... Lifelong learning... A fundamental societal revolution is changing the nature of work and leisure. Explore the emerging and future work worlds, consumer trends, and the technologies that are changing the way society works. Emphasis is on technologies impacting the food, hotel and travel service industries. Technologies explored may include those associated with communication, information retrieval, imaging, marketing, employee training, product quality, production customization, customer service, security, health, entertainment, and customer interface, as time permits. Student teams will chart the flow of product/service systems and identify innovative technologies to enhance the quality of service and creatively meet the needs of customers and emerging trends. Individual and team web sites will be constructed. **Class 3, Credit 3 (F, S)**

**HSPT-383 Assessing and Improving Service Quality**  
Quality is essential in all sectors of the economy, especially service and health care. The course lays a foundation for the use of quality tools and processes needed for improvement and innovation. The course teaches quality tools and processes which will be used in other HSPT courses (like Senior Project). Topics range from a general overview of quality systems (like TQM, QFD, and six sigma) to specific quality tools (like Pareto charts and activity network diagrams). The course sets the foundation for Senior Project (HSPT-490). (HSPT-281 Service Management in a Global Economy, STAT-145 Intro to Statistics I) **Class 3, Credit 3 (F, S)**

**HSPT-384 Financial Concepts For Hospitality Managers**  
Students will apply accounting and finance concepts to hospitality industry business systems. Hospitality industry case studies will involve analysis of balance sheets, profit and loss, cash flow, budgeting, and cost control methods. Financial ratios important to the lodging and food service industries such as RevPar, food and beverage cost percentages, room occupancy , and average daily room rates will be examined. (HSPT-181 Principles of Food, Hotel, and Tourism Operations, ACCT-110 Financial Accounting) **Class 3, Credit 3 (S)**

**HSPT-475 Responsible Entrepreneurial Leadership for the Hospitality Industry**  
This course teaches students how to become entrepreneurial leaders who focus on hospitality organizations of today and prepare for future challenges of designing effective hospitality organizations. The following topics will be explored: hospitality organizations of the future, entrepreneurial leadership traits, creating an enterprising culture in the hotel industry, lessons from hospitality leaders. **Class 3, Credit 3 Spring**

**HSPT-477 Marketing for Entrepreneurs in the Hospitality Industry**  
This course examines the merger of two traditionally distinct areas of study: marketing and entrepreneurship. Whereas marketing research and texts commonly examine established firms and entrepreneurship addresses new enterprises, entrepreneurial marketing blends the two areas of research and considers marketing in hospitality and tourism new enterprises. Distinct differences between traditional marketing and entrepreneurial marketing techniques will be discussed within the context of tourism and hospitality sectors. The unique, proactive and innovative nature of entrepreneurial marketing will be explored through lectures and case study analyses of hospitality firms. The course project provides for application-based learning and field-based research. (HSPT-284 Hospitality Industry Sales and Marketing) **Class 3, , Credit 3 (F)**

**HSPT-481 Leadership Innovation in Service Industries**  
As future leaders in the hospitality and service industry students will be called upon to create innovative organizational forms that are flexible enough to change with the demand and information so essential for success. In this course students examine their style of leadership. It also examines how the values, beliefs, expectations and assumptions of the members of the organization affect the style of leadership that best suits the company. In addition students analyze current leadership theory and how people learn to progress effectively as future leaders in the hospitality and service industries. **Class 3, Credit 3 (F, S)**

**HSPT-490 Senior Project**  
This is a capstone course requiring students to integrate skills and knowledge from other courses by conducting research into an area of professional interest or concern in hospitality or health care. The project incorporates gathering primary data, assessing and summarizing the data, and drawing conclusions from the data. The conclusions drawn form the foundation for recommendations for innovation and improvement. (HSPT-383 Assessing and Improving Service Quality, **Class 3, Credit 3 (F, S)**)

**HSPT-499 HSPT Co-op**

## Human Resource Development

**HRDE-386 Human Resources Development**  
A one-semester, three-credit course in human resource development provides the prospective manager practical information on methods to enhance the productivity, quality, and effectiveness of an organization through the creation of an environment where individual and collective performance and development has primacy. The course requires students to assimilate course material related to the following: to organizational strategy, systems thinking and legal compliance; workforce development, career development of employees; individual development and training; measuring outcomes; human resource processes and effective communications. Students integrate theoretical classroom concepts with practical knowledge and work experiences. As part of the course: students continually practice effective communication skills; students may work in teams; and are expected to engage in critical and innovative thinking. Students' understanding of human resource development is intended to help them enhance organizational effectiveness through implementing processes designed to develop and train employees. **Class 3, Credit 3 (F, S)**

## Manufacturing Engineering Technology

**MFET-120 Manufacturing Processes**  
This course will focus on the understanding and application of manufacturing processes. Students will be challenged to discover and learn how typical piece parts and assemblies are manufactured. Topics include material properties and the following process families: casting, material removal, deformation, consolidation, powder metallurgy, plastics fabrication, EDM, water jet, chemical, LASERS, plasma, and rapid prototyping. **Class 3, Credit 3 (F, S)**

**MFET-340 Automation Control Systems**  
This course will provide a thorough understanding of the manufacturing automation principles, practices and system integration. Topics include a thorough coverage of the automation hardware and software, essentials of digital and analog control using Programmable Logic Controllers (PLCs), industry best practices for programming PLCs and the essentials of Human Machine Interface (HMI) for data entry, manipulation and recording system status. (EET-215 Circuits and Electronics or EET-111 DC Circuits; corequisite MFET-341 Automation Control Systems Lab) **Class 3, Credit 2 (F, S)**

**MFET-341 Automation Control Systems Lab**  
This course will provide a thorough hands-on experience in using Programmable Logic Controllers (PLCs) for manufacturing automation and system integration. Industry best practices for programming PLCs and the essentials of Human Machine Interface (HMI) for data entry, manipulation and recording system status will be included. (EET-215 Circuits and Electronics or EET-111 DC Circuits; corequisite MFET-340 Automation Control Systems) **Lab 2, Credit 1 (F, S)**

**MFET-345 Electronics Manufacturing**  
This course provides a thorough understanding of the technology, components, equipment, and manufacturing process for through hole technology and surface mount technology electronics manufacturing. Students will develop a strong foundation needed for advanced work in surface mount technology (SMT). (PHYS-111 College Physics 1; corequisite MFET-346 Electronics Manufacturing Lab). **Class 3, Credit 2 (F)**

**MFET-346 Electronics Manufacturing Lab**  
The laboratory activities will provide the students an orientation and familiarization of the manufacturing equipment and process parameters for electronics manufacturing including through hole technology and surface mount technology. (PHYS-111 College Physics I; corequisite MFET-345 Electronics Manufacturing) **Lab 2, Credit 1 (F)**

**MFET-420 Quality Engineering Principles**  
This course is designed to introduce the student to techniques required to maintain and improve quality within manufacturing organizations and the service sector through the use of statistical methodologies. The course covers concepts of quality, quality managements and assurance, product quality, design of quality control chart, statistical process control, and quality improvement through design by considering concept development and implementation. Traditional and modern quality systems will be discussed including the work of such quality gurus like Taguchi, Deming, Juran, and Shewhart. (STAT-146 Introduction to Statistics II) **Class 3, Credit 3 (F)**

**MFET-436 Engineering Economics**  
This course provides in depth coverage of Engineering Economic analysis, which is the financial side of engineering decision making. Students are also taught ethical decision making through an introduction to an engineering professional code of conduct. Project planning/management are introduced to students. Presentation skills are enhanced with an emphasis on presenting to executives. (MATH-111 Precalculus or higher) **Class 3, Credit 3 (F, S, Su)**

**MFET-445 Robotics and Automation**  
This course will provide coverage of Robotics applications, programming and tooling, as well as computer numerical control (CNC) tool path creation for machining operations. (MCET-220 Principles of Statics; corequisite MFET-446 Robotics and Automation Lab) **Class 3, Credit 2 (F)**

**MFET-446 Robots and Automation Lab**  
This laboratory course provides hands on experience with Robotics and CNC in manufacturing. (MCET 220 Principles of Statics; corequisite MFET-445 Robots and Automation) **Lab 2, Credit 1 (F)**

**MFET-450 Lean Production and Supply Chain Operations**  
This course is designed to provide the student with knowledge of contemporary theories and practices of operations management employed by world class manufacturing and distribution organizations. Topics include TQM, MRP, JIT, lean manufacturing, six sigma, theory of constraints, work simplification and operations research. (STAT-145 Introduction to Statistics I) **Class 3, Credit 3 (S)**

**MFET-456 Advanced Concepts in Electronics Packaging**  
The advanced course in electronics packaging will provide a thorough coverage of the materials, processes, failure and reliability of chip level and PCB level packaging. Specific topics include single-chip, multi-chip, wafer level and 3D stacked packaging, smaller passives and embedded passive component technology, advanced substrates and microvia technology, solder technologies, metallurgy and joint formation, thermal management, thermal and mechanical behavior of packaging, failure analysis and reliability testing. (MFET-345 Electronics Manufacturing or equivalent experience, graduate standing or BS/MS student fourth-year standing) **Class 3, Credit 3 (S)**

**MFET-460 Integrated Design for Manufacture and Assembly Manufacturing**

Integrated Design for Manufacture and Assembly Manufacturing processes are expanded and applied to the design process. Part concepts will be considered for various manufacturing processes to determine which process will yield the lowest cost part that meets all product functional requirements. Students will learn the DFMA methodology for making decisions to analyze the costs associated with their product concepts. Designs will consider the tooling that is required in product build and will understand the interrelationships between decisions and the cost associated with manufacture and service of the product. At the conclusion of the course students will be able to effectively design parts and assemblies for manufacture, assembly, and service. Costing will be considered at every step of the design process. **Class 3, Credit 3 (S)**

**MFET-499 MFET Co-op**  
One semester of experience in a job related to the student's major ENGT-299 Career Seminar and third-year status) Credit 0 (Completion of Co-op Orientation (0606-099) required before registering for co-op)

**MFET-580 Production Systems Design**  
Production Systems Design and Production Systems Development together form Manufacturing Engineering Technology Senior Project. Students will design and produce a product, and a work cell for manufacturing and packaging the product. Students will practice project planning and communication while drawing on their technical skills to complete the project. The student will be provided material/knowledge on the design and evaluation of manufacturing systems and the use of computers in support of integrated product design, development and manufacturing activities. Group technology, process planning, shop floor control, concurrent engineering and flexible manufacturing systems are the principal topic areas. Communication amongst team members and the project advisor about expectations and performance is essential. Design, final documentation, and demonstration of successful operation are required (at the end of the corequisite sequence). (MFET-340 Automation Control Systems, MFET-445 Robots and Automation, MFET-460 Integrated Design for Manufacture and Assembly; corequisite MFET-590 Production Systems Development) **Class 3, Credit 3 (S)**

**MFET-590 Production Systems Development**  
This course focuses on the integrated design, process development, and assembly of fully functional automated workcell and product. Process improvement becomes inherent in the integrated activities. Business style communication amongst team members and the project advisor about expectations and performance is essential. Design, final documentation, and demonstration of successful fully functional automated workcell and assembly of a product are required. (MFET-340 Automation Control Systems, MFET-341 Automation Control Systems Lab, MFET-445 Robots and Automation, MFET-446 Robots and Automation Lab, MFET-460 Integrated Design for Manufacture and Assembly; corequisite MFET-580 Production Systems Design) **Class 3, Credit 3 (S)**

## **Mechanical Engineering Technology**

**MCET-101 Fundamentals of Engineering**  
This course will introduce students to the field of mechanical engineering technology through an exposition of its disciplines, including basic mechanics, fluid power, and energy. Students will be introduced to design and engineering problem solving methods that will be applied to problems in the aforementioned topic areas. Students will analyze data, perform design calculations, solve equations, and program devices. Project reports are generated through the integration of these tools with word processing and presentation software. The application of software tools to the engineering design process will be emphasized throughout. **Class 3, Rec 1, Credit 3 (F)**

**MCET-110 Foundations of Materials**  
This class explores the commonly used engineering materials. Differentiation of material families is made based on an understanding of fundamental material properties. This knowledge of properties and material families then informs analysis of which materials are selected for various applications. Materials selection software and internet resources are used. (Corequisite MCET-111 Foundations of Materials Lab) **Class 2, Credit 2 (F)**

**MCET-111 Foundations of Materials Lab**  
This lab class accompanies MCET-110 Foundations of Materials. An emphasis is placed on determining material properties through experimentation and references, and analyzing why a particular material was selected for an application based on the materials properties. Differentiation of materials families is made based on properties. A variety of discovery activities are used to explore the world of materials, including reverse engineering, labs of various types, materials selection software, and internet resources.; corequisite MCET-110 Foundations of Materials) **Lab 2, Credit 1 (F)**

**MCET-150 Mechanical Design and Fabrication**  
A course that integrates basic engineering techniques. These topics will emphasize the design of components through the use of solid modeling, dimensioning, tolerancing, GD & T, and statistics. Students will be expected to build, inspect, and integrate their designs. (Corequisite MCET-151 Mechanical Design and Fabrication Lab) **Class 3, Credit 3 (S)**

**MCET-151 Mechanical Design and Fabrication Lab**  
Mechanical Design and Fabrication Lab course topics will be experimentally validated through the creation of mechanical parts that will be assembled into a final product. Traditional machine shop tools will be utilized. Students will demonstrate their abilities to interpret drawings and select the appropriate equipment needed to produce each part. Parts built will be inspected by the student to verify the meeting of part requirements. Students will repair/replace any parts that are found to be out of specifications. Inspection tools will be utilized in the product validation requirement of the course. (Corequisite MCET-150 Mechanical Design and Fabrication) **Class 1, Credit 1**

**MCET-210 Materials in Engineering Design**  
This course will cover the process of selecting a best material for a given design application. To support this process; material families, strengthening mechanisms and degradation mechanisms and prevention will be studied. The materials selection process will include economic, ecological and ethical considerations. An emphasis is placed on the interrelationship of structure, process and properties. This class expands upon concepts presented in MCET-110 Foundations of Materials. (MCET-110 Foundations of Materials, MCET-111 Foundations of Materials Lab; corequisite MCET-211 Materials in Engineering Design Lab) **Class 2, Credit 2 (S)**

**MCET-211 Materials in Engineering Design Lab**  
This course will consist of laboratory experiences which focus on property characterization and effects of processing, strengthening mechanisms and degradation on material properties. (MCET-110 Foundations of Materials, MCET-111 Foundations of Materials Lab; corequisite MCET-210 Materials in Engineering Design) **Lab 2, Credit 1 (S)**

**MCET-220 Principles of Statics**  
This course provides an introduction to the analysis and design of structures and machines. Students learn to calculate unknown forces using the concept of equilibrium and free body diagrams and to calculate simple stresses and deflections for axially loaded members. Topics include forces, moments, free body diagrams, equilibrium, friction, stress, strain and deflection. Examples are drawn from mechanical, manufacturing and civil engineering technology. (PHYS-111 College Physics I with a grade of C or better) **Class 3, Rec 1, Credit 3 (F, S)**

**MCET-221 Strength of Materials**  
This course provides an introduction to the analysis and design of structures and machines. Students learn to calculate stresses and deflections in axially loaded members, beams, shafts and columns. Topics include statically indeterminate problems, thermal stress, stress concentration, combined stress by superposition and Mohr's Circle. Students also gain experience with laboratory equipment, experimental methods, team work, project management and communications as they complete laboratory and project assignments. (MCET- 220 Principles of Statics with a grade of C or better) **Class 4, Rec1, Credit 4 (F, S)**

**MCET-320 Mechanical Dynamics with Applications**  
Principles of engineering dynamics and the solution of practical engineering problems using engineering dynamics are studied. The dynamic analysis of particles and rigid bodies are performed using the three fundamental analytical methods. These include Force-Acceleration, Work-Energy, and Impulse-Momentum methods. An emphasis is placed on the application of these methods to the solution of real engineering problems. In addition, this course introduces the study of vibration in a mass, spring and damper system. Students will evaluate real problems experimentally, analytically and through computer simulation. (MCET-220 Principles of Statics with a grade of C or better grade) **Class 3, Rec 1, Credit 3 (F, S)**

**MCET-330** **Fluid Mechanics and Fluid Power**  
This course involves the study of the basics of fluid power. Areas of study are pressure viscosity, turbulence, flow, thermal properties and displacement. Hydraulic/pneumatic components such as pumps, actuators, valves accumulators, lines, directional controls, sealing devices servomechanisms, hydraulic fluids and fluid containers are studied. (Corequisite MCET-220 Principles of Statics) **Class 3, Rec 1, Credit 3 (F, S)**

**MCET-400** **Experimental Methods for MCET**  
This is a course in mechanical laboratory techniques and the preparation of laboratory reports. Experiments utilize principles of statics, strength of materials and dynamics. Students work independently and in groups to prepare formal and informal reports and an oral presentation. (MCET-320 Mechanical Dynamics with Applications, COMM-203 Effective Technical Communication, STAT-145 Intro to Statistics I) **LEL 3, Rec 1 Credit 3 (F, S)**

**MCET-430** **Thermal Fluid Science I**  
This course provides an introduction to the properties of pure substances, gas laws, first and second laws of thermodynamics, along with an introduction to fluid dynamics are studied and applied. Students learn through an integrated presentation of thermodynamics and fluid mechanics how to approach and solve reasonable thermal-fluid problems. Topics include the first law of thermodynamics, specific heat, ideal gases, work, energy, lumped systems, thermal resistances, fluid statics, conservation of mass/energy, laminar, and turbulent flow. Examples are drawn from mechanical, electrical-mechanical engineering technology. (PHYS-112 College Physics II MCET 330 Fluid Mechanics and Fluid Power with a grade of C or better) **Class 3, Rec 1, Credit 3 (F, S)**

**MCET-450** **Mechanical Analysis and Design I**  
In this course students will investigate how mechanical parts fail: static, fatigue, and surface modes. Students will analyze the stresses, apply failure theories, and design mechanical components to last. The fatigue characteristics for given metal samples will be investigated through experimentation, analysis, and deduction of experimental results. The computer is used extensively in analysis, FEA, and design process. (MCET-221 Strength of Materials with a grade of C or better) **LEL 4, Credit 3 (F, S)**

**MCET-499** **MCET Co-op**  
One semester of appropriate work experience in industry (ENGT-299 Career Seminar and third-year status) **Credit 0**

**MCET-530** **Thermal Fluid Science II**  
This course provides an in-depth coverage on the application of the first and second law of thermodynamics and conservation principles, mass and energy, to the analysis of open systems and power cycles, including refrigeration, heat pump and power cycles. It also introduces the fundamentals of heat transfer theory; conduction, radiation, free and forced convection, and its application to heat exchangers including free surface and conduit flow. Case studies based on real-world thermal systems are used to illustrate the connection between these interdisciplinary subjects. (MCET-430 Thermal Fluid Science I with a grade of C or better or instructor permission) **Class 3, Rec 1, Credit 3 (S)**

**MCET-535** **Thermal Fluid Systems Lab**  
Students perform laboratory experiments in thermodynamics, fluid mechanics and heat transfer. Students will do a group project involving the design/modification/analysis of a Thermo-Fluid system, its instrumentation, method of test, data analysis and final report presentation. Special emphasis is placed on report preparation and computer-aided data reduction. (MCET-530 Thermal Fluid Science II) **Rec 1, Lab 3, Credit 2 (S)**

**MCET-550** **Mechanical Analysis and Design II**  
All machines are comprised of individual components (springs, gears, fasteners, etc.) working together as a system to accomplish a goal. This course integrates the components into the bigger picture of the system. The course culminates in the design and production of a machine. (MCET-450 Mechanical Analysis and Design I; corequisite MCET 551 Mechanical Analysis and Design II Lab) **Class 3, Rec 1, Credit 3 (S)**

**MCET-551** **Mechanical Analysis and Design II Lab**  
All machines are comprised of individual components (springs, gears, fasteners, etc.) working together as a system to accomplish a goal. This course integrates the components into the bigger picture of the system. The course culminates in the design and production of a machine. (MCET-450; corequisite MCET-550) **Lab 2, Credit 1 (S)**

**MCET-560** **Alternative Energy**  
A technical introduction to alternative energy systems in the context of energy economics and conventional energy sources. Topics include solar thermal, PV, wind, ocean current and tides, geothermal, biomass and fuel cells. Project in the course will allow students to develop and test an alternative energy system, component or device. Course is intended as first course in alternative energy for MET students. (Corequisite MCET-530 Thermal Science II) **Class 3, Credit 3 (S)**

**MCET-563** **Power Plants**  
An introduction to industrial electric power generation and distribution. Students will learn about the different types of electric generating plants; steam cycle, combined cycle, gas turbine, Diesel, hydraulic. The electric power grid in North America will be introduced along with new distribution technologies such as 'smart grid,' and high voltage DC. Environmental impacts of all generation processes will be discussed. Regulations and economic aspects of the industry will also be a topic in this course. Field trips to generating plants will be a required part of this course. (Corequisite MCET-530) **Class 3, Credit 3 (S)**

**MCET-567** **Energy Management for HVAC Systems**  
This course employs professional practice to the design of comfort conditioning systems for building environments. The thermodynamics and processes of air heating, cooling, filtering, ventilating and humidity control; the heat transfer of envelopes and the system components required are developed. Those elements and systems are studied in the context of required professional practices and relevant codes to optimize systems and components performance. (Corequisites MCET-530 Thermal Science II, MCET-568 Energy Management for HVAC-Lab) **Class 2, Computer Lab 2, Credit 3 (S)**

**MCET-568** **Energy Management for HVAC Lab**  
This course employs professional practice to the design of comfort conditioning systems for building environments. The thermodynamics and processes of air heating, cooling, filtering, ventilating and humidity control; the heat transfer of envelopes and the system components required are developed. Those elements and systems are studied in the context of required professional practices and relevant codes to optimize systems and components performance. (Corequisites; MCET-530 Thermo II, MCET-567 Energy Management for HVAC Systems) **Lab 2, Credit 1 (S)**

**MCET-569** **Machinery Vibration**  
This course expands students' machine design capabilities to include the effects of vibration. The basic concepts of vibration and noise are covered. Emphasis is placed on machinery design to minimize vibration and the use of vibration and noise for machinery condition monitoring. Environmental tests for vibration, shock, and noise are performed. Measurement tools and computer analysis tools are utilized. (MCET-320 Mechanical Dynamics with Applications with a grade of C or better) **Class 3, Credit 3 (F)**

**MCET-570** **Foundations of Nuclear Energy**  
Foundations of Nuclear Energy is an introduction to the nuclear power industry. The class will cover the history of nuclear power as well as an introduction to the science of radiation and nuclear power plants. The class will finish with the future of nuclear power, both in the US and worldwide. Topics covered in this class will include basic nuclear reactor physics, fission process, nuclear fuel cycle, types of reactors, reactor safety fundamentals, and waste disposal. The class will also discuss the regulations, codes, and standards governing the nuclear industry. (Third-year standing, PHYS-112 College Physics II, MATH-172 Calculus B) **Class 3, Credit 3 (F)**

**MCET-574** **Fiber Reinforced Composites**  
Application-based study of fiber reinforced composites including properties, manufacturing methods and application design. (MCET-210 Materials in Engineering Design; corequisite MCET-575 Fiber Reinforced Composites) **Lab Class 2, Credit 2 (F)**

**MCET-575** **Fiber Reinforced Composites-Lab**  
Application based study of fiber reinforced composites including properties, manufacturing methods and application design. Laboratory exercises support classroom study of properties and manufacturing methods through fabrication and destructive testing of composites. Course project allows student teams to design, fabricate and qualify composite components for specific applications. (MCET-210 Materials in Engineering Design; corequisite MCET-574 Fiber Reinforced Composites) **Lab 2, Credit 1 (F)**



**MCET-580** **Green Plastics Manufacturing Technology**  
The course introduces fundamentals in plastics manufacturing to produce various plastic products and it emphasizes green plastics manufacturing technology (GPMT). (MCET-111 Foundations of Materials Lab; MCET-210 Materials in Engineering Design ; corequisite MCET-581 Green Plastics Manufacturing Technology Lab) **Class 2, Credit 2 (F)**

**MCET-581** **Green Plastics Manufacturing Technology Lab**  
The course introduces fundamentals in plastics manufacturing to produce various plastic products and it emphasizes green plastics manufacturing technology (GPMT). Students will perform team based projects in compression molding, rotational molding, extrusion, injection molding, blow molding, thermoforming and other plastics processing techniques. (MCET-111 Foundations of Materials Lab; MCET-210 Materials in Engineering Design; corequisite MCET-580 Green Plastics Manufacturing Technology), **Lab 2, Credit 1 (F)**

**MCET-582** **Robust Design**  
The fundamental principles of Robust Design are developed. The history of the Robust Design engineering methodology is presented. The concepts of the loss function, concept selection, parameter design and tolerance design will be covered. Metrics and analysis techniques are developed to optimize the performance of product or process components in spite of their design, manufacturing, or customer use environments. Specific attention will be paid to a number of case studies to reinforce the student's conceptualization of the methods and their focus on engineering of optimized products and processes. **Class 3, Credit 3 (F)**

**MCET-583** **Plastics Product Design**  
The study of design guidelines for plastic products based on the interrelationships between design, the material selected, the manufacturing process selected, and the tooling to be used. (MCET-210 Materials in Engineering Design, MCET-211 Materials in Engineering Design Lab) **Class 3, Credit 3 (S)**

**MCET-585** **Product Ideation**  
Students learn the process of generating and formulating an idea, developing a Voice of the Customer (VOC) survey, utilizing a House of Quality (HOQ) matrix for developing a product requirements document, brainstorming and ranking concepts through the Plough Concept Selection Matrix technique, among others. Patenting and intellectual property issues will be discussed and selected ideas will be evaluated against patent searches. (Third-year status or permission of instructor. **Class 3, Credit 3 (F)**)

**MCET-586** **Product Design and Development**  
Product development and design of new products is accomplished by using a multi-step process by most companies. Students will benefit from experiencing these steps as they develop an idea into a product. In this course, students will learn to take an idea of a feasible design and develop a detailed product definition using an industry standard process with common practices such as the Geometric Dimensioning and Tolerancing, the selection of manufacturing and assembly techniques, Tolerancing Analysis, and Critical Parameter Management. (Third-year status or permission of instructor **Class 3, Credit 3 (S)**)

**MCET-590** **Dynamics of Machinery**  
Students learn to solve kinematic and dynamic analysis problems for planar mechanisms with applications ranging from manufacturing equipment to consumer products and the automotive field. Both analytical and computer simulation methods are used. (MCET-320 Mechanical Dynamics with Applications) **Class 3, Credit 3 (F)**

## Packaging

**PACK-101** **Introduction to Packaging**  
An in-depth overview of packaging. The course will include historical perspectives of packaging. Students will explore the functions of packaging; and the materials, processes and technology employed to protect goods during handling, shipment, and storage. A brief review of container types, package design and development, and research and testing are presented, along with information about economic importance, social implications and packaging as a profession. Students will research historical, current and future packages to gain better insight into the world of packaging. **Class 1, Credit 1 (F, S)**

**PACK-151** **Packaging Design I**  
The course develops knowledge of engineering design graphics and skills of package structure design. Topics covered are basics of engineering design graphics, technical sketch, project plan, design matrix and computer aided design (CAD). Emphasis is given to use SolidWorks - CAD software to design typical packaging structures. The 10- week design project focuses on developing a packaging structure from an idea to a 3D virtual prototype. **Class 3, Credit 3 (F)**

**PACK-152** **Packaging Design II**  
The course develops knowledge and skills in applying two computer software packages for packaging design: Artios CAD and Adobe Illustrator. Topics covered are builder and rebuilder, solid modeling and drawing, animation, coloring and painting. Emphasis is given to create a typical paperboard based carton with a proper structure and color usage. (PACK-151 Packaging Design I, PACK-101 Introduction to Packaging) **LEL 4, Credit 3 (S)**

**PACK-211** **Packaging Metals and Plastics**  
The study of packaging materials from extraction through conversion and production, physical and chemical properties and uses. Emphasis is on plastics and metals used in packaging and other component materials. Recognized standard testing procedures are presented and students gain practical experience in the operation of various testing instruments, interpretation of results, and evaluation of properties and performance characteristics. (PACK-151 Packaging Design I, PACK-152 Packaging Design II) **Class 3, Rec 1, Credit 3 (F, S)**

**PACK-212** **Packaging Paper and Glass**  
The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on paper, paperboard, wood, glass and pressurized packaging systems used in packaging applications. Standard testing procedures will be presented as well as instruction on testing equipment operation, data interpretation, evaluation of properties and performance. (PACK-151 Packaging Design I, PACK-152 Packaging Design II) **Class 3, Rec 1, Credit 3 (F, S)**

**PACK-301** **Packaging Materials**  
This first course in the packaging science minor will provide students with the opportunity to learn the basic properties and applications for the common packaging materials. Students will be instructed in fundamental evaluation procedures and in the determination of material specifications. **Class 3, Credit 3 (F, S)**

**PACK-302** **Packaging Containers**  
This first course in the packaging science minor will provide students with the opportunity to learn the basic properties and applications for the common packaging container formats. Students will be instructed in fundamental evaluation procedures and in the determination of container design specifications. **Class 3, Credit 3 (F, S)**

**PACK-311** **Containers I**  
A detailed study of primary packages that includes the history, manufacturing processes, characteristics, and applications for containers in direct contact with the product. Structural design, chemical compatibility, and suitability of container for intended use are analyzed for basic container types. Students practice structural design and testing of prototype containers. Primary emphasis is on flexible paper, foil, plastic and laminated materials and on selected processing techniques. Topics to include folding cartons, heat seal technology and test methodologies, permeability theory, modeling and empirical testing. (PACK-211 Packaging Metals and Plastics, PACK-212 Packaging Paper and Glass) **Class 3, Rec 1 Credit 3 (F, S)**

**PACK-312** **Containers II**  
This course is a detailed study of primary packages. History, manufacturing processes characteristics and applications for containers in direct contact with the product. Structural design, chemical compatibility and suitability of container for intended use are analyzed for basic container types. Students practice structural design and testing of prototype containers. Primary emphasis is on rigid paperboard, glass, plastic and metal containers. (PACK-211 Packaging Metals and Plastics, PACK-212 Packaging Paper and Glass) **Class 3, Rec 1, , Credit 3 (F, S)**

**PACK-420** **Technical Communications**  
An introduction to the principles of effective written technical communication for the packaging professional. Topics include memos, business letters, summary activity reports, technical proposals and research papers. Open only to packaging science majors. **Class 3, Credit 3 (F, S)**

**PACK-421** **Packaging for Distribution**  
An exploration of different shipping, storage, and use environments common to various products and packages. Structural design of shipping containers for product physical protection and methods for testing and predicting package performance are studied. Package converting processes will be studied to reinforce the economics of efficient and sustainable package design. (PACK-311 Containers I, PACK-312 Containers II) **Class 3, Rec 1, Credit 3 (F, S)**

**PACK-422** **Dynamics and Protective Packaging**  
The course defines the factors involved in assessing the potential damage to packaged items resulting from impact and vibration forces in the handling, transport and storage environments. Students will be instructed in the use of basic shock and vibration test equipment, apply standard test protocols and develop specific testing protocols from measured field data. Based on data generated from testing activities, students will develop cushion designs to protect sensitive product components. (PACK-421 Packaging for Distribution) **Class 3 Rec 1, , Credit 3 (F, S)**

**PACK-430** **Packaging Regulations**  
This course begins with an overview of government laws and regulations applicable to the packaging industry. Students will then gain the hierarchical impact that regulations have on the global supply chain, quality systems, patent innovation and workplace safety. (PACK-421 Packaging for Distribution) **Class 3 Credit 3 (F, S)**

**PACK-451** **Packaging Development—Advanced Applications**  
Students will learn to plan and develop virtual and real packaging prototypes to reflect the requirements of end users, assess the sustainability of the designs, and validate designs in the supply chain. (PACK-422 Dynamics and Protective Packaging) **Class 3, Rec 1, Credit 3 (F)**

**PACK-470** **Food Packaging**  
Study of food products, common methods of processing and preservation, impact on quality and nutritional value of the product, and the relationships with common packaging methods and distribution practices. Students required to deliver a project to support the objectives of this course. (PACK-421 Packaging for Distribution) **Class 3, Rec 1, Credit 3 (F)**

**PACK-471** **Packaging Supply Chain**  
Market structures are analyzed in order to develop an understanding of how packaging relates to the general economy. Students will learn how market traded derivatives are utilized to protect against price volatility of packaging raw materials, utilization of purchase price cost analysis to predict packaging pricing and price movements. Packaging contract analysis and packaging pricing formula based pricing will be studied. Students are instructed in the use of basic pricing reference materials for research purposes. (PACK-311, 312 or PACK-301, 302) **Class 3, Credit 3 (S)**

**PACK-481** **Packaging for Marketing and End Use**  
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a marketing tool. Concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market and end user. Students gain practice in the development of a complete package system. (PACK-451 Packaging Development) **Class 3 Rec 1, Credit 3 (F, S)**

**PACK-499** **Cooperative Work Experience**  
Off-campus work in an approved salaried position with cooperating company. (Third-year status) **Credit 0 (F, S)**

**PACK-530** **Packaging Sustainability and the Environment**  
Consideration of packaging in a social context. Factors that enhance secondary use, recycling, recovery of resources and proper disposal are discussed. Package design in relation to solid waste disposal and materials and energy shortages are considered. Other topics of interest are discussed. Primarily a discussion class for senior students. Open to undergraduate non-majors. (PACK-301 Packaging Materials, PACK-302 Packaging Containers) **Class 3, Credit 3 (F)**

**PACK-531** **Packaging Process Control**  
An advanced course designed to give packaging students instruction process and quality control techniques for packaging applications. The course will develop TQM skills for the evaluation of packaging components and packaging manufacturing processes to design sustainable packaging. Topics include the concepts of zero defects, computer applications for control charts and acceptance sampling. (PACK-422 Dynamics and Protective Packaging, STAT-146 Introduction to Statistics II) **Class 3, Credit 3 (F)**

**PACK-535** **Characterization and Evaluation of Polymer Packaging**  
The course develops knowledge of integrated analytical techniques in characterization and evaluation of polymer packaging. Topics covered are basics of polymer packaging production, characterization of thermal properties, evaluation of barrier and mechanical properties for polymer packaging, as well as identification and development of multi layer package structures. (CHMG-121, CHMG-123, CHMG-201 and PACK-211 or PACK-301 and 302; corequisite PACK-536) **Class 2, Credit 2 (F)**

**PACK-536** **Polymer Packaging Laboratory**  
The course develops knowledge of laboratory-based analytical techniques in characterization and evaluation of polymer packaging. Topics covered include basic instruction in the use of standard laboratory protocol to assess the performance and specification characteristics of polymer packaging production, thermal properties, evaluation of barrier and mechanical properties for polymer packaging. Techniques for polymer identification and structural configuration of multi-layer packages will also be investigated. (CHMG-121, CHMG-123, CHMG-201 and PACK-211 or PACK-301 and 302; corequisite PACK-535) **Lab 2, Credit 1 (F)**

**PACK-546** **Pharmaceutical and Medical Packaging**  
Students will define the types of packages used in medical and pharmaceutical product applications. Aseptic packaging operations will be explained and demonstrated. Students will utilize ISO 11607, parts 1 and 2 and the AAMI TIR 22 for medical product packaging. A compliance document and finished prototype for ISO 11607 will be required. (PACK-311 Containers I, PACK-312 Containers II; corequisite PACK-547 Pharmaceutical and Medical Packaging Lab) **Class 2, Credit 2 (S)**

**PACK-547** **Pharmaceutical and Medical Packaging Lab**  
Students will define the types of packages used in medical and pharmaceutical product applications. Aseptic packaging operations will be explained and demonstrated. Students will utilize ISO 11607, parts 1 and 2 and the AAMI TIR 22 for medical product packaging. A compliance document and finished prototype for ISO 11607 will be required. (PACK-311 Containers I, PACK-312 Containers II; corequisite PACK-546 Pharmaceutical and Medical Packaging) **Lab 2, Credit 1 (S)**

**PACK-550** **Packaging Machinery**  
A study of package forming and filling, closing, product/package identification, inspection, and other machinery commonly used in packaging, plus consideration of handling and storage/retrieval systems. Students become aware of project management techniques, setting timelines, critical path, and resource evaluation. Quality tools and issues along with quality control processes are integrated into line and machinery designs. Students gain practice in setting up complete production lines for packaging various products. (PACK-311 Containers I, PACK-312 Containers II) **Class 3, Lab 1, Credit 3 (F, S)**

**PACK- 555** **Import/Export Packaging**  
Study of the particular forms and requirements for packaging for the import/export environment. Preservation techniques, international logistics, bulk containers, packing requirements, handling, transport and storage and related documentation. (PACK-301 Packaging Materials, PACK-302 Packaging Containers) **Class 3, Credit 3 (S)**

## **Reserve Officer Training Corps—Air Force**

**AERO-101** **Foundation of U.S. Air Force I**  
This course and its follow-on provide the student with an introductory survey of the United States Air Force (USAF) and the Air Force Reserve Officer Training Corps (AFROTC). In the first semester, the course begins with an introduction to ROTC as well as the customs and courtesies and dress and appearance standards expected of Air Force officers. It continues with a discussion on team building, military communication skills and interpersonal communications. The organization of the Air Force and how the Air Force contributes to the accomplishment of our national security objectives is also covered. The course concludes with an overview of Air Force career opportunities and benefits. Leadership Laboratory is mandatory for AFROTC contract/pursuing cadets and complements this course by providing cadets with followership experiences. **Class 1, Credit 1**

**AERO-102****Foundation of U.S. Air Force II**

This course covers an introduction to Air Force core values and offers the student an opportunity to learn about leadership, its principles, and its effective traits. The course demonstrates knowledge of Air Force heritage and legacy. Students are also introduced to basic oral and written communication skills. The course continues by exploring war, its basic principles, and motivation. The course concludes with an understanding of the Air Force oath of office and how human relations can affect them as an Air Force Officers. Leadership Laboratory is mandatory for AFROTC contract/pursuing cadets and complements this course by providing cadets with followership experiences. **Class 1 hr, Credit 1**

**AERO-201****History of Airpower I (AS200)**

This course examines the development of military air and space power from the first balloons to the on-going conflicts in Afghanistan and other parts of the world, introduces fundamental principles associated with war in the third dimension, and employs historical examples to explain the evolution of U.S. Air Force air and space power. The full course covers two academic terms. This term focuses on examples from the earliest days of flight through the Cuban Missile Crisis. This course also seeks to develop students' communication skills through class participation, short writing and briefing assignments. AFROTC Leadership Laboratory (WMIL-006) and AFROTC Physical Training (WMIL-001) complements this course by providing applied followership and leadership experience and is mandatory for all AFROTC cadets. Other interested undergraduate students (non-cadets) will be considered for registration but must have the Detachment Commander's approval for this course and any required corequisites (if desired). **Class 1 Hour, Credit 1 (F)**

**AERO-202****History of Airpower II (AS200)**

This course examines the development of military air and space power from the first balloons to the on-going conflicts in Afghanistan and other parts of the world, introduces fundamental principles associated with war in the third dimension, and employs historical examples to explain the evolution of U.S. Air Force air and space power. The full course covers two academic terms. This term focuses on examples from the Vietnam War to the "Global War on Terror." This course also seeks to develop students' communication skills through class participation, short writing and briefing assignments AFROTC Leadership Laboratory (WMIL-006) and AFROTC Physical Training (WMIL-001) complements this course by providing applied followership and leadership experience and is mandatory for all AFROTC cadets. Other interested undergraduate students (non-cadets) will be considered for registration but must have the Detachment Commander's approval for this course and any required corequisites (if desired). **Class 1 Hour, Credit 1 (S)**

**AERO-401****National Security Forces I (AS400)**

This course examines national security policy and process, regional issues, advanced leadership, air and space power functions and competencies. It is the first in a two-course sequence during which you will study roles of the military in society; military justice and law; current issues affecting the military profession; and regional cultural, politics and history. You will also study air and space power functions and competencies and the responsibilities of officership. Finally, this course also seeks to develop students' communication skills through class participation, short writing and briefing assignments. AFROTC Leadership Laboratory (WMIL-006) and AFROTC Physical Training (WMIL-001) complements this course by providing applied followership and leadership experience and is mandatory for all AFROTC cadets. Other interested undergraduate students (non-cadets) will be considered for registration but must have the Detachment Commander's approval for this course and any required corequisites (if desired). **Class 3 Hours, Credits 3 (F)**

**AERO-401****National Security Forces I (AS400)**

This course examines national security policy and process, regional issues, advanced leadership, air and space power functions and competencies. It is the second in a two-course sequence during which you will study roles of the military in society; military justice and law; current issues affecting the military profession; and regional cultural, politics and history. You will also study air and space power functions and competencies and the responsibilities of officership. Finally, this course also seeks to develop students' communication skills through class participation, short writing and briefing assignments. AFROTC Leadership Laboratory (WMIL-006) and AFROTC Physical Training (WMIL-001) complements this course by providing applied followership and leadership experience and is mandatory for all AFROTC cadets. Other interested undergraduate students (non-cadets) will be considered for registration but must have the Detachment Commander's approval for this course and any required corequisites (if desired). **Class 3 Hours, Credits 3 (S)**

**Reserve Officer Training Corps—Army****ARMY-101****Introduction to Leadership**

ARMY-101 introduces you to the personal challenges and competencies that are critical for effective leadership and the structure of the ROTC Basic courses which consist of ARMY 101, 102, 201, 202, Fall and Spring Leadership Labs, and LTC. You will learn how the personal development of life skills such as cultural understanding, goal setting, time management, mental/physical resiliency, and stress management relate to leadership, officership, and the Army profession. The focus is on developing basic knowledge and comprehension of Army leadership dimensions, attributes and core leader competencies while gaining an understanding of the ROTC program, its purpose in the Army, and its advantages for the student. Enrollment must be approved by the professor of military science. Students enrolled or contracted in Army ROTC must register for Army Conditioning Drills (Physical Training) and Army Leadership Lab when registering for the ARMY-101 class. (Corequisite ARMY-340 and WMIL-018) **Class 2, Credit 2 (F)**

**ARMY-102****Introduction to Tactical Leadership**

ARMY-102 overviews leadership fundamentals such as setting direction, problem-solving, listening, presenting briefs, providing feedback, and using effective writing skills. You will explore dimensions of leadership attributes and core leader competencies in the context of practical, hands-on, and interactive exercises. Enrollment must be approved by Professor of Military Science. Students enrolled or contracted in Army ROTC must register for Army Conditioning Drills (Physical Training) and Army Leadership Lab when you take the ARMY-102 class. (ARMY-101; corequisite ARMY-340 and WMIL-018) **Class 2, Credit 2 (S)**

**ARMY-201****Innovative Team Leadership**

ARMY-201 explores the dimensions of creative and innovative tactical leadership strategies and styles by examining team dynamics and two historical leadership theories that form the basis of the Army leadership framework. Aspects of personal motivation and team building are practiced planning, executing and assessing team exercises. The focus continues to build on developing knowledge of the leadership attributes and core leader competencies through the understanding of Army rank, structure, and duties as well as broadening knowledge of land navigation and squad tactics. Case studies will provide a tangible context for learning the Soldier's Creed and Warrior Ethos. Enrollment must be approved by the Professor of Military Science. Students enrolled or contracted in Army ROTC must register for Army Conditioning Drills (PT) and Army Leadership Lab when they enroll in ARMY-201. (ARMY-101, 102; corequisite ARMY-340 and WMIL-018) **Class 2, Credit 2 (F)**

**ARMY-202****Foundations of Tactical Leadership**

ARMY-202 examines the challenges of leading teams in the complex operational environment. The course highlights dimensions of terrain analysis, patrolling, and operation orders. Further study of the theoretical basis of the Army leadership requirements Model explores the dynamics of adaptive leadership in the context of military operations. ARMY-202 prepares Cadets for ROTC 301. Cadets develop greater self-awareness as they assess their own leadership styles and practice communication and team building skills. Case studies give insight into the importance and practice of teamwork and tactics in real-world scenarios. Enrollment must be approved by the Professor of Military Science. Students enrolled or contracted in Army ROTC must register for Army Conditioning Drills (PT) and Army Leadership Lab when they enroll in ARMY-202. (ARMY-102, ARMY-201; corequisite ARMY-340 and WMIL-018)) **Class 2, Credit 2 (S)**

**ARMY-301****Adaptive Team Leadership**

This is an academically challenging course where you will study, practice, and apply the fundamentals of Army leadership, Officership, Army values and ethics, personal development, and small unit tactics at the team and squad level. At the conclusion of this course, you will be capable of planning, coordinating, navigating, motivating and leading a team or squad in the execution of a tactical mission during a classroom PE, a Leadership Lab, or during a Situational Training Exercise (STX) in a field environment. Successful completion of this course will help prepare you for success at the ROTC Leader Development and Assessment Course (LDAC) which you will attend if you are a contracted Cadet. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, and practical exercises, a mid-term exam, and a final exam. You will receive systematic and specific feedback on your leader attributes values and core leader competencies from your instructor and other ROTC cadre and MSL IV Cadets who will evaluate you using the ROTC Leader Development Program (LDP) model. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC program (contracted Cadets) must also register for Army Conditioning Drills (Physical Fitness Training) and Army Leadership Lab. (ARMY-201, ARMY-202; corequisite ARMY-340 and WMIL-018 ) **Class 2, Credit 2 (F)**

**ARMY-302****Adaptive Team Leadership**

This is an academically challenging course that builds upon lessons learned in ARMY-301 where you will study, practice, and apply the fundamentals of Army leadership, Officership, Army values and ethics, personal development, and small unit tactics at the team and squad level. At the conclusion of this course, you will be capable of planning, coordinating, navigating, motivating and leading a team or squad in the execution of a tactical mission during a classroom PE, a Leadership Lab, or during a Situational Training Exercise (STX) in a field environment. Successful completion of this course will help prepare you for success at the ROTC Leader Development and Assessment Course (LDAC) which you will attend if you are a contracted Cadet. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, and practical exercises, a mid-term exam, and a final exam. You will receive systematic and specific feedback on your leader attributes values and core leader competencies from your instructor and other ROTC cadre and MSL IV Cadets who will evaluate you using the ROTC Leader Development Program (LDP) model. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC program (contracted Cadets) must also register for Army Conditioning Drills (Physical Fitness Training) and Army Leadership Lab. (ARMY-202, ARMY-301; corequisite ARMY-340; corequisite ARMY-340 and WMIL-018 ) **Class 2, Credit 2 (F)**

**ARMY-340****Army Leadership Lab**

Leadership Laboratory provides basic and advanced military leadership experience in military courtesy, drill and ceremonies and practical application of classroom-taught subjects. Functions and responsibilities of leadership positions are developed through cadet staff actions and command positions. Cadets are empowered to study, practice, and evaluate adaptive leadership skills as they are presented with challenging scenarios related to squad tactical operations. Cadets receive systematic and specific feedback on their leadership attributes and actions. Based on such feedback, as well as their own self-evaluations, cadets continue to develop their leadership and critical thinking abilities. **Class 1, Credit 1 (F)**

**ARMY-401****Adaptive Team Leadership II**

This is an academically challenging course where you will study, practice, and apply the fundamentals of Army leadership. You will learn how to train, mentor and evaluate MSI-3 cadets while learning the duties and responsibilities of an Army staff officer. You will learn how to apply the Military Decision Making Process (MDMP), the Army writing style and the Army's Training Management and Mission Essential Task List (METL) Development processes during weekly training meetings in order to plan, execute and assess battalion training events. Enrollment must be approved by the professor of military science. Students enrolled in Army ROTC program (contracted Cadets) must also register for Army Conditioning Drills (Physical Fitness Training) and Leadership Lab. (ARMY-301 ARMY-302; corequisite ARMY-340 and WMIL-018 ) **Class 2, Credit 2 (F)**

**ARMY-402****Leadership in a Complex World**

The course places significant emphasis on preparing cadets for their first unit of assignment. It uses case studies, scenarios, and 'What Now, Lieutenant?' exercises to prepare cadets to face the complex ethical and practical demands of leading as commissioned officers in the United States Army. It develops the cadet's proficiency in planning, executing, and assessing complex wile operations, functioning as a member of a staff, and providing performance feedback to subordinates. cadets assess risk, make ethical decisions, and lead fellow ROTC cadets. Enrollment must be approved by the Professor of Military Science. Students enrolled in Army ROTC (contracted cadets) must also register for Army Conditioning Drills (Physical Fitness Training) and Leadership Lab. (ARMY-302 and ARMY-401; corequisite ARMY-340 and WMIL-018 ) **Class 2, Credit 2 (F)**

# Saunders College of Business

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*Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).*

*Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.*

## Accounting

**ACCT-110 Financial Accounting**  
An introduction to the way in which corporations report their financial performance to interested stakeholders such as investors and creditors. Coverage of the accounting cycle, generally accepted accounting principles, and analytical tools help students become informed users of financial statements. (Second-semester status) **Credit 3 (F, S, Su)**

**ACCT-210 Management Accounting**  
Introduction to the use of accounting information by managers within a business. Explores the value of accounting information for the planning and controlling of operations, assessing the cost of a product/service, evaluating the performance of managers, and strategic decision making. (ACCT-110) **Credit 3 (F, S, Su)**

**ACCT-360 Intermediate Financial Accounting I**  
Extensive exposure to the accounting cycle with full integration of the data flow in an accounting information system. Accounting theory developed by accounting standard-setting bodies is covered in depth. Generally accepted accounting principles are discussed as they apply to the preparation of financial statements and the recognition and measurement of financial statement elements. International Financial Reporting Standards are introduced as they relate to course subject matter. (ACCT-210, junior status) **Credit 3 (F)**

**ACCT-365 Intermediate Financial Accounting II**  
In-depth consideration of generally accepted accounting principles and theory as they apply to the recognition and measurement of certain assets, liabilities, and owners' equity, including current and long-term liabilities, deferred income taxes, pensions and leases. Issues related to convertible securities, the computation of earnings per share, accounting changes, revenue recognition, and the statement of cash flows are discussed. International Financial Reporting Standards are introduced as they relate to course subject matter. (ACCT-360, junior status) **Credit 3 (F, S)**

**ACCT-420 Personal and Small Business Taxation**  
A basic introductory course in federal income taxation. Emphasis is on taxation of individuals and sole proprietorships. Topics include income measurement and deductibility of personal and business expenses. (ACCT-110, junior status) **Credit 3 (F, S)**

**ACCT-430 Cost Accounting**  
Intermediate-level coverage of operational budgeting and performance evaluation. Development and use of cost data for external reporting and internal planning and control. Topics include operational budgeting, performance evaluation, job costing, process costing, joint product and by-product costing, service department cost allocation, standard costing, activity-based costing, back-flush costing, and transfer pricing. Development of relevant cost information for special purposes is also considered. (ACCT-210) **Credit 3 (S)**

**ACCT-440 Advanced Taxation**  
A continuation of Personal and Small Business Taxation. Emphasis is on tax treatment of property transactions and taxation of business entities. Also covers the use of technology to prepare complex returns and to research tax issues. (ACCT-420) **Credit 3 (S, Su)**

**ACCT-445 Accounting Information Systems**  
This course combines information systems concepts and accounting issues. In this course, we discuss the conceptual foundations of information systems, their applications, the control and auditing of accounting information systems, and the system development process. Topics include the business process, e-business, relational database, database design, computer fraud and security, accounting cycle, system analysis and AIS development strategies. Students analyze accounting information systems topics through problem solving, group project, presentations, exams, and case studies. (ACCT-110) **Credit 3 (F, S)**

**ACCT-450 Accounting for Government and Not-for-Profit Organizations**  
This course provides a detailed examination and discussion of the accounting principles used by governmental and not-for-profit entities. The course focuses on the use of special funds for such entities as state and local governments, colleges and universities, hospitals and other health care entities, voluntary health and welfare organization, and other organizations. Students will learn what characterizes an entity as one for which the GASB is the authoritative standard-setting body versus one for which the FASB is the authoritative standard-setting body and develop an understanding of why two unique sets of accounting principles were developed to serve these entities. (ACCT-365, junior status) **Credit 3 (S)**

**ACCT-460 Forensic Accounting and Fraud Examination**  
This course provides an introduction to the principles and methodologies of fraud detection and prevention. Topics may include the nature and types of fraud, fraud investigation and detection, financial statement fraud, consumer fraud, asset misappropriation, corruption, and tax evasion. (ACCT-210, junior status) **Credit 3 (S)**

**ACCT-490 Auditing**  
A study of the legal, ethical, and technical environment in which the auditor works. Current auditing theory, standards, procedures, and techniques are studied. The audit process is studied to ascertain how it leads to the development of an audit opinion. The Sarbanes-Oxley Act and internal control issues are examined. Students are also introduced to accountants' professional responsibility. (ACCT-360) **Credit 3 (F, Su)**

**ACCT-500 Cost Management in Technical Organizations**  
A first course in accounting for students in technical disciplines. Topics include the distinction between external and internal accounting, cost behavior, product costing, profitability analysis, performance evaluation, capital budgeting, and transfer pricing. Emphasis is on issues encountered in technology-intensive manufacturing organizations. This course is not available for Saunders College of Business students. (Junior status) **Credit 3**

**ACCT-510 Internal Auditing**  
Course explores the role of the internal audit function in the management of companies. Topics include internal vs. external auditing, internal control issues, reliability and integrity of information; compliance with policies, procedures, laws and regulations; efficiency of operations. Ethical considerations affecting the internal audit function are introduced. (ACCT-210, junior status) **Credit 3 (F)**

**ACCT-540 Advanced Accounting**  
Investigates the application of generally accepted accounting principles to partnerships and corporations with investments in subsidiaries. Issues involving consolidated financial statements, international accounting, and accounting for not-for-profit and governmental entities are considered. (ACCT-365, senior status) **Credit 3 (F)**

## Business Legal Studies

**BLEG-200 Business Law I**  
An introduction to legal principles and their relationship to business organizations. Explores the U.S. legal system, the U.S. court system, civil and criminal procedure, the role of government agencies, legal research, and the substantive areas of law most relevant to business, including constitutional law, tort law, criminal law, contract law, intellectual property, debtor-creditor relations, bankruptcy, business entities, securities regulation, and antitrust law. **Credit 3 (F, S, Su)**



**BLEG-300**

Explores the impact of the Uniform Commercial Code and other substantive areas of law on business operations. Emphasis is on topics included on the certified public accounting exam, including provisions of the Uniform Commercial Code dealing with the sale and lease of goods, product warranties, commercial paper, negotiable instruments and secured transactions. Other topics include business entities, creditors' rights, bankruptcy, environmental law, and insurance law. (BLEG-200) **Credit 3 (F, S)**

**Business Law II****Decision Sciences****DECS-310****Operations Management**

A survey of operations and supply chain management that relates to both service- and goods-producing organizations. Topics include operations and supply chain strategies; ethical behavior; forecasting; product and service design, including innovation and sustainability; capacity and inventory management; lean operations; managing projects; quality assurance; global supply chains; and the impacts of technology. (STAT-145 or equivalent, junior status) **Credit 3 (F, S, Su)**

**Finance****FINC-120****Personal Financial Management**

Examines financial decisions people must make in their personal lives. Covers personal taxation, housing and mortgages, consumer credit, insurance (including life, health, property and casualty) and retirement and estate planning. Also reviews the common financial investments made by individuals, including stocks, bonds, money market instruments and mutual funds. This class involves extensive use of the Internet for access to information. (Students in the finance program may use this course only as a free elective, not as a course creditable towards the finance program.) **Credit 3 (F, S, Su)**

**FINC-220****Corporate Finance**

Basic course in financial management. Covers business organization, time value of money, valuation of securities, capital budgeting decision rules, risk-return relation, Capital Asset Pricing Model, financial ratios, global finance and working capital management. (ECON-201, STAT-145, ACCT-110) **Credit 3 (F, S, Su)**

**FINC-352****Managing Assets and Liabilities**

Advanced course in financial management. Covers project cash-flow analysis, issuance of securities, cost of capital, debt policy, dividend policy, and market efficiency. (FINC-220) **Credit 3 (F, S, Su)**

**FINC-359****Financing New Ventures**

The course focuses on financial issues affecting an entrepreneur. The course emphasizes, identifies and follows the wealth creation cycle. The wealth creation cycle begins with an idea for a good, product or service, progresses to an initial company startup, passes through successive stages of growth, considers alternative approaches to resource financing, and ends with harvesting the wealth created through an initial public offering, merger or sale. Identification and valuation of business opportunities, how and from whom entrepreneurs raise funds, how financial contracts are structured to both manage risk and align incentives, and alternative approaches by which entrepreneurs identify exit strategies are reviewed. **Credit 3 (F, S)**

**FINC-361****Financial Institutions and Markets**

This course provides a comprehensive survey of the major financial markets and institutions in the U.S. and abroad. This course analyzes the important structural features of the major markets and notes the interaction of the financial markets with the decisions of financial institutions, corporations, and the government. (FINC-220) **Credit 3 (F, S)**

**FINC-362****Intermediate Investments**

Focuses on the financial investment problems faced by individuals and institutions. Theoretical topics include asset pricing, hedging and arbitrage. Application topics include risk management in bond-and-stock portfolio context. A discussion of options, futures and swaps also is included. (FINC-220) **Credit 3 (F, S)**

**FINC-420****Finance in a Global Environment**

Discusses the problems posed by the international financial environment in which corporations operate. In particular, students learn to quantify and manage risks arising from shifting exchange rates. Other topics include exchange rate systems, international trade finance, international capital budgeting, country risk analysis and long-term international financing. (FINC-220) **Credit 3 (F or S, Su)**

**FINC-430****Advanced Corporate Financial Planning**

This course focuses on strategic financial management of the corporation. It employs pedagogies that emphasize analysis and evaluation of applied financial problems. Topics include working capital management, financial statement analysis, valuation, capital budgeting decisions, and risk management. (FINC-352) **Credit 3 (S)**

**FINC-460****Financial Analysis and Modeling**

In this course, students learn to obtain and organize financial data and conduct financial analysis such as discounted cash flow analysis, risk analysis and financial forecasting. Sources of data include web-based sources and proprietary databases. Excel will be the main software tool. (FINC-352) **Lab 1, Credit 3 (F, S)**

**FINC-470****Introduction to Options and Futures**

This course explores risk management from the viewpoint of finance professional. The primary tools used are derivative instruments such as options, futures and swaps. Students learn about the basic features of derivative instruments: how to value them, how they are traded, and how to use them to mitigate various types of financial risk. (FINC-220) **Credit 3 (F, S)**

**International Business****INTB-225****Global Business Environment**

Being an informed global citizen requires an understanding of the global business environment. Organizations critical to the development of the global business environment include for-profit businesses, non-profits, governmental, non-governmental, and supranational agencies. This course introduces students to the interdependent relationships between organizations and the global business environment. A holistic approach is used to examine the diverse economic, political, legal, cultural, and financial systems that influence both organizations and the global business environment. **Credit 3 (F, S)**

**INTB-300****Cross-Cultural Management**

This course explores the key implementation issues facing global businesses and those firms wishing to expand into the global arena. An emphasis is placed on issues related to the topic of culture. The course examines its impact on management, individuals, groups and how it affects organizational performance. Leadership styles, in the cross-cultural context, will be deconstructed as will communication, decision-making, negotiation, and motivation. (INTB-225, junior status) **Credit 3 (F, S)**

**INTB-310****Regional Business Studies**

An introduction to the most important and the fast growing economic entities to the students such as the European Union, China, India, and Brazil. The course introduces the idiosyncratic competitive environment in these major economies, the unique business models of the local ventures, and the business opportunities and the hidden risks in these markets. The course will also develop students with the necessary knowledge base and skills to compete with and in these major economies. (Junior status) **Credit 3 (F, S)**

**INTB-320****Global Marketing**

A hands-on course focusing on developing marketing strategies for entering and competing in foreign countries. Topics include foreign market opportunity assessment, developing commercialization and entry strategies, understanding foreign customers and distribution channels, and communicating value through advertising and promotion in different markets. (MKTG-230, junior status) **Credit 3 (F, S)**

**INTB-550****Global Entry and Competition Strategies**

This course explores the strategic challenges faced by businesses operating in a global environment. It emphasizes the development of strategies under differing perspectives, globalization or regionalization of competitive marketplace, creating value for the firm globally, entry mode management, global CSR and governance. (INTB-225; corequisite senior status) **Credit 3 (S)**

**Management****MGMT-101****Business 1: Ideas and Business Planning**

This is the first of a two-course sequence comprising the freshman integrated experience. In Business 1 students will be introduced to the key functional areas of business, the evaluation of new business opportunities, and the business plan process. By applying the creative process, students will conceive new business ideas that will be developed in Business 2. (Corequisite MGIS-101) **Credit 3 (F)**

**MGMT-150** **The World of Business**  
Designed as an introductory course for business students or non-majors that want to learn more about the fundamentals of business. This course provides an overview of the functions and processes of business organizations. Topics include the role and responsibility of the manager, the processes and functions of business, the impact of technology, business planning process, doing business in global environments, and career exploration. **Credit 3 (F, S)**

**MGMT-215** **Organizational Behavior**  
As an introductory course in managing and leading organizations, this course provides an overview of human behavior in organizations at the individual, group, and organizational level with an emphasis on enhancing organizational effectiveness. Topics include: individual differences, work teams, motivation, communication, leadership, conflict resolution, organizational culture, and organizational change. (Sophomore status) **Credit 3 (F, S, Su)**

**MGMT-300** **Air Force Management and Leadership I (AS300)**  
AF Management and Leadership (AS 300) courses emphasize the concepts and skills required of the successful young officer, manager and leader. The first course includes applied written and oral communication techniques, coordination, and history of management theory, analytic methods of decision making, strategic and tactical planning, various leadership theories and followership. The second course stresses organizing, staffing, controlling, counseling, human motivation and group dynamics, ethics, managerial power and politics, managing change, career development, and performance appraisal. Actual Air Force case studies are used to enhance the learning process. (This course is restricted to AFROTC Students.) **Credit 3 (F)**

**MGMT-301** **Air Force Management and Leadership II (AS300)**  
Integrated management and leadership courses emphasize the concepts and skills required of the successful young officer, manager, and leader. The first course includes applied written and oral communication techniques, coordination, history of management theory, analytic methods of decision-making, strategic and tactical planning various leadership theories, and followership. The second course stresses organizing, staffing, controlling, counseling, human motivation and group dynamics, ethics, managerial power and politics, managing change, career development, and performance appraisal. Actual Air Force case studies are used to enhance the learning process. (This course is restricted to AFROTC students.) (MGMT-300 Air Force Management and Leadership I (AS 300)) **Credit 3 (S)**

**MGMT-305** **Careers in Business**  
This course consists of a series of workshops designed to introduce business students to the skills needed to be successful in job and coop searches and applications to graduate schools. Students will establish their career goals, create material (e.g., resume, cover letter), and acquire skills needed to achieve these goals. (Sophomore status) **Credit 1 (F, S)**

**MGMT-310** **Leadership in Organizations**  
This course will explore the character, personal attributes, and behaviors of effective leaders in organizations. The course includes an overview of leadership research, theory, and practice, with an emphasis on developing an actionable leadership development plan. (MGMT-215) **Credit 3 (F, S)**

**MGMT-320** **Managerial Skills**  
This course provides the opportunity to develop individual and interpersonal skills that enhance individual, team, and managerial performance in today's high-performance organization. Skills will be identified, modeled, practiced, and developed using video and other formative feedback, as well as individual and group coaching. Industry experts will provide relevant insights on course topics, which will include communication, interviewing, interpersonal interaction, business networking, teamwork, and management styles. (MGMT-215) **Credit 3, (F, S)**

**MGMT-330** **Design Thinking and Concept Development**  
Design thinking is a process that aids collaboration among designers, technologists, and business professionals. The process provides a structured creative process for discovering and developing products, services, and systems for profit and non-profit applications. Students will apply a wide range of design tools in a hands-on project. Topics include problem-framing, end-user research, visualization, methods for creative idea generation, and prototyping. (Junior status) **Credit 3 (F, S)**

**MGMT-340** **Business Ethics and Corporate Social Responsibility**  
This course applies concepts of ethics to business at the macro level and at the micro level. At the macro level the course examines competing business ideologies exploring the ethical concerns of capitalism as well as the role of business in society. At the micro level the course examines the role of the manager in establishing an ethical climate with an emphasis on the development of ethical leadership in business organizations. The following topics are typically discussed: the stakeholder theory of the firm, corporate governance, marketing and advertising ethics, the rights and responsibilities of employees, product safety, ethical reasoning, business's responsibility to the environment, moving from a culture of compliance to a culture of integrity, and ethical leadership. (Junior status) **Credit 3 (F, S)**

**MGMT-350** **Entrepreneurship**  
This course studies the process of creating new ventures with an emphasis on understanding the role of the entrepreneur in identifying opportunities, seeking capital and other resources, and managing the formation and growth of a new venture. It addresses the role of entrepreneurship in the economy and how entrepreneurial ventures are managed for growth. (Junior status) **Credit 3 (F, S, Su)**

**MGMT-360** **Digital Entrepreneurship**  
Digital Entrepreneurship brings together state-of-the-art knowledge in digital business practices with basic instruction in entrepreneurship and business planning. This highly interactive, applied experience will allow students to develop business ideas, discover RIT resources that support new ventures, network with and learn from industry experts, and complete a professional plan to communicate and advance a digital business venture. Student work for this course will involve research and analysis of electronic marketplaces and, ultimately, the design and development of competitive digital startups. **Credit 3 (F, S, Su)**

**MGMT-380** **Human Resource Management**  
This course is an introduction to the basic concepts in human resource management (HRM), with an emphasis on developing HRM skills that are important to any manager, not only to those who plan to work in the HRM functional area. It is not intended to prepare one to be a human resource specialist, but rather aims to provide one with an overview of human resource management and the context in which it operates. The course emphasizes experiential learning and interactive discussions, in order to provide a level of learning beyond simple content knowledge in the HRM field. Instructional methods will include readings, mini-lectures, discussions, case analyses, and exercises. (MGMT-215, junior status) **Credit 3 (F, S)**

**MGMT-420** **Managing Innovation and Technology**  
This course focuses on commercializing technology, and gives students the chance to work on real business projects involving new technology. Topics covered include assessing inventions for market readiness, drivers of innovation, technology-driven entrepreneurship and intrapreneurship, managing different types of innovation, and the construction of a technology strategy for a firm or business unit. Students learn how to understand both technology and business perspectives as well as how to formulate a profitable technology strategy. Projects focus on current situations in real companies, including, on occasion, student-owned startup companies. (Junior status) **Credit 3 (F, S)**

**MGMT-450** **Negotiations**  
This course is designed to teach the art and science of negotiation so that one can negotiate successfully in a variety of settings, within one's day-to-day experiences and, especially, with in the broad spectrum of negotiation problems faced by managers and other professionals. Individual class sessions will explore the many ways that people think about and practice conflict resolution as well as provide opportunity to develop and practice negotiations skills and strategies in a variety of context. (Senior status) **Credit 3 (F, S)**

**MGMT-470** **Applied Entrepreneurship and Commercialization**  
This course enables students to gain course credit, in association with the RIT Student Development Lab, for advancing a business concept, working on a multi-disciplinary product commercialization team, or working with an existing entrepreneurial venture. Students must apply for admission into this program and follow the guidelines provided by the RIT Entrepreneurship Program. (Permission of instructor) **Credit 3 (F, S, Su)**

**MGMT-550** **Field Experience in Business Consulting**  
Students nearing the completion of their program work in consulting teams to assist startup ventures and/or small businesses. Problems are isolated and solutions then developed. Affiliated course projects may focus on a number of areas. For example, they may seek to develop commercialization plans for specific technologies, products, or services; focus on unique problems associated with small businesses, and develop growth strategies. (Junior status) **Credit 3 (F, S)**

**MGMT-560** **Strategy and Innovation**  
A capstone course drawing upon major business functions, accounting, finance, marketing, operations management, and organizational theory, as well as the key concepts of innovation. The course provides an integrated perspective of business organizations toward the achievement of enhanced profitability and a sustainable competitive advantage. Topics include the analysis of business environments, industry attractiveness, competitive dynamics, and innovation management. Students learn how to formulate and implement effective business-level, corporate-level, global, and innovation strategies. (MGMT-215, MKTG-230, FINC-220, DECS-310, senior status) **Credit 3 (F, S, Su)**

## Management Information Systems

**MGIS-101** **Computer-based Analysis**  
This course provides students with hands-on experience with the analytical software tools and techniques that are used in today's businesses. Emphasis will be placed on the application of spreadsheet models for supporting management decision-making. A variety of spreadsheet-based cases in market research, financial analysis, accounting applications and other business domains will be utilized to show how to effectively analyze and solve business problems using the spreadsheet tool. **Credit 1 (F)**

**MGIS-102** **Business 2: Technology-enabled Launch**  
This course, the second course in the first-year business sequence, applies technology tools to create well-defined and complete business plans. Students will develop websites and other marketing and process tools to take their business concept outlined in Business 1 to a final business plan for review with an outside board. (MGMT-101, MGIS-101) **Credit 2 (S)**

**MGIS-120** **Business Computer Applications**  
The primary focus of the course is to provide students with hands-on skills in using computers as productivity tools in the workplace. Students will be exposed to a combination of advanced productivity software including word processors, spreadsheets and presentation graphics applications. Hands-on exercises and assignments will help to develop computer proficiency and problem-solving skills. **Credit 3 (F, S)**

**MGIS-201** **Business Information Systems Processes**  
Managers, professionals and business technologists manage, maintain or participate in business processes. This course is an introduction to the basic business processes involved in organizations and the information systems that support them. Students examine the relationship between business processes and information systems and the qualities of good information. Students observe how these concepts are applied through hands-on exposure to an Enterprise Resource Planning (ERP) system, such as SAP R/3. **Credit 3 (F)**

**MGIS-250** **Applying Business Technologies**  
In this course, students learn to take a business idea from inception to launch. It covers the major steps involved in commercializing a new product or service with the help of in-depth understanding of key business processes and cutting-edge e-business technologies. Topics covered include idea generation, basic business plan development, computer based market analysis, preparation for business idea implementation, and e-commerce website development. (Prior business and spreadsheet coursework; for transfer students only; not for students that have completed the MGMT-101, MGIS-101 and MGIS-102 sequence) **Credit 3 (F, S)**

**MGIS-320** **Database Management Systems**  
Transforming data into information is critical for making business decisions. This course introduces students to the concepts of data, information and the business database management systems (DBMS) used by modern organizations. Exercises and hands-on projects are used to model the information needs of an organization and implement and query databases using applications such as Microsoft Access and SQL. **Credit 3 (F, S)**

**MGIS-330** **Systems Analysis and Design**  
Successful organizations utilize a systematic approach to solve real-world business problems through the use of computing resources. Students who complete this course will be able to design and model business processes. They will learn how to conduct requirements analysis, approach the design or redesign of business processes, model system functions, effectively communicate systems designs to various levels of management, work in a project-based environment, and approach the implementation of a new organizational information system. **Credit 3 (F, S)**

**MGIS-340** **Emerging Business Technologies**  
This course stresses a business-oriented approach to evaluating, selecting and leveraging emerging information technologies to support an organization's business processes. Students gain hands-on knowledge to design effective and secure networked IT infrastructure systems for business operations. Students also explore management issues such as defining an IT strategy, establishing IT standards, managing IT operations, and outsourcing IT services. **Credit 3 (F, S)**

**MGIS-350** **Developing Business Applications**  
Development of business applications is transforming from programming to integration of software components using application development environments. Students learn the fundamentals of computer programming and applications development through a set of programming exercises that focus on visual development environments and component integration. These exercises expand into a project where students apply concepts of typical development and project methodologies to complete a comprehensive programming assignment. **Credit 3 (S)**

**MGIS-360** **Building a Web Business**  
This course gives students both a conceptual and hands-on understanding of the launching of Web businesses. Students will study the full process of Web business creation, including domain name registration, frameworks for application creation, hosting of Web applications and search engine optimization. Students will apply their knowledge by designing and building a business website that can actually make money. **Credit 3 (F, S)**

**MGIS-415** **Object-oriented Business Programming**  
Object-oriented Programming (OOP) will prepare students to plan and implement systems using the OO approach. This course will build on earlier programming classes, and will emphasize the programming practices of polymorphism, inheritance and data hiding. (MGIS-350 or equivalent) **Credit 3 (F)**

**MGIS-425** **Database Systems Development**  
This course builds upon the basic concepts from Database Management Systems (MGIS-320). Students work in a real-world business database development environment and gain hands-on experience in advanced database querying language, such as Oracle PL/SQL. Students learn to analyze business processes and, using tools such as Oracle, develop fully functioning database prototype systems to support them. (MGIS-320 or equivalent) **Credit 3 (F, S)**

**MGIS-435** **Advanced Systems Analysis and Design**  
Object-oriented analysis and design concepts and techniques are covered. Computer-aided software engineering (CASE) software and software quality metrics are introduced. Students that successfully complete this course and the prerequisite Systems Analysis & Design will have acquired a comprehensive foundational knowledge of systems analysis and design concepts currently used in systems development environments. (MGIS-330, junior status) **Credit 3 (S)**

**MGIS-445** **Web Systems Development**  
Students in this class will analyze business problems and develop data-driven Web applications to solve them. An industry-level application server will provide the framework for integrating and deploying a set of client and server technologies to create these applications. Development skills will include presenting and receiving information through a website, validating entered information, and storing entered information in text files or databases. Students will design solutions using Hypertext Markup Language, client scripting and server programs for database and file access. (MGIS-350 or equivalent, MGIS-320) **Credit 3 (F, S)**

**MGIS-450****Enterprise Systems**

This course explores the role of enterprise resource planning (ERP) systems in organizations. Students analyze cross-functional business processes and ERP systems commonly used to support these processes. Students engage in a hands-on project using a current ERP system, such as SAP R/3, to demonstrate, analyze and design system structures, key data elements and process configurations that support cross-functional business processes, including accounting, sales, material management, production and distribution. **Credit 3 (F)**

**MGIS-550****MIS Capstone**

This capstone course for MIS majors applies the concepts of project management and techniques for estimating, planning and controlling of resources to accomplish specific project goals. Students complete a team project requiring them to develop an innovative information system while utilizing project management techniques. Students analyze real business situations and develop IT-based innovative solutions for problems encountered. (MGIS-320, MGIS-330, MGIS-340, senior status) **Credit 3 (F, S)**

## Marketing

**MKTG-230****Principles of Marketing**

An introduction to the field of marketing, stressing its role in the organization and society. Emphasis is on determining customer needs and wants and how the marketer can satisfy those needs through the controllable marketing variables of product, price, promotion and distribution. (Sophomore status) **Credit 3 (F, S, Su)**

**MKTG-310****Marketing Metrics and Research**

A study of research methods used to understand the changing needs of customers in order to guide the decision-making of marketing managers. Emphasizes the data-driven elements of marketing by integrating key marketing metrics with marketing research. Topics include problem formulation, sources of marketing data, research design, data collection, selection and calculation of metrics and statistical analysis. (MKTG-230, STAT-146) **Credit 3 (F, S)**

**MKTG-320****Internet Marketing**

Internet marketing is critical to an organization's overall strategy. This course focuses on tactics and strategies that enable marketers to fully leverage the Internet. Topics include the overall Internet marketing landscape, technologies, customer segmenting and targeting, search, analytics and emerging Internet-marketing platforms. (MKTG-230) **Credit 3 (F, S)**

**MKTG-340****Product and Service Commercialization**

An introduction to the tools, skills, and knowledge required to minimize the inherent risks in commercialization of new products and services. This course will focus on marketing management techniques and processes that are common to commercialization, such as scanning the external environment, defining a product concept, capturing the Voice of the Customer, and creating marketing plans. (MKTG-230) **Credit 3 (S)**

**MKTG-350****Buyer Behavior**

A study of the determinants of buying behaviors. Emphasis is on identifying target markets and customer needs, internal and external influences on lifestyle and understanding the buying decision process. (MKTG-230) **Credit 3 (F, S)**

**MKTG-360****Professional Selling**

Selling concepts, tools, strategies, and tactics are discussed as they apply to both external and internal customers. Students learn and experience some of problems faced and rewards earned by those in professional sales. Customer relationship management/partnering with customers and truly seeking to meet their requirements are discussed as key to long-term success. (MKTG-230, junior status) **Credit 3 (F, S)**

**MKTG-370****Advertising and Promotion Management**

An in-depth view of tools of promotion management: advertising, sales promotion, public relations, personal selling, direct marketing and Internet marketing as well as new and alternative media. Basic concepts of how to use print, broadcast, Internet and out-of-home media are studied. Planning, budgeting, creative strategy and the roles of advertising agencies are also covered. (MKTG-230) **Credit 3 (F)**

**MKTG-410****Search Engine Marketing and Analytics**

An examination of search engine marketing strategies to maximize site traffic, lower customer acquisition costs and boost conversion rates. Marketing frameworks provide the basis for the hands-on examination of search engine marketing and web analytics. (MKTG-320) **Credit 3 (F, S)**

**MKTG-420****Advanced Internet Marketing**

An advanced course that gives students an in-depth knowledge of Internet theories, marketing problems, and processes. The course will enable students to critically evaluate the Internet marketing planning process. It integrates the core principles, tools and tactics necessary to succeed online. (MKTG-410), **Credit 3, (F, S)**

**MKTG-550****Marketing Management**

A capstone course that gives the student an in-depth knowledge of middle- and upper-management-level marketing problems and processes. Topics include tools used by marketing managers in the development, implementation and control of marketing plans. (MKTG-230, MKTG-310, senior status, one co-op completion) **Credit 3 (F, S)**

# B. Thomas Golisano College of Computing and Information Sciences

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Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

## Computing Exploration

**CINT-101** **Computing Exploration Seminar**  
A one credit-hour course for the Computing Exploration students, including an overview of the computing disciplines and an introduction to six computing and informatics academic programs: information technology, computer science, software engineering, information security and forensics, medical informatics, and networking and systems administration. Curricula requirements of the six programs and career opportunities in the computing fields are discussed. Potential employers discuss job opportunities. Introductions to the faculty, students, and laboratory facilities of the six programs are provided. Cooperative education, study abroad, and innovation fellowship program opportunities available to the students are explored. **Class 1, Lab 0, Credit 1 (F)**

## Computer Science

**CMPR-271** **Computational Problem Solving for Engineers**  
This course introduces computational problem solving. Basic problem-solving techniques and algorithm development through the process of top-down step-wise refinement and functional decomposition are introduced throughout the course. Classical numerical problems encountered in science and engineering are used to demonstrate the development of algorithms and their implementations. May not be taken for credit by computer science, software engineering, or computer engineering majors. This course is designed for electrical engineering and microelectronic engineering majors and students interested in the electrical engineering minor. (Calculus I, Calculus II corequisite) **Class 3, Credit 3 (F, S)**

**CSCI-101** **Principles of Computing**  
This course is designed to introduce students to the central ideas of computing. Students will engage in activities that show how computing changes the world and impacts daily lives. Students will develop step-by-step written solutions to basic problems and implement their solutions using a programming language. Assignments will be completed both individually and in small teams. Students will be required to demonstrate oral and written communication skills through such assignments as short papers, homework, group discussions and debates, and development of a term paper. Computer science majors may take this course only with department approval, and may not apply these credits toward their degree requirements. (None) **Class 3, Credit 3 (F)**

**CSCI-140** **Computer Science for AP Students**  
This accelerated course covers material from the first-year sequence of courses and provides the foundation for all subsequent computer science courses. The course stresses problem solving while covering modern software development techniques and introducing essential software tools. Topics include tree and graph structures, nested data structures, objects, classes, inheritance, interfaces, object-oriented collection class libraries for abstract data types (e.g., stacks, queues, maps, and trees), and static vs. dynamic data types. Concepts of object-oriented design are a large part of the course. Software qualities related to object orientation, namely cohesion, minimal coupling, modifiability, and extensibility, are all introduced in this course, as well as a few elementary object-oriented design patterns. Input and output streams, graphical user interfaces, and exception handling are covered. (Permission of department) **Lecture/Lab 6, Credit 4 (F)**

**CSCI-141** **Computer Science I—Introduction to Computational Problem Solving**  
This course serves as an introduction to computational thinking using a problem-centered approach. Specific topics covered include: expression of algorithms in pseudo code and a programming language; functional and imperative programming techniques; control structures; problem solving using recursion; basic searching and sorting; elementary data structures such as lists, trees, and graphs; and correctness, testing and debugging. Assignments (both in class and for homework) requiring a pseudo code solution and an implementation are an integral part of the course. An end-of-term project is also required. **Lecture/Lab 6, Credit 4 (F, S)**

**CSCI-142** **Computer Science II—Computational Problem Solving with Software Structures**  
This course delves further into problem solving by continuing the discussion of data structure use and design, but now from an object-oriented perspective. Key topics include more information on tree and graph structures, nested data structures, objects, classes, inheritance, interfaces, object-oriented collection class libraries for abstract data types (e.g., stacks, queues, maps, and trees), and static vs. dynamic data types. Concepts of object-oriented design are a large part of the course. Software qualities related to object orientation, namely cohesion, minimal coupling, modifiability, and extensibility, are all introduced in this course, as well as a few elementary object-oriented design patterns. Input and output streams, graphical user interfaces, and exception handling are covered. Students will also be introduced to a modern integrated software development environment (IDE). Programming projects will be required. (CSCI-141 Computer Science I) **Lecture/Lab 6, Credit 4 (F, S, Su)**

**CSCI-242** **Computer Science for Transfer Students**  
This course serves as a means of bringing transfer students with some programming and data structures background to the same skill level that the computer science program's first year students have after completing CSCI-141 and 142. Problem solving skills and the choice and application of appropriate algorithms and data structures are at the core of the course. Assignments (both in class and for homework) requiring a design and an implementation are an integral part of the course. Larger programming projects are also required. (Permission of department) **Lecture/Lab 6, Credit 4 (F)**

**CSCI-243** **The Mechanics of Programming**  
Students will be introduced to the details of program structure and the mechanics of execution as well as supportive operating system features. Security and performance issues in program design will be discussed. The program translation process will be examined. Programming assignments will be required. (CSCI-142 Computer Science II or CSCI-140 Computer Science for AP Students or CSCI-242 Computer Science for Transfer Students or permission of instructor) **Class 3, Credit 3 (F, S, Su)**

**CSCI-250** **Concepts of Computer Systems**  
An introduction to the hardware and software organization of computer systems. The course emphasizes a multilevel model of computer organization. Topics include the digital logic level; the micro architecture level; the machine instruction set level; the operating system level; and the assembly language level. Programming assignments will be required. (CSCI-243 The Mechanics of Programming and MATH-190 Discrete Mathematics for Computing) **Class 3, Credit 3 (F, S, Su)**



**CSCI-251** **Concepts of Parallel and Distributed Systems**  
This course is an introduction to the organization and programming of systems comprising multiple computers. Topics include the organization of multicore computers, parallel computer clusters, computing grids, client-server systems, and peer-to-peer systems; computer networks and network protocols; network security; multithreaded programming; and network programming. Programming projects will be required. (CSCI-243 The Mechanics of Programming or permission of instructor) **Class 3, Credit 3 (F, S, Su)**

**CSCI-261** **Analysis of Algorithms**  
This course provides an introduction to the design and analysis of algorithms. It covers a variety of classical algorithms and data structures and their complexity and will equip students with the intellectual tools to design, analyze, implement, and evaluate their own algorithms. (MATH-190 Discrete Mathematics for Computing or equivalent and CSCI-243 The Mechanics of Programming) **Class 3, Credit 3 (F, S, Su)**

**CSCI-262** **Introduction to Computer Science Theory**  
This course provides an introduction to the theory of computation, including formal languages, grammars, automata theory, computability, and complexity. (MATH-190 Discrete Mathematics for Computing or equivalent and CSCI-141 Computer Science I) **Class 3, Credit 3 (F, S, Su)**

**CSCI-263** **Honors Introduction to Computer Science Theory**  
This course provides a challenging introduction to the theory of computation with an emphasis on problem solving. Topics include formal languages, grammars, automata theory, computability, and complexity. (MATH-190 Discrete Mathematics for Computing or equivalent and CSCI-141 Computer Science I) **Class 3, Credit 3 (F)**

**CSCI-320** **Principles of Data Management**  
This course provides a broad introduction to the principles and practice of modern data management, with an emphasis on the relational database model. Topics in relational database systems include data modeling; the relational model; relational algebra; Structured Query Language (SQL); and data quality, transactions, integrity and security. Students will also learn approaches to building relational database application programs. Additional topics include object-oriented and object-relational databases; semi-structured databases (such as XML); and information retrieval. A database project is required. (MATH-190 Discrete Mathematics for Computing or equivalent, and CSCI-142 Computer Science II or equivalent, or permission of instructor) **Class 3, Credit 3 (F, S)**

**CSCI-331** **Introduction to Intelligent Systems**  
An introduction to the theories and algorithms used to create intelligent systems. Topics include search algorithms (e.g. A\*, iterative deepening), logic, planning, knowledge representation, machine learning, and applications from areas such as computer vision, robotics, natural language processing, and expert systems. Programming assignments are an integral part of the course. (CSCI-261 Analysis of Algorithms and MATH-251 Probability and Statistics I or permission of instructor) **Class 3, Tutorial 1, Credit 3 (F, S, Su)**

**CSCI-344** **Programming Language Concepts**  
This course is a study of the syntax and semantics of a diverse set of high-level programming languages. The languages chosen are compared and contrasted in order to demonstrate general principles of programming language design and implementation. The course emphasizes the concepts underpinning modern languages rather than the mastery of particular language details. Programming projects will be required. (One of the following: CSCI-243 The Mechanics of Programming, or SWEN-250 Personal Software Engineering, or IGME-309 Data Structures and Algorithms II, and in addition MATH-190 Discrete Mathematics for Computing or equivalent) **Class 3, Credit 3 (F, S, Su)**

**CSCI-351** **Data Communications and Networks I**  
This course is an introduction to the concepts and principles of computer networks. Students will design and implement projects using application protocols, and will study transport, network, and data link protocols and algorithms. The course also includes an introduction to local area networks, data transmission fundamentals, and network security. Programming projects will be required. (CSCI-243 The Mechanics of Programming and MATH-251 Probability and Statistics I) **Class 3, Credit 3 (F)**

**CSCI-352** **Operating Systems**  
An in-depth study of operating system concepts. Topics include process synchronization, interprocess communication, deadlock, multiprogramming and multiprocessing, processor scheduling and resource management, memory management, static and dynamic relocation, virtual memory, file systems, logical and physical I/O, device allocation, I/O processor scheduling, process and resource protection. Programming projects involving the development of or modification to operating system kernel features will be required. (CSCI-250 Concepts of Computer Systems and CSCI-251 Concepts of Parallel and Distributed Systems) **Class 3, Credit 3 (F)**

**CSCI-371** **Professional Communications**  
An introduction to the types of communication that are part of the life of a computing professional. Topics include: technical versus academic communication; models or theories of communication; audience analysis; determining the intent or basic purpose for any form of communication and deciding appropriate strategies to use to effectively communicate with the intended audience; common formats and required elements for typical documents; preparing and delivering effective presentations; developing and enhancing problem-solving, leadership, and conflict management skills when working in small groups; learning how to conduct effective group meetings; improving analytical, listening, and critiquing skills. (CSCI-142 Computer Science II or equivalent, or permission of instructor) **Class 3, Credit 3 (F, S, Su)**

**CSCI-420** **Principles of Data Mining**  
This course provides an introduction to the major concepts and techniques used in data mining of large databases. Topics include the knowledge discovery process; data exploration and cleaning; data mining algorithms; and ethical issues underlying data preparation and mining. Data mining projects, presentations, and a term paper are required. (STAT-145 Introduction to Statistics I or equivalent, and CSCI-142 Computer Science II or equivalent, or permission of instructor) **Class 3, Credit 3 (F, S)**

**CSCI-431** **Introduction to Computer Vision**  
An introduction to the underlying concepts of computer vision. The course will consider fundamental topics, including image formation, edge detection, texture analysis, color, segmentation, shape analysis, detection of objects in images and high level image representation. Depending on the interest of the class, more advanced topics will be covered, such as image database retrieval or robotic vision. Programming homework assignments that implement the concepts discussed in class are an integral part of the course. (CSCI-331 Introduction to Intelligent Systems) **Class 3, Credit 3 (F, S)**

**CSCI-452** **Systems Programming**  
Application of operating system concepts to the design of hardware interfaces for a multiprogramming environment. Laboratory work includes the development of a multiprogramming (optionally, multiprocessing) kernel with system call and interrupt handling facilities, and the building of device drivers for a variety of peripheral devices. This course provides extensive experience with those aspects of systems programming that deal directly with the hardware interface. A significant team programming project is a major component of this course. (CSCI-352 Operating Systems) **Class 3, Credit 3 (S)**

**CSCI-453** **Computer Architecture**  
Computer Architecture is a study of the design of both modern and classic computer hardware. Topics include: a review of classical computer architectures; the design of operation codes and addressing modes, data formats, and their implementation; internal and external bus structures; architectural features to support virtual storage and page-replacement policies, high-level language features, and operating systems. Students will write programs which simulate the organization of several different processor architectures to help further their understanding of design choices. (CSCI-352 Operating Systems or permission of instructor) **Class 3, Credit 3 (S)**

**CSCI-455** **Principles of Computer Security**  
This course provides a broad introduction to the basic principles and practice of computer security and emphasizes policies and mechanisms for building secure computer systems. Topics include but are not limited to the following: security policies and mechanisms; basic cryptography used in security; secure coding and programs; secure operating systems; secure networks; secure data management; secure application development; mobile device security; web security; privacy; security administration; and legal and ethical issues. Presentations and projects will be required. (CSCI-251 Concepts of Parallel and Distributed Systems or permission of instructor) **Class 3, Credit 3 (S)**

**CSCI-462** **Introduction to Cryptography**  
This course provides an introduction to cryptography, its mathematical foundations, and its relation to security. It covers classical cryptosystems, private-key cryptosystems (including DES and AES), hashing and public-key cryptosystems (including RSA). The course also provides an introduction to data integrity and authentication. (MATH-190 Discrete Mathematics for Computing or equivalent and CSCI-243 The Mechanics of Programming) **Class 3, Credit 3 (F, S, Su)**

**CSCI-464** **Xtreme Theory**  
A fast paced, informal look at current trends in the theory of computing. Each week is dedicated to a different topic and will explore some of the underlying theory as well as the practical applications of the theory. Sample topics may include: quantum cryptography, networks and complex systems, social welfare and game theory, zero knowledge protocols. Students will be evaluated on homework assignments and a final presentation. (MATH-190 Discrete Mathematics for Computing or equivalent and CSCI-142 Computer Science II) **Class 3, Credit 3 (F every other year)**

**CSCI-499** **Computer Science Undergraduate Co-op**  
Students perform professional work related to Computer Science for which they are paid. Students work full time during the term for which they are registered. Students must complete a student co-op work report for each term for which they are registered; students are also evaluated each term by their employer. A satisfactory grade is given for co-op when both a completed student co-op work report and a completed, corresponding employer evaluation are received and when both documents are generally consistent. (Second year standing (or higher) and permission of department) **Credit 0 (F, S, Su)**

**CSCI-510** **Introduction to Computer Graphics**  
Introduction to Computer Graphics is a study of the hardware and software principles of interactive raster graphics. Topics include an introduction to the basic concepts, 2D and 3D modeling and transformations, viewing transformations, projections, rendering techniques, graphical software packages and graphics systems. The course will focus on rasterization techniques and emphasize the hardware rasterization pipeline including the use of hardware shaders. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Programming projects will be required. (MATH-241 Linear Algebra and CSCI-243 The Mechanics of Programming and CSCI-250 Concepts of Computer Systems or permission of instructor) **Class 3, Credit 3 (F, S)**

**CSCI-519** **Seminar in Computer Graphics**  
This course examines current topics in computer graphics. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the computer graphics and visualization cluster. (Varies) **Class 3, Credit 3 (Varies)**

**CSCI-529** **Seminar in Data Management**  
This course examines current topics in Data Management. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the data management cluster, the security cluster, or both clusters. (Varies) **Class 3, Credit 3 (Varies)**

**CSCI-531** **Introduction to Security Measurement**  
The course will introduce students into the algorithmic foundations and modern methods used for security evaluation and tools design. It will combine a theoretical revision of the methods and models currently applied for computer security evaluation and an investigation of computer security through the study of user's practice. The students will be required to complete a few homework assignments, to deliver a class presentation and to implement a team project. (CSCI-351 Data Communications and Networks I or permission of instructor) **Class 3, Credit 3 (F)**

**CSCI-532** **Introduction to Intelligent Security Systems**  
The course will introduce students to the application of intelligent methodologies in computer security and information assurance systems design. It will review different application areas such as intrusion detection and monitoring systems, access control and biological authentication, firewall structure and design. The students will be required to implement a course project on design of a particular security tool with an application of an artificial intelligence methodology and to undertake its performance analysis. (CSCI-331 Introduction to Intelligent Systems or CSCI-351 Data Communications and Networks I or permission of instructor) **Class 3, Credit 3 (S)**

**CSCI-539** **Seminar in Intelligent Systems**  
This course examines current topics in Intelligent Systems. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the intelligent systems cluster, the computational vision and acoustics cluster, the security cluster, or some combination of these three clusters. (Varies) **Class 3, Credit 3 (Varies)**

**CSCI-541** **Programming Skills**  
The goal of this course is to introduce the students to a programming paradigm and an appropriate programming language chosen from those that are currently important or that show high promise of becoming important. A significant portion of the learning curve occurs through programming assignments with exemplary solutions discussed later in class. The instructor will post specifics prior to registration. With the approval of the program coordinator, the course can be taken for credit more than once, provided each instance deals with a different paradigm and language. (CSCI-344 Programming Language Concepts or permission of instructor) **Class 3, Credit 3 (F, S)**

**CSCI-549** **Seminar in Languages and Tools**  
This course examines current topics in Languages and Tools. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the languages and tools cluster, the security cluster, or both clusters. (Varies) **Class 3, Credit 3 (Varies)**

**CSCI-559** **Seminar in Systems**  
This course examines current topics in Systems. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the distributed systems cluster, the architecture and operating systems cluster, the security cluster, or some combination of these three clusters. (Varies) **Class 3, Credit 3 (Varies)**

**CSCI-569** **Seminar in Theory**  
This course examines current topics in Theory. This is intended to allow faculty to pilot potential new undergraduate offerings. Specific course details (such as prerequisites, course seminar, format, learning outcomes, assessment methods, and resource needs) will be determined by the faculty member(s) who propose a specific seminar course in this area. Specific course instances will be identified as belonging to the theory cluster, the security cluster, or both clusters. (Varies) **Class 3, Credit 3 (Varies)**

**CSCI-571** **Honors Capstone Research**  
This course allows students to pursue two threads of research in computer science. One thread is the discovery and analysis of previous work in the field. Students will select, read and collectively discuss papers from conferences and journals in CS. A survey paper on a topic of the student's choice will be required. The other thread is an independent project. Students will select a topic, lay out weekly goals, and meet with the instructor weekly. A final report and presentation will be required. (At least fourth-year standing or permission of instructor) **Class 3, Credit 3 (F, S)**

**CSCI-599 Computer Science Undergraduate Independent Study**  
Students work with a supervising faculty member on topics of mutual interest. A student works with a potential faculty sponsor to draft a proposal that describes what a student plans to do, what deliverables are expected, how the student's work will be evaluated, and how much credit will be assigned for successful completion of the work. The faculty sponsor proposes the grade, but before the grade is officially recorded, the student must submit a final report that summarizes what was actually accomplished. (Permission of instructor and department) **Credit 1-3 (F, S, Su, I)**

## **Computing Security**

**CSEC-101 Fundamentals of Computing Security**  
An introduction to the fundamental issues, concepts and tools common to all areas of computing security. Topics include identifying attackers and their motivations. Essential techniques will be introduced covering the areas of anti-virus, monitoring, virtual machines, account control, and access rights management. Various security models will be investigated. Concept areas such as confidentiality, integrity, availability and privacy will be studied. **Class 3, Credit 3 (F, S)**

**CSEC-210 Cyber Self Defense**  
This course will examine cyber security from a computer user's perspective to provide students with a basic understanding of the risks they face, how best to prepare to withstand attacks, and what to do if they are attacked. This course will teach students how to recognize a potential cyber attacker and identify their own vulnerabilities so that they can defend themselves, their information and their identity. Students will also gain insight into the societal, legal, and ethical impact of digital crime. This class is for non-computing majors only and qualifies for the general education credit. **Class 3, Credit 3 (F, S)**

**CSEC-362 Cryptography and Authentication**  
As more users access remote systems, the job of identifying and authenticating those users at distance becomes increasingly difficult. The growing impact of attackers on identification and authentication systems puts additional strain on our ability to ensure that only authorized users obtain access to controlled or critical resources. This course introduces encryption techniques and their application to contemporary authentication methods. (CSEC-101 Fundamentals of Information Security) **Class 3, Credit 3 (F, S)**

**CSEC-363 Cyber Security Policy and Law**  
In this course, students will study the need for information security policies, procedures and standards. Students will write security policies and examine cases used as precedent for current laws. Other topics may include, but are not limited to, trust models, security policy design, incident response, and review of legal cases. (CSEC-101 Fundamentals of Information Security) **Class 3, Credit 3 (F, S)**

**CSEC-461 Computer System Security**  
This course will discuss the areas of liability, exposure, opportunity, ability and function of various weaknesses in computer security. The course will cover forms of attack and the methods to detect and defend against them. The issues and facilities available to both the intruder and administrator will be examined and evaluated with appropriate out-of-class laboratory exercises to illustrate their effect. (CSEC-101 Fundamentals of Information Security, NSSA-322 Systems Administration II) **Class 3, Credit 3 (F)**

**CSEC-462 Network Security and Forensics**  
This course investigates the many facets of network security and forensics. Students will examine the areas of intrusion detection, evidence collection, network auditing, network security policy design and implementation as well as preparation for and defense against attacks. The issues and facilities available to both the intruder and data network administrator will be examined and evaluated with appropriate laboratory exercises to illustrate their effect. (CSEC-101 Fundamentals of Information Security, NSSA-242 Networking II, and NSSA-243 Networking Lab) **Class 3, Credit 3 (S)**

**CSEC-463 Sensor Network Security**  
This course will provide students with an introduction to sensor networks and the security concepts related to sensor networks. The unique networking and security challenges will be presented. Students will work on a related research problem identified in consultation with the instructor. The instructor will work with the students closely and guide them in the implementation and testing of the research ideas. (NSSA-242 Networking II, CSEC-362 Cryptography and Authentication, and CSCI-242 Computer Science for Transfer Students) **Class 3, Credit 3 (F)**

**CSEC-464 Computer System Forensics**  
An investigation of the tasks of incident response and computer system forensics will be pursued. Students will learn the basic procedure for incident response as well as the tools needed to uncover the activities of computer users (deleted and hidden files, cryptographic steganography, illegal software, etc.). Students will also learn to employ the activities needed to gather and preserve this evidence to ensure admissibility in court. (NSSA-221 Systems Administration I) **Class 2, Credit 3 (F)**

**CSEC-465 Network and System Security Audit**  
This course will provide students with an introduction to the processes and procedures for performing a technical security audit of systems and networks. Students will explore state-of-the-art auditing techniques and apply appropriate tools to audit systems and network infrastructure components. In addition, students will write and present their audit reports on vulnerabilities as well as recommendations to fix any problems discovered. (NSSA-221 Systems Administration I, NSSA-241 Networking I) **Class 3, Credit 3 (F)**

**CSEC-466 Introduction to Malware**  
Computer malware is a computer program with malicious intent. In this course, students will study the history of computer malware, categorizations of malware such as computer viruses, worms, Trojan horses, spyware, etc. Other topics include, but are not limited to, basic structures and functions of malware, malware delivery mechanism, propagation models, anti-malware software, its methods and applications, reverse engineering techniques. (CSEC-362 Cryptography and Authentication, NSSA-322 System Administration II, CSEC-363 Cyber Security Policy and Law) **Class 3, Credit 3 (F)**

**CSEC-467 Mobile Device Security and Forensics**  
This course will be an in-depth study of security, incident response, and forensics as applied to the hardening and protection of mobile devices. Students will learn issues specific to the security of and vulnerabilities of mobile devices as well as forensics tools and incident response techniques used to reveal activities and information related to mobile devices. (NSSA-221 Systems Administration I) **Class 3, Lab 0, Credit 3 (F)**

**CSEC-468 Risk Management for Information Security**  
The three key elements of risk management will be introduced and explored. These are risk analysis, risk assessment, and vulnerability assessment. Both quantitative and qualitative methodologies will be discussed as well as how security metrics can be modeled, monitored, and controlled. Several case studies will be used to demonstrate the risk management principles featured throughout the course. Students will work in teams to conduct risk assessments on the selected case study scenarios. They will develop mitigation plans and present the results of their analysis both in written reports and oral presentations. (NSSA-221 Systems Administration I, third-year standing) **Class 3, Credit 3 (F)**

**CSEC-469 Wireless Security**  
This course is designed to give the student an understanding of the theories and ideas regarding 802.11 network security. In addition, students will receive practical knowledge via hands on experiences. Course topics cover the TCP/IP networking model and include modules such as signal interception, basic 802.11 layer 2 security, ACLs, VPNs, encryption, authentication and 802.1x architectures. The course culminates in an attack/defend exercise in which teams determine the weaknesses of the surrounding networks while protecting their own. (NSSA-242 Networking II) **Class 3, Credit 3 (S)**

**CSEC-470 Covert Communications**  
Covert communications have been employed in the past in traditional information warfare. Today with huge amounts of digital information exchanged in our cyber space and covert communication will become a potential tool for information warfare inside the space. Students will be introduced to the history, theory, methodology and implementation of various kinds of covert communications. Students will explore future techniques and uses of covert communications. More specifically students will explore possible uses of covert communications in the management of botnets. Students will conduct research in this topic area and will write a research paper on their research. Students will be required to submit their paper for publication in a peer-reviewed venue. (Fourth-year standing and permission of instructor) **Class 3, Credit 3 (F)**

**CSEC-471 Penetration Testing Frameworks and Methodologies**  
The process and methodologies employed in negotiating a contract, performing a penetration test, and presenting the results will be examined and exercised. Students will be exposed to tools and techniques employed in penetration testing. Assignments will explore the difficulties and challenges in planning for and conducting an assessment exposing potential vulnerabilities. Students will develop a metric used to evaluate the security posture of a given network and will develop a coherent and comprehensive report of their findings to present to their client. Particular attention will be paid to the ramifications of the findings toward the security of the targets. (Third-year standing) **Class 3, Credit 3 (S)**

**CSEC-472 Authentication and Security Models**  
As more users access remote systems, the job of identifying and authenticating those users at distance becomes increasingly difficult. The growing impact of attackers on identification and authentication systems puts additional strain on our ability to ensure that only authorized users obtain access to controlled or critical resources. This course reviews basic cryptology techniques and introduces their application to contemporary authentication methods. (CSCI-462 Introduction to Cryptography) **Class 3, Credit 3 (S)**

**CSEC-473 Cyber Defense Techniques**  
Students will study, build, defend and test the security of computer systems and networking infrastructure while potentially under attack. Students will gain an understanding of standard business operations, timelines and the value of risk and project management. Techniques as related to security guidelines and goals will be studied. Aspects of legal requirements, inheriting existing infrastructure, techniques for back-up and recovery of data and systems will be examined. (Third-year standing) **Class 3, Credit 3 (F)**

**CSEC-474 Linux System Forensics**  
This course is designed to provide students with the ability to identify and employ forensics techniques for gathering, preserving and analyzing evidence on Linux/Unix systems, and to report the pertinent evidence to the courts. The course emphasizes both the fundamental computer forensics procedures and the hands-on experience of utilizing forensics tools to uncover pertinent evidence from memory, allocated and unallocated space, and other Linux artifacts including log files, deleted files, browser history, emails, etc. Students will also follow and practice the forensically sound procedures to ensure evidence admissibility in court. (NSSA-221 Systems Administration I) **Class 3, Credit 3 (S)**

**CSEC-475 Windows System Forensics**  
This course is designed to provide students with the ability to identify and employ forensics techniques for gathering, preserving and analyzing evidence on Windows systems, and to report the pertinent evidence to the courts. The course emphasizes both the fundamental computer forensics procedures and the hands-on experience of utilizing the Windows forensics tools to uncover pertinent evidence from memory, allocated and unallocated space, and other Windows artifacts including registry, recycle bin, Internet Explorer, emails, etc. Students will also follow and practice the forensically sound procedures to ensure evidence admissibility in court. (NSSA-221 Systems Administration I or equivalent) **Class 3, Credit 3 (S)**

**CSEC-476 Malware Reverse Engineering**  
This course provides an overview of basic concepts, techniques, and tools of malware reverse engineering. Students will learn how to perform reverse engineering to discover hidden software functions and hidden network communication techniques and protocols. Students will also learn techniques to protect against software reverse engineering. (CSCI-250 Concepts of Computer Systems and CSEC-466 Introduction to Malware or equivalent) **Class 3, Credit 3 (S)**

**CSEC-490 Capstone in Computing Security**  
This is a capstone course for students in the information security and forensics program. Students will apply knowledge and skills learnt and work on real world projects in various areas of computing security. Projects may require performing security analysis of systems, networks, and software, etc., devising and implementing security solutions in real world applications. (Fourth-year status) **Class 3, Credit 3 (F, S)**

**CSEC-499 Cooperative Education in CSEC**  
Students will gain experience and a better understanding of the application of technologies discussed in classes by working in the field of computing security. Students will be evaluated by their employer. If a transfer student, they must have completed one term in residence at RIT and be carrying a full academic load. (Permission of the department) **Class 0, Credit 0 (F, S, Su)**

**CSEC-599 Independent Study in CSEC**  
Students will work with a supervising faculty member on a project of mutual interest. Project design and evaluation will be determined through discussion with the supervising faculty member and documented through completion of an independent study form to be filed with the department of computing security. (Permission of the instructor) **Credit Variable 1-6 (F, S, Su)**

## Information Sciences and Technologies

**ISTE-100 Computational Problem Solving in the Network Domain I**  
A first course in using the object-oriented approach in the network domain. Students will learn to design software solutions using the object-oriented approach, to implement software solutions using a contemporary programming language, and to test these software solutions. Topics include thinking in object-oriented terms, problem definition, designing solutions using the object-oriented approach, implementing solutions using a contemporary programming language, and testing software solutions. Programming projects will be required. **Class 6, Credit 4 (F, S)**

**ISTE-101 Computational Problem Solving in the Network Domain II**  
A second course in object-oriented problem solving in the network domain. Students will learn to develop software for the applications layer of the protocol stack. Topics include data structures, network processes, network protocols, and network security. Programming projects will be required. (ISTE-100 Comp Prob Solve Net Domain I) **Class 6, Credit 4 (F, S)**

**ISTE-105 Web Foundations**  
A hands-on introduction to Internet and web foundations for non-computing majors. Includes HTML (Hypertext Markup Language) and CSS (Cascading Stylesheets), Web page design fundamentals, basic digital image manipulation, and website implementation and maintenance. Students will design and build their own websites using the latest technologies and deploy them to the Web for world-wide access. **Class 3, Credit 3 (F, S, Su)**

**ISTE-110 Ethics in Computing**  
Computing and the Internet are now integral parts of our lives. In this course, we consider and discuss how ethical theories and principles can inform and provide guidance about interactions and uses of computing technologies. Topics include the development interpretation, and application of ethical theory, moral values, personal responsibility, codes of conduct, ethics in the real and virtual worlds, intellectual property, and information security. This is a writing intensive (WI) course. Students are provided with guidance and opportunities for improving informal and formal writing skills. Grades received on writing assignments will constitute a significant component of the final course grade. **Class 3, Credit 3 (F, S)**

**ISTE-120 Computational Problem Solving in the Information Domain I**  
A first course in using the object-oriented approach to solve problems in the information domain. Students will learn to model hierarchical information structures using XML, to design software solutions using the object-oriented approach, to visually model systems using UML, to implement software solutions using a contemporary programming language, and to test these software solutions. Additional topics include thinking in object-oriented terms, and problem definition. Programming projects will be required. **Class 6, Credit 4 (F, S)**

**ISTE-121 Computational Problem Solving in the Information Domain II**  
A second course in using the object-oriented approach to solving problems in the information domain. Students will learn: basic design principles and guidelines for developing graphical user interfaces, and use of the event model to implement graphical interfaces; algorithms for processing data structures; multithreading concepts and use of the multithreading model to design and implement advanced processing methods. Additional topics include the relational model of information organization, and the client-server model. Individual implementation projects are required. A team implementation exercise is used to provide students an opportunity to apply basic software development and project management practices in the context of a medium-scale project. (ISTE-120 Comp Prob Solve Info Domain I) **Class 6, Credit 4 (F, S)**

**ISTE-140 Web I**  
This course provides students with an introduction to Internet and Web technologies, and to development on Macintosh/UNIX computer platforms. Topics include Internet transport protocols and security methods, XHTML and CSS, multimedia, Web page design and website publishing. Emphasis is placed on fundamentals, concepts and standards. Additional topics include the user experience, mobile design issues, and copyright/intellectual property considerations. Exercises and projects are required. **Lecture/Lab 3, Credit 3 (F, S)**

**ITSE-190 Foundations of Modern Information Processing**  
Computer-based information processing is a foundation of contemporary society. This course provides an overview of modern information processing technologies, applications, practices and trends. An emphasis is placed on how these technologies shape information environments and how participants in these environments are able to access, process, and use data and information. Topics include computing system fundamentals, models for organizing data and information, data exploration and knowledge discovery, Internet and the Web, social computing, information security and privacy, and current trends and futures. **Class 3, Credit 3 (F, S)**

**ISTE-200 Java for Programmers**  
An intensive review of object-oriented design and the Java programming language for students with prior programming background. This course covers the creation of application programs using Java. Topics include: Java and the Java environment, object-oriented design, GUI interfaces, exception handling, threads, and the client/server environment. Programming projects will be required. (A two-course object-oriented programming sequence). **Lecture/Lab 5, Credit 3 (F)**

**ISTE-205 Digital Image Creation**  
This course explores the creation and manipulation of digital images intended for use on the Web. Topics include basics of digital photography, acquisition of images, intermediate image manipulation, image compression, and intellectual property issues. Students will be provided with digital cameras for use in the course. (ISTE-105 Web Foundations or ISTE-140 Web I) **Class 3, Credit 3 (F, Su)**

**ISTE-206 Digital Video Creation**  
This course explores the creation of digital video intended for use on the Web. Topics include basics of digital videography, acquisition of audio, editing, streaming, compression, as well as storytelling with video and integration into websites and applications. Students will be provided with digital cameras for use in the course. (ISTE-105 or ISTE-140) **Class 3, Credit 3 (S)**

**ISTE-230 Introduction to Database and Data Modeling**  
A presentation of the fundamental concepts and theories used in organizing and structuring data. Coverage includes the data modeling process, basic relational model, normalization theory, relational algebra, and mapping a data model into a database schema. Structured Query Language is used to illustrate the translation of a data model to physical data organization. Modeling and programming assignments will be required. (One course in object-oriented programming) **Class 3, Credit 3 (F, S, Su)**

**ISTE-240 Web II**  
This course builds on the basics of Web page development that are presented in Web I and extends that knowledge to focus on theories, issues, and technologies related to the design and development of websites. An overview of Web design concepts, including usability, accessibility, information architecture, and graphic design in the context of the Web will be covered. Introduction to website technologies, including HTTP, Web client and server programming, and dynamic page generation from a database also will be explored. Development exercises are required. (ISTE-121, ISTE-140; corequisite ISTE-260) **Class 3, Credits 3 (F, S)**

**ISTE-260 Designing the User Experience**  
The user experience is an important design element in the development of interactive systems. This course presents the foundations of user-centered design principles within the context of human-computer interaction (HCI). Students will explore and practice HCI methods that span the development lifecycle from requirements analysis and creating the product/service vision through system prototyping and usability testing. Leading edge interface technologies are examined. Group-based exercises and design projects are required. (ISTE-140 Web I; corequisite ISTE-240 Web II) **Class 3, Credit 3 (F, S)**

**ISTE-270 Data Exploration and Knowledge Discovery**  
Rapidly expanding volumes of data from all areas of society are becoming available in digital form. High value information and knowledge is embedded in many of these data volumes. Unlocking this information can provide many benefits, and may also raise ethical questions in certain circumstances. This course provides students with a gentle, hands-on introduction to how interactive data exploration and data mining software can be used for data-driven knowledge discovery. Students will use statistical, visual, and data/text mining software systems to explore data collections from several different domains such as business, environmental management, healthcare, finance, and transportation. (STAT-145 Intro to Statistics or equivalent). **Class 3, Credit 3 (F, S)**

**ISTE-271 Introduction to Informatics**  
This course introduces students to the world of Informatics and provides them with tools to begin working as an informatician. Students learn the breadth of informatics and the roles informaticians play. Tools for working with XML and spreadsheets are presented. The course utilizes extensive hands-on computing, but no programming experience is necessary. **Class 2, Credit 2 (F)**

**ISTE-305 Rapid Online Presence**  
Although large-scale websites still require considerable development effort, there are today several options for establishing a Web presence using tools designed for non-programmers. This course gives students understanding of and experience with installing and customizing websites using tools such as blogs, wikis, content management systems, and website toolkits. (ISTE-105 Web Foundations) **Class 3, Credit 3 (F, S)**

**ISTE-330 Database Connectivity and Access**  
In this course, students will build applications that interact with databases. Through programming exercises, students will work with multiple databases and programmatically invoke the advanced database processing operations that are integral to contemporary computing applications. Topics include the database drivers, the data layer, connectivity operations, security and integrity, and controlling database access. (ISTE-230 Introduction to Database and Data Modeling) **Class 3, Credit 3 (F, S)**

**ISTE-340 Client Programming**  
This course will explore the analysis, design, development, and implementation of client-side programming in the context of Internet technologies, mobile devices, Web-based client systems and desktop applications. Students will learn to design and build usable and effective interactive systems, clients, and interfaces. Key features addressed will include browser and platform compatibility, object reusability, bandwidth and communications issues, development environments, privacy and security, and related technologies and APIs. Programming is required. (ISTE-240 Web II) **Class 3, Credit 3 (F, S)**

**ISTE-341 Server Programming**  
This course provides in-depth work in server-side programming. Students will develop dynamic, data centric webpages and systems, and server-side information services that will be available to clients implemented in a variety of software technologies. Topics include XML parsing, generation, and consumption; Web configuration and security; design patterns; Web service structures, and application security. Programming projects are required. (ISTE-330 Database Connectivity and Access and ISTE-340 Client Programming; corequisite: SWEN-383 Software Design Principles and Patterns). **Class 3, Credit 3 (F, S)**

**ISTE-371 Integration in Informatics**  
This course is the capstone for the Applied Informatics Minor. Students will use mashup tools along with their programming and database skills to develop a project, based on their major's domain, which demonstrates the work of an informatician. The course utilizes extensive hands-on computing, including programming and database work. **Class 2, Credit 2 (F)**

**ISTE-382 Introduction to Geospatial Technologies**  
This course provides a survey of underlying concepts and technologies used to represent and understand the earth, collectively referred to as Geospatial Technologies (GTs). Students will gain hands-on experience with GTs, including Global Positioning Systems (GPSs), Geographic Information Systems (GISs), remote sensing, Virtual Globes, and Web mapping mashups. Students also will develop basic spatial thinking, reasoning, problem solving and literacy skills. **Class 3, Credit 3 (F)**

**ISTE-384 Introduction to Geographic Information Systems**  
This course introduces students to Geographic Information Systems (GIS). Course lectures, reading assignments, and practical lab experiences will cover a mix of conceptual, practical and technical GIS topics. Topics include GIS data models, basic cartography, geodatabases, spatial data acquisition and creation, spatial analysis, and GIS software operation. (ISTE-382 Intro to Geo Information Sys) **Class 3, Credit 3 (S)**

**ISTE-386 Geographic Information Systems (GIS) Programming**  
Any serious interest in Geographic Information System (GIS) beyond the “out-of-the-box” capabilities of standard commercial GIS software such as ESRI’s ArcGIS platform requires knowledge of how to program a GIS. Knowledge of how to program a GIS extends the capabilities and possibilities of GIS in numerous scientific, technical, and applied dimensions not possible with “out-of-the-box” GIS capabilities. This course is targeted to students with a serious interest in GIS who wish to apply previously learned object oriented programming concepts within the context of Geographic Information System (GIS) application development across a variety of environments. (A programming course [ISTE-100 or ISTE-120 or similar] and ISTE-382 Intro to GIS) **Class 3, Credit 3 (S)**

**ISTE-392 Fundamentals of Instructional Technology**  
Instructional Technology encompasses the basic processes for developing and delivering instruction. Instructional Systems Design (ISD) is a well-established methodology for describing knowledge and skills and developing instructional systems to effectively conveying knowledge. This course enables the student to be able to plan, organize, and systematically develop instructional materials. The course uses an ISD model to analyze, design, deliver, and evaluate instruction. **Class 3, Credit 3 (F)**

**ISTE-394 Interactive Courseware**  
Computer software that teaches is referred to as courseware. This course is a continuation of Fundamentals of Instruction Technology (ISTE-392), and serves as a transition from general instructional design principles to the actual application of these principles in a computer-based environment. Although the basic principles of instructional design hold true in all media environments, using these teaching and learning principles is somewhat different when developing instruction that will be delivered by computer. This course teaches procedures that already have been successful in the design and development of courseware. (ISTE-392 Fund Instruct Technology, ISTE-121 Comp Prob Solve Info Domain II, or equivalent programming background) **Class 3, Credit 3 (S)**

**ISTE-405 Web Integration and Application**  
The final course in the minor in Web design and development (for non-GCCIS majors). Students will develop a deeper understanding of technologies underlying the Web and how to combine them. This course builds upon the work from the preceding four courses in the minor and emphasizes integrating multiple technologies and content sources to create sophisticated websites and Web applications for desktop and mobile devices. This course is not available to GCCIS majors. (ISTE-105, ISTE-205, ISTE-305, IGME-431) **Class 3, Credit 3 (S)**

**ISTE-422 Application Development Practices**  
In this course, students will gain experience with the processes, practices, and tools professional developers use to deliver robust and maintainable applications. Students will apply these practices and tools to build smaller-scale production-quality applications and systems. Topics include development life cycles, version control, test bed development and use, build utilities, error handling, deployment tools, and documentation. (ISTE-121 Comp Prob Solve Info Domain II) **Class 3, Credit 3 (F)**

**ISTE-424 Distributed Application Systems Development**  
Program code and functionality of larger-scale systems are typically distributed across multiple servers. In this course, students will work with messaging middleware and enterprise development frameworks typically used in industry. Programming projects will be required (ISTE-341 Server Programming, SWEN-383 Software Design Principles and Patterns) **Class 3, Credit 3 (S)**

**ISTE-430 Information Requirements Modeling**  
Students will survey and apply contemporary techniques used in analyzing and modeling information requirements. Requirements will be elicited in a variety of domains and abstracted at conceptual, logical, and physical levels of detail. Process, data, and state modeling will be applied in projects that follow a systems development lifecycle. Object-oriented modeling will be explored and contrasted with data and process oriented modeling. Individual and team modeling assignments will be required. (ISTE-230-Introduction to Database and Data Modeling) **Class 3, Credit 3 (F, S)**

**ISTE-432 Database Application Development**  
Database applications have aspects that need to be considered when designing and developing larger-scale systems. In this course students will explore topics such as concurrent processing, scalability, performance, and security within the context of developing larger-scale data/base information processing systems. Programming projects are required (ISTE-330 Database Connectivity and Access). **Class 3, Credit 3 (F)**

**ISTE-434 Data Warehousing**  
This course covers the purpose, scope, capabilities, and processes used in data warehousing technologies for the management and analysis of data. Students will be introduced to the theory of data warehousing, dimensional data modeling, the extract/transform/load process, warehouse implementation, and summary-data management. The basics of data mining and importance of data security will also be discussed. Hands-on exercises include implementing a small-scale data warehouse. (ISTE-230 Intro to Database and Data Model and third-year standing) **Class 3, Credit 3 (S)**

**ISTE-436 Database Management and Access**  
Students will be introduced to issues in client/server database implementation and administration. Students will configure, test, and establish client-server communication and server-server communication with single and multiple database servers. Topics such as schema implementation, storage allocation and management, user creation and access security, backup and recovery, and performance measurement and enhancement will be presented in lecture and experienced in a laboratory environment. Students will configure and demonstrate successful communication between a database file server and multiple clients. (ISTE-330 Database Connectivity And Access) **Class 3, Credit 3 (S)**

**ISTE-442 Web Application Development**  
When building larger-scale Web applications, there are a myriad of concerns that range from technology, framework, and architecture selection to runtime performance optimization. This course focuses on the development of integrated Web applications that consume information served from one or many sources. Trends in Web application development are identified and assessed. Programming projects are required. (ISTE-341 Server Programming, ISTE-432 Database Application Development) **Class 3, Credit 3 (S)**

**ISTE-444 Web Server Development and Administration**  
Web developers often need to go beyond building Web pages and client-server programming to plan, install, configure, develop, and maintain the Web servers that host their sites. They need to understand issues of scalability, performance, and security as they apply to deploying a Web presence. This course provides a practical hands-on approach to development, configuration, and administration of Web server platforms. Topics include issues of and approaches to scalability, multiple server systems, security, and auditing, as well as the many configuration options, modules, and server alternatives available. (ISTE-341 Server Programming) **Class 3, Credit 3 (S)**

**ISTE-452 Foundations of Mobile Design**  
This course is an introduction to designing, prototyping, and creating applications and Web Apps for mobile devices. These devices include a unique set of hardware and communications capabilities, incorporate novel interfaces, are location aware, and provide persistent connectivity. Topics covered include user interaction patterns, connectivity, interface design, software design patterns, and application architectures. Programming projects are required. (ISTE-240 Web II). **Class 3, Credit 3 (F)**

**ISTE-454 Mobile Application Development I**  
This course extends the material covered in the Foundations of Mobile Design course and provides students with experience writing native applications for mobile devices such as smartphones in one of the current major platforms. These devices are exceptionally portable, have unique sets of hardware and communications capabilities, incorporate novel interfaces, are location aware, and provide persistent connectivity. Students are encouraged to make use of these unique characteristics and operating properties to develop innovative applications. Programming projects are required. (ISTE-452 Foundations of Mobile Design, ISTE-341 Server Programming, or instructor permission) **Class 3, Credit 3 (S)**

**ISTE-456 Mobile Application Development II**  
This course extends the Mobile Application Development I experience and provides students with experience writing native and hybrid applications for mobile devices such as smartphones in one or more of the current major platforms not covered in prior courses. In addition, this course will include advanced concepts not previously covered. Programming projects are required. (ISTE-454 Mobile Application Development I or instructor permission) **Class 3, Credit 3 (S)**

**ISTE-472** **Text Analytics**  
This course covers fundamental concepts and technologies for the management and analysis of unstructured textual data. Topics include encoding, indexing, preprocessing, storing, searching, processing, and presenting textual information using fully automatic systems. Analytic techniques, such as categorization and clustering, and link analysis, are introduced that allow students to process and analyze textual data, discover patterns and knowledge, and interpret the results. Students use text analytics existing APIs and tools to design experiments for exploring the behavior of basic text analytic techniques. (ISTE-121 Comp Prob Solve Info Domain II, ISTE-230 Intro to Database and Data Model, MATH-131 Discrete Mathematics, STAT-146 Intro to Statistics II or equivalents; third-year standing) **Class 3, Credit 3 (F)**

**ISTE-474** **Social and Web Analytics**  
From the social computing perspective, user interactions create user-generated content. Examples of user-generated content include blogs and wikis, reports of location, activity, plans and schedules, and patterns of interaction. This course will provide students with the knowledge and tools to extract information from user-generated content and to use this information to build user-centric applications with high degrees of personalization. Through development projects, students will gain experience using social network APIs and with developing social-oriented mashups. Security and privacy concerns are emphasized. (ISTE-341 Server Programming, ISTE-472 Text Analytics) **Class 3, Credit 3 (S)**

**ISTE-476** **Visual Analytics**  
This course introduces students to Visual Analytics, or the science of analytical reasoning facilitated by interactive visual interfaces. Course lectures, reading assignments, and practical lab experiences will cover a mix of conceptual, practical and technical Visual Analytics topics. Topics include analytical reasoning, human cognition and perception of visual information, visual representation and interaction technologies, data representation and transformation, production, presentation, and dissemination of analytic process results, and Visual Analytic case studies and applications. (ISTE-260 Designing the User Experience or equivalent, ISTE-472 Text Analytics) **Class 3, Credit 3 (F)**

**ISTE-482** **Geospatial Data Analysis**  
This course is an introduction to the theory and techniques used for spatial analysis of complex, geographically referenced data. Topics include spatial data analysis and statistical techniques for a variety of problem types that span a broad spectrum of disciplines. In-class and out-of-class assignments will develop students spatial data analysis skills. (ISTE-384 Intro to Geo Information Sys, STAT-146 Intro to Statistics II or equivalent) **Class 3, Credit 3 (F)**

**ISTE-483** **Information Science and Technology Research**  
This course is for students enrolled in the BS IT degree program and minors to demonstrate competence in concepts, techniques and applications via a semester-length research project developed in conjunction with a faculty member and based on the student's degree concentration or minor. With instructor guidance, students will learn how to formulate a research question, choose relevant methods to answer the question, execute the project and present results in a public forum. (Fourth-year standing or permission of instructor) **Class 3, Credit 3 (S)**

**ISTE-484** **Thematic Cartography and Geographic Visualization**  
This course examines concepts and techniques associated with dynamic map construction, usage, and assessment. Specific topics include thematic cartography, geographic information visualization, sources of dynamic geographic information, developing animated and interactive maps, mapping mashup development, using maps as a means to support group work, usability of dynamic maps, and current geovisualization research areas. Development of a visualization prototype and an associated research project in an area related to thematic cartography and geographic visualization are required. GCCIS-ISTE-386 (GIS Programming). **Class 3, Credit 3 (S)**

**ISTE-499** **Undergraduate Co-op**  
Students perform paid, professional work related to their program of study. Students work full-time during the term they are registered for co-op. Students must complete a student co-op work report for each term they are registered; students also are evaluated each term by their employer. A satisfactory grade is given for co-op when both a completed student co-op report and a corresponding employer report that indicates satisfactory student performance are received. (Third-year standing and/or permission of department) **Credit 0 (F, W, Su)**

**ISTE-500** **Senior Development Project I**  
The first course in a two-course, senior level, system development capstone project. Students form project teams and work with sponsors to define system requirements. Teams then create architectures and designs, and depending on the project, also may begin software development. Requirements elicitation and development practices introduced in prior coursework are reviewed, and additional methods and processes are introduced. Student teams are given considerable latitude in how they organize and conduct project work. (ISTE-341 Server Programming, ISTE-430 Info Requirements and Modeling, completion of co-op requirement) **Class 3, Credit 3 (F, S)**

**ISTE-501** **Senior Development Project II**  
The second course in a two-course, senior level, system development capstone project. Student teams complete development of their system project and package the software and documentation for deployment. Usability testing practices introduced in prior coursework are reviewed, and additional methods and processes are introduced. Teams present their developed system and discuss lessons learned at the completion of the course. (ISTE-500 Senior Development Project I) **Class 3, Credit 3 (F, S)**

**ISTE-590** **Information Technology Seminar**  
This course explores emerging topics in Information Technology. The faculty member(s) who offer an Information Technology seminar course determine specific course parameters such as prerequisites, format, learning outcomes, and assessment methods. **Lecture/Lab 3, Credit 3 (Varies)**

**ISTE-599** **Information Technology Undergraduate Independent Study**  
Independent study offers a student an opportunity to explore, in greater depth, a topic previously introduced in a prior course or a topic of special interest. A faculty member supervises the student's work. A student and faculty member will collaboratively develop an independent study proposal that describes the student's plan of work, expected deliverables, evaluation criteria, and number of credits that will be earned. (Permission of instructor and department) **Credit 1-3 (F, S, Su)**

## Interactive Games and Media

**IGME-101** **New Media Interactive Design and Algorithmic Problem Solving I**  
This course provides students with an introduction to problem solving, abstraction, and algorithmic thinking that is relevant across the field of new media. Students are introduced to object-oriented design methodologies through the creation of event-driven, media-intensive applications. Students will explore the development of software through the use of a range of algorithmic concepts related to the creation of applications by writing classes that employ the fundamental structures of computing, such as conditionals, loops, variables, data types, functions, and parameters. There is an early emphasis on object oriented concepts and design. **Class 6, Credit 4 (F, S)**

**IGME-102** **New Media Interactive Design and Algorithmic Problem Solving II**  
This course provides students a continued introduction to problem solving, abstraction, and algorithmic thinking that is relevant across the field of new media. As the second course in programming for New Media students, this course continues an object-oriented approach to programming for creative practice. Topics will include reusability, data structures, rich media types, event-driven programming, loaders, XML, object design and inheritance. Emphasis is placed on the development of problem-solving skills as students develop moderately complex applications. (IGME-101) **Class 6, Credit 4 (F, S)**

**IGME-105** **Game Development and Algorithmic Problem Solving I**  
This course introduces students within the domain of game design and development to the fundamentals of computing through problem solving, abstraction, and algorithmic design. Students will learn the basic elements of game software development, including problem decomposition, the design and implementation of game applications, and the testing/debugging of their designs. **Class 6, Credit 4 (F, S)**



**IGME-106                      Game Development and Algorithmic Problem Solving II**  
This course furthers the exploration of problem solving, abstraction, and algorithmic design. Students apply the object-oriented paradigm of software development, with emphasis upon fundamental concepts of encapsulation, inheritance, and polymorphism. In addition, object structures and class relationships comprise a key portion of the analytical process including the exploration of problem structure and refactoring. Intermediate concepts in software design including GUIs, threads, events, networking, and advanced APIs are also explored. Students are also introduced to data structures, algorithms, exception handling and design patterns that are relevant to the construction of game systems. (IGME-105) **Class 6, Credit 4 (F, S)**

**IGME-110                      Introduction to Interactive Media**  
This course provides an overview of media in historical, current and future contexts. Incorporating lectures and discussion with hands on work involving written and interactive media assets, students examine the role of written and visual media from theoretical as well as practical perspectives. The course also provides an introduction to interactive media development techniques, including digital media components and delivery environments. Students will be required to write formal analysis and critique papers along with digital modes of writing including collaborative editing and effective presentation design. **Class 3, Credit 3 (F, S)**

**IGME-119                      2D and 3D Animation and Asset Production**  
This course provides a theoretical framework covering the principles of animation and its use in game design to affect user experience. Emphasis will be placed upon principles that support character development and animations that show cause and effect. Students will apply these principles to create animations that reflect movement and character appropriate for different uses and environments. The course will introduce students to both 2D and 3D characteristics of animation systems. (IGME-110) **Class 3, Credit 3 (F, S)**

**IGME-201                      New Media Interactive Design and Algorithmic Problem Solving III**  
This is the third course in the software development sequence for New Media Interactive Development students. Students further their exploration of problem solving and abstraction through coverage of topics such as GUI development, events, file I/O, networking, threading, and other advanced topics related to the design and development of modern dynamic applications. Programming assignments are an integral part of the course. (IGME-102) **Class 3, Credit 3 (F, S)**

**IGME-202                      Interactive Media Development**  
This course introduces students to the practice of media programming for the development of highly interactive user experiences in games, simulation, education, and entertainment. Students learn to manage and edit a wide variety of digital media types, e.g., still- and motion-graphics, text, audio, and video. Students develop applications to allow users to access, control, and manipulate each of these media types. This course will require programming projects. (IGME-102 or IGME-106 and IGME-110 and MATH-131) **Class 3, Credit 3 (F, S)**

**IGME-209                      Data Structures and Algorithms for Games and Simulations I**  
This course focuses upon the application of data structures, algorithms, and fundamental Newtonian physics to the development of video game applications, entertainment software titles, and simulations. Topics covered include 3D coordinate systems and the implementation of affine transformations, geometric primitives, and efficient data structures and algorithms for real-time collision detection. Furthermore, Newtonian mechanics principles will be examined in the context of developing game and entertainment software where they will be applied to compute the position, velocity and acceleration of a point-mass subject to forces and the conservation of momentum and energy. Programming assignments are a required part of this course. (IGME-202, PHYS-111 and MATH-185) **Class 3, Credit 3 (F, S)**

**IGME-219                      Advanced Animation and Asset Production**  
This course covers 3D modeling techniques to create environments and character animation. Basic ideas learned within the first asset production course, such as narrative and movement, are revisited within the 3D environs. Discussion of modeling will include not only how to create models and character animation, but also a study of 3D forms within the domains of sculpture, architecture, animation and games. While students will be taught how they may simulate reality in both modeling and animation, they will also study examples of simplifications, abstractions and hyper-realities in the service of narrative and game development. (IGME-119) **Class 3, Credit 3 (F, S)**

**IGME-220                      Game Design and Development I**  
This course examines the core process of game design, from ideation and structured brainstorming in an entertainment technology context through the examination of industry standard processes and techniques for documenting and managing the design process. This course specifically examines techniques for assessing and quantifying the validity of a given design, for managing innovation and creativity in a game development-specific context, and for world and character design. Specific emphasis is placed on both the examination and deconstruction of historical successes and failures, along with presentation of ethical and cultural issues related to the design and development of interactive software and the role of individuals in a team-oriented design methodology. Students in this class are expected to actively participate and engage in the culture of design and critique as it relates to the field. (IGME-202) **Class 3, Credit 3 (F, S)**

**IGME-230                      Website Design and Implementation**  
This course provides an introduction to Web development tools and technologies, such as X/HTML, CSS, JavaScript and DHTML, AJAX, Web platforms and environments, and server-side programming methods. (IGME-102 or IGME-106) and IGME-110) **Class 3, Credit 3 (F, S)**

**IGME-236                      Interaction, Immersion, and the Media Interface**  
This course examines the concepts of interface and interaction models in a media-specific context, with particular emphasis on the concept of the immersive interface. This course explores concepts such as perception, expectation, Gestalt Theory, interactivity, Semiotics, presence, and immersion in the context of media application development and deployment. In addition, underlying concepts of cognitive psychology and cognitive science will be integrated where appropriate. These theories are then integrated in the exploration of the immersive interface, and with related concepts such as user-level-interface modification, augmentation of identity, and the interface as a social catalyst. (IGME-102 or IGME-106) and IGME-110) **Class 3, Credit 3 (F, S)**

**IGME-309                      Data Structures and Algorithms for Games and Simulations II**  
This course continues the investigation into the application of data structures, algorithms, and fundamental Newtonian mechanics required for the development of video game applications, simulations, and entertainment software titles. Topics covered include quaternion representation of orientation and displacement, cubic curves and surfaces, classifiers, recursive generation of geometric structures, texture mapping, and the implementation of algorithms within game physics engines for collision detection and collision resolution of rigid bodies, and the numerical integration of the equations of motion. In addition, advanced data structures such as B+ trees and graphs will be investigated from the context of game application and entertainment software development. Programming assignments are a requirement for this course. (IGME-209 and MATH-186) **Class 3, Credit 3 (F, S)**

**IGME-320                      Game Design and Development II**  
This course continues to examine the core theories of game design as they relate to the professional field. Beginning with a formalized pitch process, this course examines the design and development paradigm from storyboarding and pre-visualization through rapid iteration, refinement, and structured prototyping exercises to further examine the validity of a given design. Specific emphasis is placed on iterative prototyping models, and on methodologies for both informal and formal critique. This course also explores production techniques and life-cycle in the professional industry. (IGME-220) **Class 3, Credit 3 (F, S)**

**IGME-330                      Rich Media Web Application Development I**  
This course provides students the opportunity to explore the design and development of Media Rich Internet Applications (MRIAs). This course moves beyond client and server side Web development, and explores issues of presentation, interactivity, persistence, and extensibility common among such applications. Specifically, items explored include framework characteristics, data management, persistence, data binding, information manipulation, as well as data presentation. (IGME-202 and IGME-230) **Class 3, Credit 3 (F, S)**

**IGME-430                      Rich Media Web Application Development II**  
This course provides students the opportunity to continue the exploration of Media Rich Internet Applications (MRIAs). Topics include communications for media ecologies, distributed web application frameworks, advanced interactivity, data transformation, representation, automation, persistence, and large scale systems deployment. In addition, students are exposed to concepts and technologies related to the next generation of MRIA development. (IGME-330) **Class 3, Credit 3 (F)**

**IGME-431 Digital Video for the Web**  
Web-deployed video is an increasingly important medium. It is used for illustration, instruction, entertainment and marketing. Students working with video for the web require an understanding of its inherent qualities, limitations and how it may be implemented. This course will focus on video and specifically how to create and implement quality work suitable for web delivery. (IGME-202 and IGME-230) **Class 3, Credit 3, (S)**

**IGME-440 Online Virtual Worlds and Simulations**  
Students will create online virtual worlds and simulations using 3D development technologies. Critical to the exploration of this area, students will learn to utilize 3D constructs for the presentation of and interaction with interactive content and dynamic experiences. The course allows students to integrate prior knowledge in design, programming, and interaction for the creation of such experiences. Individual and group projects will be required. (IGME-202, MATH-186) **Class 3, Credit 3 (F, S)**

**IGME-450 Casual Game Development**  
This course explores the design and construction of casual game experiences. Topics include modes of casual game play, mechanics for casual games, characteristics of successful games, development processes, and the distribution of casual games. Students will create casual games, and employ technologies to address issues of scalability, presentation, social interconnectivity, and game analytics. (IGME-430) **Class 3, Credit 3 (S)**

**IGME-451 Systems Concepts for Games and Media**  
This course focuses on systems-based theoretical models of computation in the context of a media-delivery modality. Students will explore concepts such as memory management, parallel processing, platform limitations, storage, scheduling, system I/O, and optimization from a media-centric perspective. Particular emphasis will be placed on the integration of these concepts in relation to industry standard hardware including game consoles, mobile devices, custom input hardware, etc. (IGME-309) **Class 3, Credit 3 (S)**

**IGME-470 Physical Computing and Alternative Interfaces**  
The rich variety and widespread adoption of gestural touch screens, motion-sensing devices, weight-reactive surfaces, wearable digital devices, and similar interface products demonstrates the demand for well-integrated devices and services that seamlessly couple people and environments. Such products can interface computers with real-world inputs and outputs, and give people new ways of controlling and experiencing their devices and information. This course provides a rapid technical introduction to basic electronics (components, circuits, microcontrollers, etc.) and emphasizes the application of interface design concepts to physically interactive and innovative product development. The course requires solo and team projects that blend electronics, programming, and design. (IGME-202) **Class 3, Credit 3 (F)**

**IGME-499 Undergraduate Co-op**  
Cooperative education is a work experience designed to supplement the educational process. Students may select from a range of activities designated as cooperative education, including relevant industrial experience, internships, entrepreneurial activities, as well as faculty-supervised research and innovation opportunities. (Third-year standing) **Class 0, Credit 0 (F, S, Su)**

**IGME-529 Foundations of Interactive Narrative**  
This course focuses on the major elements of narrative for interactive environments. Students in this course explore the basics of narrative in the context of interactive games and media, with examination of digital storytelling in games and interactive environments of several varieties. Branching narrative, hypertext, multi- and non-linear concepts are also explored with an emphasis on balancing immersive and interactive aspects of digital narrative. (IGME-202) **Class 3, Credit 3 (S)**

**IGME-540 Foundations of Game Graphics Programming**  
Students will explore the use of an advanced graphics API to access hardware-accelerated graphics in a real-time graphics engine context. The course will involve discussion of scene graphs, optimizations, and integration with the API object structure, as well as input schemes, content pipelines, and 2D and 3D rendering techniques. Students will also explore the advanced use of the API calls in production code to construct environments capable of real-time performance. Students will construct from scratch a fully functional graphics engine, with library construction for game development. (IGME-309) **Class 3, Credit 3 (F)**

**IGME-550 Foundations of Game Engine Design and Development**  
This course will provide students with theory and practical skills in game engine design topic areas such as understanding the graphics pipeline as it influences engine design, hardware principles and the relationship to game engine construction, mathematical principles involved in game engine design, scene graph construction and maintenance, texture and materials management, collision systems, physics systems, particle systems, and control systems. Furthermore, this course will examine software and toolsets that assist game engine designers in their tasks. Students will be expected to design and implement a game engine in teams as well as properly document their design and development strategy. (IGME-540) **Class 3, Credit 3 (S)**

**IGME-560 Artificial Intelligence for Game Environments**  
This course explores introductory artificial intelligence concepts through both a theoretical and practical perspective, with an emphasis on how to apply these concepts in a game development context. In particular the course focuses on applying concepts such as search, reactive intelligence, knowledge representation, and machine learning to real-time situations and applications as relevant to the field of entertainment technology and simulation. (IGME-309) **Class 3, Credit 3 (S)**

**IGME-570 Digital Audio Production**  
Technologies and techniques for producing and manipulating digital audio are explored. Topics include digital representations of sound, digital audio recording and production, MIDI, synthesis techniques, real-time performance issues, and the application of digital audio to multimedia and Web production. (IGME-230) **Class 3, Credit 3 (F)**

**IGME-571 Interactive Game Audio**  
This course provides students with exposure to the design, creation and production of audio in interactive applications and computer games. Students will become familiar with the use of sound libraries, recording sounds in the studio and in the field, generating sound with synthesizers, and effects processing. Students will create sound designs for interactive media, integrating music, dialog, ambient sound, sound effects and interface sounds within interactive programs. (IGME-570) **Class 3, Credit 3 (S)**

**IGME-580 IGM Production Studio**  
This course will allow students to work as domain specialists on teams completing one or more large projects over the course of the semester. The projects will be relevant to experiences of the Interactive Games and Media programs, but will require expertise in a variety of sub-domains, including web design and development, social computing, computer game development, multi-user media, human-computer interaction and streaming media. Students will learn to apply concepts of project management and scheduling, production roles and responsibilities, and their domain skill sets to multidisciplinary projects. Students will complete design documents, progress reports and final assessments of themselves and their teammates in addition to completing their assigned responsibilities on the main projects. (Third-year standing) **Class 3, Credit 3 (F, S)**

**IGME-581 Innovation and Invention**  
In this course, students explore the process and products of innovation and invention. Each term a multi-disciplinary team of students conceives and develops a different "outside the box" project. Readings, projects, scholarly term papers, and pragmatic challenges of collaboration and communication across disciplines provides direct experience of the interplay of technology, human nature, and a human environment in which emerging technologies and new modes of interaction are pervasive and ubiquitous. Artists, natural scientists, social scientists, and technologists are guided through a series of collaborative experiences inventing, designing, implementing and studying emerging technologies. Presentations, projects and individually-written research papers are required. The faculty staff and resources of the Simone Center for Student Innovation and Entrepreneurship are significant assets for this course. (Third-year standing and first and second year core completion) **Class 3, Credit 3 (F, S)**

**IGME-582 Humanitarian Free and Open Source Software Development**  
This course provides students with exposure to the design, creation and production of Open Source Software projects. Students will be introduced to the historic intersections of technology and intellectual property rights and will become familiar with Open Source development processes, tools and practices. They will become contributing members of humanitarian software development communities such as the One Laptop Per Child and Sugar communities. Students will actively document their efforts on Humanitarian Free and Open Source Software community hubs. (Third-year standing) **Class 3, Credit 3 (F)**

**IGME-588** **New Media Team Project**  
This course is designed to engage the new media major in a capstone production experience. The instructor will form interdisciplinary student teams that will design, plan, prototype, and implement new media projects. Student groups are required to test their product with users and provide written feedback and analysis. (Fourth-year standing) **Class 3, Credit 3 (S)**

**IGME-590** **Undergraduate Seminar in IGM**  
This is intended to allow for special one-time offerings of undergraduate topics or to allow faculty to pilot new undergraduate offerings. Specific course details (such as the course topics, format, resource needs, and credit hours) will be determined by the faculty member(s) who propose a given special-topics offering. (Varies) **Class Varies, Credit 2-6 (F, S, Su)**

**IGME-599** **Independent Study**  
The student will work independently under the supervision of a faculty adviser on a topic not covered in other courses. (Permission of IGM Director) **Class Varies, Credit 1-6 (F, S, Su)**

## Medical Informatics

**MEDI-130** **Computers in Medicine**  
This course begins with a historical perspective on computing in medicine. It reviews software and hardware from supercomputers to mobile devices, and surveys their use in medical practice, research, and education. Next it studies the nature of medical data, its collection, organization and use. This sets the stage for the major part of the course which studies important applications of computing to medicine, including Hospital Information Systems (HIS), medical imaging, surgery, telemedicine, and pharmacy. **Active Learning 3, Credit 3 (F)**

**MEDI-150** **Introduction to Medical Informatics**  
An introduction to informatics as applied to the medical field. A study of the nature of medical information and its use in clinical practice, medical research, and medical education. The Electronic Medical Record (EMR) and its impact on health care delivery. The Internet and mobile computing as sources of medical information. The health care information system, their development, selection and implementation. The importance of the computing or informatics specialists in medicine and the various roles they can play. Privacy, confidentiality and information security including health care regulatory and accreditation issues and the Health Insurance Portability and Accountability Act (HIPAA). **Class 3, Credit 3 (S)**

**MEDI-245** **Medical Informatics Seminar**  
This is an introduction to the use of computers in medical practice, education and research. Every week a different speaker from the medical field gives a presentation. Students also receive information concerning career opportunities and cooperative education. **Class 1, Credit 1 (S)**

**MEDI-310** **Developing Medical Applications**  
After having successfully completed one semester of computer programming in an object oriented programming language, the students in this course learn new computing systems suitable for developing medical applications. These computing systems are popular in hospitals and other health care facilities for both traditional and Web based database applications. Programming projects are required. (ISTE-120) **Class 3, Credit 3 (F)**

**MEDI-320** **Medical Database Architectures**  
This course, designed for BS students with a major or concentration in Medical Informatics, will provide an in-depth exposure to the design, development, and use of medical databases. Topics may include existing medical databases, flat-file and relational databases, medical data formats, database design and implementation, both relational and object-relational databases, database applications, JDBC, ODBC, SQL, ad hoc queries, desktop and web-based user interfaces, and database administration topics. (MEDI-310 and ISTE-230)

**MEDI-330** **The Electronic Health Record**  
This course provides an introduction and hands-on practice in both the use and development of electronic health records. Students address issues related to the acquisition, storage, and use of information in computer-based health records including the various types of information used in clinical care: text, structured data, images, audio, video, etc. Other topics covered include: clinical vocabularies (existing schemes and their limitations); how clinical information is generated and utilized; methods of information storage and retrieval; and the legal, social and regulatory problems associated with electronic health records such as security and confidentiality. Programming assignments will be required. (MEDI-320) **Class 3, Credit 3 (F)**

**MEDI-430** **Medical Application Integration**  
This course will provide students with an understanding of application integration in healthcare. Java programming assignments will be required. Students will also learn medical business processes and how they impact data integration within a hospital. Middleware message brokers will be examined along with the use of the HL7 messaging standard. Web services and other forms of data integration will be studied. (MEDI-330, ISTE-121) **Class 3, Credit 3 (S)**

## Networking, Security and Systems Administration

**NSSA-101** **NSA Themes**  
This course is an introduction to the fundamentals from each of the primary areas of the networking, security and systems administration (NSSA) domain. Students will develop a collective view of the NSSA field as they experience and integrate the perspectives of the sub-domain areas. Students will carry this perspective into the other supporting coursework of their degree program. Topics will focus on the core concepts in the three areas: 1.) wired and wireless networking; 2.) system and network security and awareness, and 3.) systems administration. Emerging technologies in each of the areas will be explored. A project and case studies will be used as the basis for exploring and interrelating each of the fundamental topics. **Class 3, Credit 3 (F, S)**

**NSSA-102** **Computer Systems Concepts**  
This course teaches the student the essential technologies needed by NSSA majors, focused on PC and mainframe hardware topics. They include: how those platforms operate, how they are configured, and the operation of their major internal components. Also covered are the basic operating system interactions with those platforms, physical security of assets, and computing-centric mathematical concepts. (NSSA-101 NSSA Fundamentals) **Class 2, Lab 2, Credit 3 (F, S)**

**NSSA-220** **Introduction to Scripting**  
An introduction to the Unix operating system and scripting in the Perl and Unix shell languages. The course will cover basic user-level commands to the Unix operating system, followed by basic control structures, and data structures in Perl. Examples will include GUI programming, and interfacing to an underlying operating system. Following Perl, students will be introduced to the basics of shell programming using the Unix bash shell. (ISTE-101 or one year of programming in an object-oriented language.) **Studio 4, Credit 3 (F, S)**

**NSSA-221** **Systems Administration I**  
This course is designed to give students an understanding of the role of the system administrator in large organizations. This will be accomplished through a discussion of many of the tasks and tools of system administration. Students will participate in both a lecture section and a separate lab section. The technologies discussed in this class include: operating systems, system security, and service deployment strategies. (NSSA-220) **Class 2, Lab 2, Credits 3, (F, S)**

**NSSA-241** **Networking I**  
This course is an introduction to wired network infrastructures, topologies, technologies and protocols required for effective end-to-end communication. Basic security concepts are also introduced at the local area network communication level. Networking layers 1, 2 and 3 are examined in-depth using the International Standards Organization's Open Systems Interconnection and TCP/IP models. Topics focus on the TCP/IP protocol suite, the Ethernet LAN protocol, and routed and routing protocols common in local area networks. Labs will cover the various aspects of communication, management and security on equipment found in industry. (NSSA-101 NSA Themes) **Class 2, Lab 2, Credit 3 (F, S)**

**NSSA-242** **Networking II**  
This course is designed to provide the student with an understanding of the protocols, principles and concepts of radio and optical communication as they apply to wireless data networking for local area networks and peripherals. As its basis it uses the fundamental concepts and technologies learned in Networking I, and expands upon them to include other contemporary and emerging technologies. Topics including WLANs, wireless network operation, network integration, construction and network design will be discussed. Modulation techniques, measurement standards, nomenclature, equipment and theory behind transmissions in this portion of the electromagnetic spectrum will be examined. (NSSA-241) **Class 2, Lab 2, Credit 3 (F, S)**

**NSSA-290****NSSA Essentials for Developers**

This is a course in the basics of network communication for software developers. Topics will include the OSI 7-layer model and its realization in the TCP/IP protocol stack. Students will also learn about naming and name resolution as it is used in the internet, plus the basics of routing and switching. The focus in all of this will be on an analysis of how name resolution, routing and switching operate at the developer's perspective. The specifics of how the socket transport layer appears to the programmer and operates will be a key topic. Finally, an overview of authentication mechanisms and number of examples of the security vulnerabilities of existing communication protocols will be provided to instruct students on the inherent risks of communication via the internet. (One year of programming in a high level language) **Class 3, Credit 3 (F, S)**

**NSSA-320****Advanced Scripting in Perl**

This course teaches students advanced techniques in the Perl language. Techniques include the use and construction of object oriented scripts, user administration and monitoring, file system walking and checking, and computer and network security issues. (NSSA-220) **Studio 4, Credit 3 (F)**

**NSSA-322****Systems Administration II**

An investigation of the tasks of selecting, configuring and administering services in an Internet-working environment. Topics include the TCP/IP protocol suite, service administration including DHCP, DNS, SSH, and Kerberos. Students completing this course will have experience in administering an internetwork of computers with a variety of these services as well as an understanding of the similarities and differences between protocols in the TCP/IP suite (TCP and UDP). This course is a writing intensive course and students will be expected to complete several writing projects as part of the course. Students will participate in both a lecture section and a separate lab section. (NSSA-221, NSSA-242) **Class 2, Lab 2, Credit 3 (F, S)**

**NSSA-341****VoIP and Unified Communications I**

Students will explore the issues associated with migrating to newer systems and implement their own IP based data networks. These networks will be designed to carry real time data, including IP telephony. (NSSA-242 Networking II and NSSA-243 Networking Lab) **Class 2, Lab 2, Credit 3 (F)**

**NSSA-342****VoIP and Unified Communications II**

This course will discuss the changing nature of communication, the requirements of emerging applications, the effect on network design, quality of service and the associated security concerns. The focus is on the evolution of multimedia services (such as voice and video) and Internet-working technologies in support convergence. While examining upcoming technologies and future trends that will impact the direction of IP and broadband technology development, of primary concern will be standards, protocols, deployment, and emerging technologies involved in the Voice over IP, Video over IP and Unified Communication systems. (NSSA-341 VoIP and Unified Communications I) **Class 2, Lab 2, Credit 3 (S)**

**NSSA-370****Project Management**

This course teaches the student the essential project management skills needed by NSA majors. Students will gain experience with project lifecycles, and a sampling of project management best practices will be covered. Students will use appropriate software tools applied to small project management tasks. (Third-year standing) **Class 3, Credit 3 (F, S)**

**NSSA-422****Storage Architectures**

This course provides students with a theoretical as well as hands-on exposure to enterprise scale storage technologies such as storage area networks and network attached storage. Students will study SCSI, Fibre Channel, IP Storage, Infiniband, and Fibre Channel over Ethernet both in lectures and labs. They will also gain a better appreciation for the importance of storage architectures in the enterprise. (NSSA-322 Systems Administration II and ) **Class 3, Credit 3, (F, S)**

**NSSA-423****Enterprise Computing**

This course explores mid-range (server farms and clusters) and mainframe system architecture, hardware, configuration, and operating system concepts. Students in this course gain understanding of the reasons companies choose mid-range and large-scale systems for their computing environments and how those firms implement those architectures. (ISTE-101 and third-year standing minimum) **Class 3, Credit 3 (S)**

**NSSA-425****Data Center Operations**

This course provides students with a background in the technologies and techniques used to design, implement, and maintain a modern data center. This course will help students to see the interrelated nature of many of these topics and to gain a better understanding of the role of the following technologies in a modern data center: physical facility design, network infrastructures, power distribution, heating, ventilation and air conditioning (HVAC), storage, high-availability computing, disaster recovery, and emerging data center technologies. (NSSA-322 Systems Administration II) **Class 3, Credit 3 (F, S)**

**NSSA-426****System Design and Deployment**

Problems or the implementation of a new business strategy requiring the support of computing solutions for their resolution or success must first be systematically analyzed to determine the most effective and cost efficient solution. Once the solution is defined and designed it must then be successfully deployed. This course will help students develop skills in the areas of requirements gathering, requirements analysis and group problem solving. Using prerequisite knowledge students will design a solution. Students will learn about the consequences of new technology solutions and how to plan a successful deployment and implementation of their technological solution. (NSSA-322 Systems Administration II and fourth-year status) **Class 3, Credit 3 (F, S)**

**NSSA-441****Advanced Routing and Switching**

Advanced Routing and Switching covers advanced networking technologies available to enterprises to build a large intranet infrastructure. Protocol options and tools to analyze and optimize performance are explored in depth. Topics include: WANs, WAN protocols, IPv6, core routers and routing protocols, queuing, redistribution, multicast routing, access control lists, variable length subnet masking, network address translation, MultiProtocol Label Switching, RSTP, emerging switching technologies, VLAN tagging, trunking, and port aggregation. (NSSA-242 Networking II) **Class 2, Lab 2, Credit 3 (F, S)**

**NSSA-443****Network Design and Performance**

This course will examine the design and performance of networks. Students will learn to design networks based on identified needs and analyze the performance of that network. The designs include site, campus, and enterprise. WAN technologies will be combined with LAN technologies in the design of enterprise networks. A simulation tool may be used to implement the design as a network model and evaluate the performance of the network model. (NSSA-241 Networking I, NSSA-322 Systems Administration II) **Class 3, Credit 3 (F)**

**NSSA-445****Wireless Sensor and Ad-hoc Networks**

This course will help students to identify the major issues associated with ad-hoc/sensor networks. Students will explore current ad-hoc/sensor technologies by researching key areas such as algorithms, protocols, hardware, and applications. Students will learn how to program and communicate with embedded operating system such as TinyOS, a prominent application development environment for sensor systems using Motes. At the end of this course students will gain hands-on experience through real-world programming projects on ad-hoc/sensor hardware and be able to implement or develop algorithms involved in ad-hoc/sensor systems. (NSSA-242 Networking II and one year of programming in an object-oriented language) **Class 2, Lab 2, Credit 3 (F, S)**

## Software Engineering

**SWEN-101****Software Engineering Freshman Seminar**

Provides first-year students with the skills necessary to succeed at RIT and in the software engineering major. Small group sessions are used to help new students make friends, create a stronger bond with RIT and their major and become acquainted with the campus and its facilities. In addition, students are introduced to the profession of software engineering and to ethical issues they will face at RIT and throughout their careers. **Class 2, Credit 1 (F)**

**SWEN-220****Mathematical Models of Software**

An introduction to the use of mathematics to model software as part of the software process. Included will be models of software structure and functionality, concurrent and distributed computation, and structured data. (MATH-190) **Class 3, Credit 3 (S)**

**SWEN-250****Personal Software Engineering**

This is a project-based course to enhance individual, technical engineering knowledge and skills as preparation for upper-division team-based coursework. Topics include adapting to new languages, tools and technologies; developing and analyzing models as a prelude to implementation; software construction concepts (proper documentation, implementing to standards etc.); unit and integration testing; component-level estimation; and software engineering professionalism. (CSCI-142 corequisite) **Class 3, Credit 3 (S)**

**SWEN-256 Software Process and Project Management**  
An introductory course to software process and related software project management issues. Emphasis is on the study, use, evaluation, and improvement of the software development process and related project management. Topics include software development methodologies, software project planning and tracking, change control, software quality assurance, risk management, and software process assessment and improvement. (SWEN-261) **Class 3, Credit 3 (F, S)**

**SWEN-261 Introduction to Software Engineering**  
An introductory course in software engineering, emphasizing the organizational aspects of software development and software design and implementation by individuals and small teams within a process/product framework. Topics include the software lifecycle, software design, user interface issues, specification and implementation of components, assessing design quality, design reviews and code inspections, software testing, basic support tools, technical communications and system documentation, team-based development. A term-long, team-based project done in a studio format is used to reinforce concepts presented in class. (CSCI-142 or CSCI-243) **Class 3, Credit 3 (F, S)**

**SWEN-262 Engineering of Software Subsystems**  
An introduction to the principles of the foundations of contemporary software design. Topics include software subsystem modeling, design patterns, design tradeoffs, and component-based software development, with a focus on application of these concepts to concrete design problems. The relationship between design and related process issues such as testing, estimation, and maintenance are also discussed. (SWEN-261 and either SWEN-250 or CSCI-243 or CMPE-380) **Class 3, Credit 3 (F, S)**

**SWEN-331 Engineering Secure Software**  
Principles and practices forming the foundation for developing secure software systems. Coverage ranges across the entire development lifecycle: requirements, design, implementation and testing. Emphasis is on practices and patterns that reduce or eliminate security breaches in software intensive systems, and on testing systems to expose security weaknesses. (SWEN-261) **Class 3, Credit 3 (F, S)**

**SWEN-342 Engineering of Concurrent and Distributed Software Systems**  
The principles, practices and patterns applicable to the design and construction of concurrent and distributed software systems. Topics include synchronization, coordination and communication; deadlock, safety and liveness; concurrent and distributed design patterns; analysis of performance; distributed state management. (SWEN-220, SWEN-262) **Class 3, Credit 3 (S)**

**SWEN-343 Engineering of Enterprise Software Systems**  
This course addresses architecture-level design of large, enterprise-critical software systems. The course focuses on enterprise-level design patterns and on design approaches for object-oriented and aspect-oriented application containers: encapsulating database access, application distribution, concurrent session management, security, scalability, reliability, web-based user interaction, and the programming models and tools to support system development, integration, testing, and deployment. Hands-on exercises and a team project will reinforce the course concepts and expose students to the complexity of these systems. (SWEN-262, SWEN-220) **Class 3, Credit 3 (F)**

**SWEN-350 Software Process and Product Quality**  
This course covers advanced topics in software engineering relating to software quality, with processes and metrics being viewed as a means to achieving quality. Quality is interpreted broadly to include product functionality and performance, project schedule and budget, and business objectives. Software metrics help a software organization on two main fronts: quality assessment of its products and processes, and process improvement towards its main goal: the production of successful software artifacts within schedule and budget constraints. (SWEN-256, STAT-205, one semester of SWEN-499) **Class 3, Credit 3 (F)**

**SWEN-352 Software Testing**  
Concepts and techniques for testing software and assuring its quality. Topics cover software testing at the unit and system levels; static vs. dynamic analysis; functional testing; inspections; and reliability assessment. (SWEN-261) **Class 3, Credit 3 (F, S)**

**SWEN-356 Trends in Software Development Processes**  
A course in the exploration of current approaches in planning, executing and managing the project activities performed during the development of a professional software product. Topics include the characteristics of state of the practice development methods, selecting practices best suited based on project context and techniques for refining practices to achieve process improvement. Students work on team projects inclusive of all development life cycle activities to reinforce concepts presented in class. (SWEN-256) **Class 3, Credit 3 (S)**

**SWEN-383 Software Design Principles and Patterns**  
Quality software designs and architectures reflect software engineering principles that represent best contemporary practice. This course focuses on explicating these fundamental principles, examining a set of design and architecture patterns that embody the principles, and applying patterns appropriate to a design problem in a given context. Restricted to IST majors only. (ISTE-330, ISTE-340; corequisite ISTE-341) **Class 3, Credit 3 (S)**

**SWEN-440 Software System Requirements and Architecture**  
Principles and practices related to identifying software system stakeholders, eliciting functional and quality requirements, translating requirements into architectural structures, and analyzing candidate architectures with respect to the requirements. (One software engineering design elective; one quarter of co-op) **Class 3, Credit 3 (F, S)**

**SWEN-444 Human-Centered Requirements and Design**  
This course introduces quantitative models and techniques of human-computer interface analysis, design and evaluation, which are relevant to the Software Engineering approach of software development. User-focused requirements engineering topics are also covered. Contemporary Human Computer Interaction (HCI) techniques are surveyed, with a focus on when and where they are applicable in the software development process. Students will deliver usable software systems derived from an engineering approach to the application of scientific theory and modeling. Other topics may include: usability evaluation design, methods of evaluation, data analysis, social and ethical impacts of usability, prototyping and tools. (SWEN-262, STAT-205) **Class 3, Credit 3 (F, S)**

**SWEN-461 Real-Time and Embedded Systems**  
This course provides a general introduction to real-time and embedded systems. It will introduce a representative family of microcontrollers and require students to program on these devices. Fundamental material on real-time operating systems, such as requirements specification, scheduling algorithms and priority inversion avoidance will be presented. The features of a commercial real-time operating system will be discussed and used for course projects. (SWEN-220 or CSCI-251 or CMPE-380) **Class 3, Credit 3 (F)**

**SWEN-462 Modeling of Real-Time Systems**  
This course introduces the modeling of real-time software systems. It takes an engineering approach to the design of these systems by analyzing system models before beginning implementation. UML will be the primary modeling methodology. Non-UML methodologies will also be discussed. Implementations of real-time systems will be developed manually from the models and using automated tools to generate the code. (SWEN-220 or CSCI-251 or CMPE-380) **Class 3, Credit 3 (S)**

**SWEN-463 Performance Engineering of Real-Time and Embedded Systems**  
This course discusses issues of performance in real-time and embedded systems. Techniques for profiling the resource usage of a system and for measuring the effect of increasing system requirements will be covered. The control of physical systems will motivate the need for performance tuning of a real-time system. Students will write programs running under a real-time operating system that can maintain control of a physical system. The course will discuss and experiment with performance trade-offs that can be made using hardware-software co-design. (SWEN-220 or CSCI-251 or CMPE-380) **Class 3, Credit 3 (F)**

**SWEN-467 Hardware/Software Co-Design for Cryptographic Applications**  
The objective of this course is to establish knowledge and skills necessary for efficient implementations of cryptographic primitives on reconfigurable hardware. Implementation platform will be a field programmable gate array (FPGAs) containing general purpose processor and additional reconfigurable fabric for implementations of custom hardware accelerators. In the studio format students work on team projects that require them to design, and then compare and contrast software, custom FPGA hardware, and hybrid hardware-software co-design implementations of selected cryptographic primitives. (SWEN-261 Introduction to Software Engineering, CSCI-462 Introduction to Cryptography) **Class 3, Credit 3 (S)**

**SWEN-498** **Software Engineering CIR Experience**  
Software Engineering CIR Experience. This course may be taken in lieu of one of the four cooperative education blocks to provide experience in non-traditional venues for creativity, innovation and research. Registration conditional on submitted plan of activity and approval of department of software engineering. (SWEN-499, department permission) **Class 0, Credit 0 (Su)**

**SWEN-499** **Software Engineering Co-op**  
Software Engineering co-op work block. One semester of appropriate paid work experience in industry. (SWEN-262, COMM-251) **Class 0, Credit 0 (F, S, Su)**

**SWEN-548** **SE Affinity Research Group**  
This course is a project-based, research-focused course that supports teamwork, collaboration, and both professional and technical skill building. Students will work in teams that consist of both students and professor. Topics include: research methods, technical communication, and technical topics that are relevant to the project(s). (SWEN-261, instructor approval) **Class 3, Credit 3 (F, S, Su)**

**SWEN-549** **Software Engineering Design Seminar**  
Emerging topics of relevance in software engineering design. (SWEN-262) **Class 1-3, Credit 1-3 (F, S)**

**SWEN-559** **Software Engineering Process Seminar**  
Emerging topics of relevance in software engineering process. (SWEN-256) **Class 1-3, Credit 1-3 (F, S)**

**SWEN-561** **Software Engineering Project I**  
The first course in a two-course, senior-level, capstone project experience. Students work as part of a team to develop solutions to problems posed by either internal or external customers. Problems may require considerable software development or evolution and maintenance of existing software products. Culminates with the completion and presentation of the first major increment of the project solution. (Co-op complete, SWEN-256, SWEN-440, SWEN-444) **Class 3, Credit 3 (F, Su)**

**SWEN-562** **Software Engineering Project II**  
This is the second course in a two-course, senior-level capstone project experience. Students submit one or more additional increments that build upon the solution submitted at the end of the first course. Students make major presentations for both customers as well as technical-oriented audiences, turn over a complete portfolio of project-related artifacts and offer an evaluation of the project and team experience. (SWEN-562) **Class 3, Credit 3 (F, Su)**

**SWEN-590** **Software Engineering Seminar**  
Emerging topics of relevance in software engineering. (Varies) **Class 1-3, Credit 1-3 (F, S)**

**SWEN-598** **Honors Independent Study**  
The honors student will work independently under the supervision of a faculty adviser on a topic not covered in other courses. (SWEN-262, one semester co-op) **Class 1-3, Credit 1-3 (F, S)**

**SWEN-599** **Independent Study**  
The student will work independently under the supervision of a faculty adviser on a topic not covered in other courses. (Proposal signed by a faculty member) **Class 1-3, Credit 1-3 (F, S)**

# Kate Gleason College of Engineering

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Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

## Applied Statistics

**CQAS-251** **Probability and Statistics for Engineers I**  
Statistics in engineering; enumerative and analytic studies; descriptive statistics and statistical control; sample spaces and events; axioms of probability; counting techniques; conditional probability and independence; distributions of discrete and continuous random variables; joint distributions; central limit theorem. (MATH-182) **Class 3, Credit 3 (F, S)**

**CQAS-252** **Probability and Statistics for Engineers II**  
Point estimation; hypothesis testing and confidence intervals; one- and two-sample inference; introduction to analysis of variance, experimental design, and non-parametric methods. (CQAS-251) **Class 3, Credit 3 (F, S)**

**CQAS-325** **Design of Experiments for Biomedical Engineers**  
Topics covered include: observational versus experimental studies, fundamentals of good design, including randomization, replication, blocking, and blinding; one-factor designs: completely randomized, randomized complete block, and Latin-Square designs; fixed and random effects; analysis of residuals; two-factor and factorial designs; repeated measures designs; two-level factorial and fractional factorial designs. Lectures and assignments incorporate real-world examples and critiques of studies in the literature. (CQAS-252) **Class 3, Credit 3 (S)**

**CQAS-511** **Statistical Software**  
This course is an introduction to two statistical-software packages, SAS and R, which are often used in professional practice. Some comparisons with other statistical-software packages will also be made. Topics include: data structures; reading and writing data; data manipulation, subsetting, blocking, and sorting, and merging; conditional execution and looping; built-in functions; creation of new functions or macros; graphics; matrices and arrays; simulations; select statistical applications. (STAT-205, MATH-252, CQAS-252, or permission of instructor) **Class 3, Credit 3 (F, S)**

## Biomedical Engineering

**EGEN-099** **Engineering Co-op Preparation**  
This course will prepare students for both the job search and employment in the field of engineering. Students will learn strategies for conducting a successful job search, including the preparation of resumes and cover letters, behavioral interviewing techniques, and effective use of social media in the application process. Professional and ethical responsibilities during the job search and for co-op and subsequent professional experiences will be discussed. (At least second-year standing) **Class 1, Credit 0 (F, S)**

## BIME-181

### Introduction to Biomedical Engineering I

This course will provide an overview of the discipline. The students also have an opportunity to interact with their curricular adviser and obtain a clear understanding of the program and the possible curricular options. It will consist of the following components: 1) Overview of the discipline including an introduction to relevant literature, organizations, examples of successes, ongoing challenges and possible new opportunities. 2) Introduction of an engineering methodology applicable to biomedical problems. 3) Opportunity to address a simple biomedical engineering related problem that necessitates problem statement, research, solution proposal and summary report and presentation of results. 4) Introduction to team dynamics, organization and interpersonal communication associated with working with a multidisciplinary team. **Class 1, Lab 3, Credit 1 (F)**

## BIME-182

### Introduction to Biomedical Engineering II

Builds on the Introduction to field of biomedical engineering presented in Introduction to BME I with the following additional components: 1) Introduction to programming as a organized, problem solving method (MATLAB and Labview or equivalent). 2) Application of programming for the purpose of removing artifacts from measured signals and analysis of signal properties including their statistical properties. 3) Addressing a simple biomedical engineering related problem that requires a multi-person team and necessitates problem statement, research, solution proposal, data acquisition and processing, data analysis, and summary report and presentation of results. (BIME-181) **Class 1, Lab 3, Credit 1 (S)**

## BIME-200

### Introduction to Musculoskeletal Biomechanics

This course is an introduction to the structures and components of the human body as well as their basic functionality. Essential elements of human anatomy and histology will be presented and students will be encouraged to correlate their structure and function with non-human structures and devices that might be considered as replacements or improvements. Fundamental concepts in biomechanics will be introduced and integrated with relevant topics from physics. Variability in dimensions and the concepts of normal and exceptional ranges of values in terms of populations will be introduced and how they need to be accounted for and accommodated. (PHYS-211) **Class 3, Credit 3**

## BIME-250

### Engineering Analysis I

This is the first in a two course sequence that exposes the student to engineering problem solving methodologies within the context of issues relevant to biomedical engineering. The course provides a pragmatic link between the basic sciences and the generic strategies and tools that engineers use to solve complex problems. A key emphasis will be the disciplined approach engineers use to define the scope of a problem and breakdown a system into elements that are amenable to analysis. An important step is anticipating cause-and-effect behaviors in a system. Engineers develop analytical abstractions of system elements in order to predict such behavior. Students will be taught how engineers develop such abstractions, drawing on knowledge from the basic sciences and mathematics, combined with judicious use of approximations. The positive and negative consequences of using approximations and estimation techniques on the outcome will be discussed and analyzed. A predominantly deterministic approach to engineering analysis and problem solving will be covered and will be used as a foundation for the analysis of more complex systems and more realistic stochastic methodologies that will be developed in Engineering Analysis II (BIME-450). The course also introduces appropriate software tools including application software packages for spreadsheet based analysis and graphing. (PHYS-211, BIME-182) **Class 3, Credit 3 (F)**

## BIME-370

### Introduction to Biomaterial Science

This course is intended to provide an overview of materials used in biomedical applications, both internal and external to the human body. The specific objective of this course is to present the principles which apply to the properties and selection of materials used in medical applications. Topics include structure and properties of metals, ceramics, polymers, and composites; fundamental composition of biological tissues; material performance in hostile environments, the basic processes associated with wound healing; and principles associated with the interaction between biological tissues and artificial materials. (CHMG-142, CHMG-145, BIME-200, BIME-250, BIOG-140) **Class 3, Credit 3**



**BIME-391****Biomechanics and Biomaterials Lab**

Laboratory experiments are conducted to explore and reinforce fundamental principles and concepts introduced in BIME-200 (Introduction to Musculoskeletal Biomechanics) and BIME-370 (Introduction to Biomaterial Science). The experimental procedures involve measuring results, analyzing and interpreting data and drawing objective conclusions. Emphasis is also placed on proper documentation and effective presentation of findings and results. Lab procedures involve manipulation and measurements of anatomical structures and samples as well as equipment and materials designed to simulate naturally occurring tissues and structures. (BIME-200, Corequisite: BIME-370) **Lab 3, Credit 1 (S)**

**BIME-410****Systems Physiology I**

Based on an understanding of the fundamental components of cellular and molecular biology that provide the basis of a living biological entity, this course begins a two course sequence involving the description and analysis of physiological mechanisms from a systems point of view. The first course in this sequence will be concerned with fundamental aspects of electrophysiology, electrically excitable cells and tissue, the operation of the nervous system including the central, peripheral, somatic and autonomic systems, the special senses and the connection between the nervous system and the endocrine system. Differences and relationships between speed, specificity and sensitivity of signaling mechanism of the nervous system and the endocrine system will be discussed. The cardiovascular system is introduced in terms of its control and impact on overall regulation of homeostasis. (BIME-370, PHYS-211, CHME-320, BIOG-141) **Class 3, Credit 3**

**BIME-411****Systems Physiology II**

The second in a two course sequence involving the description and analysis of physiological mechanisms from a systems point of view. The focus of this course will be on the interaction between organ systems for the purpose of homeostasis. In particular, attention will be paid to feedback mechanisms that involve electrical and chemical feedback and control systems. Fluid and gas transport mechanisms associated with the cardiovascular and respiratory systems including their regulatory behavior and the function of the kidney are introduced by way of their contribution to fluid volume and pressures as well as its fundamental material exchange properties. Engineering analysis methods will be applied to an open-ended problem associated with pathological performance of some aspect of these systems and will be used to proposing a suitable compensatory mechanism to address or eliminate it. The interaction between the nervous, muscular, digestive, endocrine, immune, cardiovascular, renal and respiratory systems and how they affect growth and metabolism, movement, fluid and electrolyte balance, material exchange and disease processes will be discussed. Open-ended problems and weaknesses in these mechanisms will be discussed and addressed in a quantitative and analytical manner based on engineering analysis including simple statistics associated with population based variations. (Writing Intensive Course) (BIME-410, CQAS-251, corequisite: CQAS-252) **Class 3, Credit 3**

**BIME-440****Biomedical Signals and Analysis**

Introduction to and application of signal processing techniques to evaluate and manipulate continuous and discrete time signals presumed to originate from systems that may be either linear or non-linear, time invariant or varying and random or deterministic in nature. Representative data sets will be used to characterize and process signals from physiological systems and processes. A multi-week project will be assigned that will consist of processing and analysis of a typical biomedical signal source to provide a robust and consistent evaluation of some aspect associated with the signal source based on methods discussed both in class and reported on in the literature. (BIME-250, MATH-231; prerequisites or corequisites: BIME-410, CQAS-251) **Class 3, Credit 3 (S)**

**BIME-450****Engineering Analysis II**

This is the second course in a two sequence course in engineering analytical and problem solving methodology, providing a pragmatic link between the basic sciences and the generic strategies and tools that engineers use to predict the cause-and-effect behavior of complex systems. Students will develop the tools to analyze the dynamic behavior of biomedical situations that are more complex, and thus require a greater degree of analytical sophistication, than the systems examined in Engineering Analysis I. The analysis of such problems will require the use of differential equations and numerical analysis, as well as the application of software packages (e.g., spreadsheets, graphing, MATLAB). The set of tools that are developed and whose application is demonstrated also serve to provide a solid framework for quantitative and critical evaluation of material to be presented in upper level engineering courses. While some of the problems analyzed will be well described by a deterministic perspective, a significant element of the course will be the analysis of situations that are fundamentally stochastic and thus require a probabilistic, statistical approach to their modeling and solution. (BIME-250, MATH-231, CQAS-251, corequisite CQAS-252) **Class 3, Credit 3 (F)**

**BIME-460****Dynamics and Control of Biomedical Systems**

Application of engineering analysis, modeling, problem solving and design skills to characterize and manipulate the operation of biomedical systems for the purpose of remediating, supplanting, replacing or enhancing the function of physiological processes. This presumes that those same tools and skills can be used to model the observed and/or known function of the physiological systems and processes under consideration. In addition to lectures, homework and examinations, the course will a project oriented assignment to design and evaluate a model that faithfully duplicates and predicts the operation of that process or system. (BIME-411, BIME-440, BIME-450) **Class 3, Credit 3**

**BIME-489****Special Topics**

Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. **Class 3, Credit 3 (F, S)**

**BIME-491****Quantitative Physiological Signal Analysis Lab**

Laboratory experiments are conducted to explore and reinforce fundamental principles and concepts introduced in BIME-410 (Systems Physiology I) and BIME-440 (Biomedical Signals and Analysis). The experimental procedures involve measuring results, analyzing and interpreting data and drawing objective conclusions. Emphasis is also placed on proper documentation and effective presentation of findings and results. Laboratory experiments will be conducted to investigate pressure, volume and flow relationships of the cardiovascular and respiratory systems including the inherent variability and dynamic response to perturbations. Signal processing methods will be utilized to address ubiquitous artifacts found in measured physiological signals. (BIME-410, BIME-440) **Lab 3, Credit 1 (F)**

**BIME-492****Systems Physiology Control and Dynamics Lab**

Laboratory experiments are conducted to explore and reinforce fundamental principles and concepts introduced in BIME-411 (Systems Physiology II) and BIME-460 (Dynamics and Control of Biomedical Systems). The experimental procedures involve measuring results, analyzing and interpreting data and drawing objective conclusions. Emphasis is also placed on proper documentation and effective presentation of findings and results. Laboratory experiments and simulations will be conducted to enable the prediction, observation and characterization common physiological processes and systems. (BIME-411, corequisite or prerequisite BIME-460) **Lab 3, Credit 1 (F)**

**BIME-497****Multidisciplinary Senior Design I**

This is the first of a two course sequence oriented to the solution of real world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow an engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, completing systems and subsystems designs, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. (Fifth-year standing) **Class 3, Credit 3 (F)**

**BIME-498****Multidisciplinary Senior Design II**

This is the second of a two course sequence oriented to the solution of real world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow an engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, completing systems and subsystems designs, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. (BIME-497) **Class 3, Credit 3 (S)**

**BIME-499****Co-op**

One semester of paid work experience in biomedical engineering. (At least third-year standing and department approval required) **Class 0, Credit 0 (F, S, Su)**

**BIME-599****Independent Study**

Allows upper-level undergraduate students an opportunity to independently investigate, under faculty supervision, aspects of the field of computer engineering that are not sufficiently covered in existing courses. Proposals for independent study activities must be approved by both the faculty member supervising the independent study and the department head. (Permission of supervising faculty member and department head required.) **Credit variable 1-4 (F, S, Su)**

## Chemical Engineering

### EGEN-099

#### Engineering Co-op Preparation

This course will prepare students for both the job search and employment in the field of engineering. Students will learn strategies for conducting a successful job search, including the preparation of resumes and cover letters, behavioral interviewing techniques, and effective use of social media in the application process. Professional and ethical responsibilities during the job search and for co-op and subsequent professional experiences will be discussed (At least second year standing) **Class 1, Credit 0 (F, S)**

### CHME-181

#### Chemical Engineering Insights I

This course provides an overview of the traditional, contemporary, and future issues facing chemical engineers. Case studies involving problems that are amenable to chemical engineering analysis are proposed and discussed to illustrate the problem solving strategies used in the profession as well as the constraints on design due to product specifications, environmental issues, economics, and engineering ethics. **Class 2, Credit 1 (F)**

### CHME-182

#### Chemical Engineering Insights II

This course continues the case study approach used in Chemical Engineering Insights I, and focuses on quantitative analysis skills appropriate for first year students. The spreadsheet environment will be utilized as a means of organizing and designing experiments and solving physically motivated mathematical problems. The course is intended to provide students with essential skills that will aid them in their technical course work. **Class 2, Credit 1 (S)**

### CHME-230

#### Chemical Process Analysis

A first course for chemical engineers, introducing units, dimensions and dimensional analysis, simple material and energy balances for batch and continuous systems in steady and unsteady states with/without chemical reaction, and elementary phase equilibrium in multi-component systems. (CHMG-142 or equivalent; MATH-182 or equivalent or may be taken as pre-requisite or as corequisite) **Class 3, Credit 3 (F)**

### CHME-301

#### Analytical Techniques for Chemical Engineering I

Mathematical techniques necessary for engineering analysis are introduced that augment training from core mathematics and engineering courses. The spreadsheet environment and MATLAB are used to implement mathematical procedures and examine data results. Topics examined include roots of equations, curve fitting, statistics, Fourier analysis, solution of systems of algebraic equations, optimization, numerical differentiation and integration, and the solution of ordinary and partial differential equations. Techniques are applied to mathematical problems naturally arising in chemical engineering. (MATH-231: MATH-221 can be taken as a pre- or corequisite) **Class 3, Credit 3 (S)**

### CHME-302

#### Analytical Techniques for Chemical Engineering II

Chemical engineers are responsible for the design and development of the manufacturing processes that produces a large fraction of the products society uses. Chemical engineers are also frequently tasked with the management of manufacturing and R&D operations. Virtually all real life engineering problems encountered requires an appreciation of variability. This course is an introduction to the techniques and software (Minitab) chemical engineers use on a daily basis to develop, manage, improve and control processes. Topics to be covered include variance, confidence intervals, statistical process control and design of experiments; these are taught within the context of typical chemical engineering problems encountered in practice. (CHME-301) **Class 3, Credit 3 (F)**

### CHME-310

#### Thermodynamics

This is a course in the fundamentals of both single and multiple-component thermodynamics. The first and second laws of thermodynamics and concepts of entropy and equilibrium are examined in open and closed control volume systems. Energy, work, and heat requirements of various unit operations are examined. Equations of states and properties of fluids are explored. Phase transition and equilibrium involving single-and multiple components are examined for both ideal and non-ideal systems. Energy released/absorbed during chemical reaction and solution creation are imbedded in analysis of chemical engineering processes (CHME-230) **Class 3, Credit 3 (S)**

### CHME-320

#### Continuum Mechanics I

Fundamentals of static and flowing fluids are examined on both large-scale (control volumes) and local differential scales. Forces on solids due to static and flowing fluids are determined. Head losses and pumping requirements are considered in piping systems. The art of engineering approximation is examined through estimates of forces due to flow on solids, as well as various limiting cases involving internal pipe flows with friction factors. Exact solutions of local differential equations of fluid mechanics are considered under both steady state and transient conditions, and these analyses are used to determine forces in control volume analysis of bodies. The important interplay between differential and control volume analyses in solving problems is emphasized. (PHYS-211, MATH-231; CHME-391 and 310 can be taken as pre- or corequisites) **Class 3, Credit 3 (S)**

### CHME-321

#### Continuum Mechanics II

This course is the continuation of Continuum Mechanics I, and focuses on fluid flow and heat transfer on a differential scale. Commonly-used approximations to the equations of fluid mechanics are considered, such as creeping, potential, and boundary layer flows. Scaling is introduced as a means of characterizing these regimes. General local differential equations and boundary conditions describing heat transfer are derived and solved in a variety of configurations. Simplifying approximations of conduction, convection, and radiation dominated heat transfer are introduced, and combined modes of transfer are analyzed. The performance of heat exchangers is analyzed for a variety of common configurations. (CHME-320) **Class 3, Credit 3 (F)**

### CHME-330

#### Mass Transfer Operations

This course covers the analysis and design of chemical processes for the separation and purification of mixtures. The course will include an introduction to the fundamentals of diffusion and the analogies between heat and mass transfer, leading up to mass transfer coefficients and their use in solving a variety of engineering problems. Design methodologies will be examined for equilibrium based processes (such as absorption, distillation, extraction and crystallization) and rate-governing separations (such as dialysis and reverse osmosis). Fixed bed processes such as adsorption and ion exchange will also be introduced. (CHME-230, MATH-231) **Class 3, Credit 3 (S)**

### CHME-340

#### Reaction Engineering

The fundamentals of chemical kinetics are integrated with the concepts of mass and energy conservation, from both a macroscopic and microscopic perspective, to develop models that describe the performance of chemical reactors. Topics include mass action kinetics and absolute rate theory, series and parallel reaction systems, and the mathematical modeling of various reactor configurations. The conceptual framework and tools are developed to understand and design chemical reactor processes and to interpret experimental data obtained on a laboratory scale to design pilot scale and full scale manufacturing processes. (CHME-230, MATH-231) **Class 4, Credit 4 (S)**

### CHME-350

#### Multi-scale Material Science

This course gives students fundamental background in the atomic and molecular structures of engineering materials and how they can be manipulated. The physical and chemical foundations of the thermal, electrical and optical properties of engineering materials are studied. The effect of fabrication on structure/material properties is examined, as well as criteria to select appropriate materials for engineering applications. A summary of nanomaterial properties and the prevalent methods of synthesis will also be highlighted. (CHME-310, CHMO-231, CHMO-235, CHMI-351) **Class 3, Credit 3 (F)**

### CHME-391

#### Chemical Engineering Principles Lab

Students are introduced to basic equipment and methodologies for designing laboratory experiments, measuring results, interpreting data, and drawing objective conclusions. Students work in teams to design experimental procedures, identify lab equipment, and assemble simple apparatus to achieve specific experimental goals. (CHME-230) **Lab 6, Credit 2 (S)**

### CHME-401

#### System Dynamics and Control

The dynamic behavior of chemical process components is examined. The mathematics of Laplace transforms are examined extensively as a fundamental underpinning of control theory. Block diagrams, feedback control systems, and stability analysis are introduced. (CHME-302) **Class 3, Credit 3 (S)**

**CHME-421****Interfacial Phenomena**

This course will cover the fundamental principles of interfacial phenomena incorporating unique physics and chemistry associated with interfaces arising between liquids, gases, and solids. It is designed to introduce students to the significance of interfacial science in important engineering applications such as the wetting behavior of liquids on solid surfaces, the coating of thin liquid films, the formation of dispersed phases, and colloid and nanoparticle technology. (CHMG-141, CHME-310, MATH-231, or instructor permission) **Class 3, Credit 3 (S)**

**CHME-451****Analysis of Multi-scale Processes**

This course examines the use of larger scale chemical engineering processes to control and manipulate microscale phenomena. In an introductory topic, human physiology is examined as a prototypical multi-scale process, and biometric principles are discussed. Langmuir-Blodgett film generation, thin-film breakup and draining, chemical vapor deposition, emulsion based reaction processes to create nano-particles, flow systems involving colloids, porous media flows and membrane separations, and controlled patterning via molecular self assembly are among processes examined. (CHME-321, CHME-330, CHME-340, CHME-350) **Class 3, Credit 3 (F)**

**CHME-489****Special Topics**

Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. (CHME-321) **Class 3, Credit 3 (F, S)**

**CHME-490****Design with Constraint**

This course examines typical constraints on design and their integration with technology. Economics, environmental considerations, ethics, and globalization and supply chain management ideas are among the concepts introduced. Modern examples that integrate knowledge of unit operations and processes with design constraints are examined. (CHME-451) **Class 3, Credit 3 (F)**

**CHME-491****Chemical Engineering Process Lab**

This course extends the laboratory experience from the previous Chemical Engineering Principles Lab, and focuses on unit operations common to engineering practice. Students work in teams to design experimental procedures on existing equipment, and to in some cases, manipulate experimental apparatus to achieve specific experimental goals. (CHME-391; CHME-340 corequisite) **Lab 6, Credit 2 (F)**

**CHME-497****Multidisciplinary Senior Design I**

This is the first of a two course sequence oriented to the solution of real world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow an engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, completing systems and subsystems designs, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. (CHME-490 corequisite) **Class 3, Credit 3 (F)**

**CHME-498****Multidisciplinary Senior Design II**

This is the second of a two course sequence oriented to the solution of real world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow an engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, completing systems and subsystems designs, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. (CHME-497) **Class 3, Credit 3 (S)**

**CHME-499****Co-op**

One semester of paid work experience in chemical engineering. (At least third-year standing and department approval required) **Class 0, Credit 0 (F, S, Su)**

**CHME-599****Independent Study**

Allows upper-level undergraduate students an opportunity to independently investigate, under faculty supervision, aspects of the field of chemical engineering that are not sufficiently covered in existing courses. Proposals for independent study activities must be approved by both the faculty member supervising the independent study and the department head. (Permission of supervising faculty member and department head required.) **Credit variable 1-4 (F, S, Su)**

**Computer Engineering****EGEN-099****Engineering Co-op Preparation**

This course will prepare students for both the job search and employment in the field of engineering. Students will learn strategies for conducting a successful job search, including the preparation of resumes and cover letters, behavioral interviewing techniques, and effective use of social media in the application process. Professional and ethical responsibilities during the job search and for co-op and subsequent professional experiences will be discussed. (At least second-year standing) **Class 1, Credit 0 (F, S)**

**CMPE-110****Introduction to Computer Engineering**

This course overviews the field of computer engineering and provides an appreciation of the computer engineering curriculum. Fundamental concepts of computers, computing and engineering design are introduced. Topics include basic circuits, number systems, digital logic, computer organization, programming in the MATLAB environment, teamwork, communication skills, ethics and professionalism, historical background and global, societal and environmental issues related to computers. Lab exercises familiarize students with lab equipment, experiments and data analysis. (First-year standing in computer engineering or permission by the instructor) **Class 2, Lab 2, Credit 3 (F)**

**CMPE-160****Digital System Design I**

The course covers the specification, analysis, and design of basic digital systems, including the design of combinational and sequential circuits using basic logic components: AND, OR, INV, NAND, NOR, and XOR. Standard modules, such as decoders, multiplexers, shifter registers, adders, and counters, will be analyzed. Lectures will discuss fundamental design methodologies using Karnaugh Maps as well as Mealy and Moore state machines. The laboratory provides hands-on experiences of the design, implementation, and testing of digital systems using SSI, MSI, and FPGA components as well as CAD tools. (CMPE-110 or equivalent; corequisite CSCI-141) **Class 3, Lab 2, Credit 3 (F, S)**

**CMPE-240****Engineering Fundamentals of Computer Systems**

This course introduces the computer engineering fundamentals upon which current computer systems are based. Discussion of the machine-level representation of data, Boolean algebra and simple logic circuits describes the hardware foundations for modern computer systems. An introduction to instruction set design and assembly language provides the student with an understanding of the interface between hardware and software. The course concludes by discussing high-level architectural design and networking emphasizing its effect on program performance. (MATH-190, CSCI-142) **Class 3, Lab 2, Credit 4 (F, S)**

**CMPE-250****Assembly Language Programming**

Course introduces the fundamental computer organization, assembly language programming, and input/output techniques of a modern microprocessor system. Covers addressing methods, machine instructions, assembler directives, macro definitions, subroutine linkage, data-structures, I/O programming, and interrupts. The assembly language program design techniques necessary to write efficient, maintainable device drivers are considered. An introduction to basic digital computer organization concepts is also provided. The Freescale 68HCS12 microcontroller family of devices and Code Warrior Development Environment are used in most class examples and all required programming projects. (CMPE-160 and CSCI-142) **Class 3, Lab 2, Credit 4 (F, S)**

**CMPE-260****Digital System Design II**

This course presents modern approaches to the design, modeling and testing of digital system. Topics covered are: VHDL and Verilog HDL as hardware description languages (HDLs), simulation techniques, design synthesis, verification methods, and implementation with field programmable gate arrays (FPGAs). Combinational and both the synchronous and asynchronous sequential circuits are studied. Testing and design for testability techniques are emphasized and fault tolerant and fail safe design concepts are introduced. Laboratory projects that enable students gain hands-on experience are required. The projects include complete design flow: design of the system, modeling using HDLs, simulation, synthesis and verification. (CMPE-160, PHYS-212 or equivalent) **Class 3, Lab 2, Credit 4 (F, S)**

**CMPE-350 Computer Organization**  
Provides an understanding of the information transfer and transformations that occur in a computer, with emphasis on the relations between computer architecture and organization. Topics include design levels and their respective primitives, modules and descriptive media, register transfer and micro-operations, basic computer organization and design, central processor organization, control unit and microprogramming, memory organization, input-output organization, computer architecture defining the hardware/software interface, and from architecture to organization (one to many). (CMPE-250) **Class 3, Credit 3 (F, S)**

**CMPE-380 Applied Programming**  
An introduction to classical algorithms used in the solution of numerical problems encountered in science and engineering. The C language will be introduced as a tool for implementing these algorithms. Topics include an introduction to C, computer number representation and roundoff error, algorithms for finding roots of nonlinear equations, interpolation, numerical differentiation and integration, function approximation and data fitting solutions to systems of linear equations, and general matrix manipulation. (MATH-231, MATH-241, CSCI-142) **Class 3, Credit 3 (F, S)**

**CMPE-460 Interface and Digital Electronics**  
This course will cover various sensors, signal conditioning circuits including amplification, filtering, level shifting, ADC and DAC. Modern CAD tools such as CodeWarrior, Pspice will be used to simulate and debug Freescale micro-controllers, and analog active filters, and operational amplifier application circuits. Each team of two students are required to design a complete data acquisition system from sensors, amplification, filtering, ADC and DAC to analog outputs through either wired transmission or wireless transmission circuits. (EEEE-381, CMPE-250) **Class 3, Lab 2, Credit 4 (F, S)**

**CMPE-480 Digital Signal Processing**  
This course introduces the basic elements of continuous and discrete time signals and systems and fundamental signal processing techniques, such as FIR and IIR Filtering, the Fourier transform, the Discrete Fourier transform and the z transform. Theory is strengthened through MATLAB-based projects and exercises. (CMPE-380) **Class 3, Credit 3 (F, S)**

**CMPE-489 Special Topics**  
Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. **Class 3, Credit 3 (F, S)**

**CMPE-495 Computer Engineering Senior Projects I**  
The first part of a capstone undergraduate design projects course in computer engineering. Lecture materials include real-time programming techniques, patents and intellectual property, a brief introduction to project management techniques, and formulating major capstone project proposals. Students undertake individual independent investigations of team project subsystems deemed to be of the highest risk to successful project completion. This first course ends at the formulation of a detailed proposal for a reasonably complex multidisciplinary design project to be completed during the concluding course. (CMPE-460, at least two terms of co-op completed, and fourth or fifth year status) **Class 3, Credit 3 (F, S)**

**CMPE-496 Computer Engineering Senior Projects II**  
The conclusion of a capstone undergraduate design projects course in computer engineering. Students will have prepared for the major course project during the previous course and will have done some detailed project analysis over the intervening co-op work period. This course begins with project design reviews presented to the class and selected faculty members. Project performance analysis and reliability will be major metrics. Engineering ethics topics will also be presented. Students will prepare detailed project reports on a department website. (CMPE-495) **Class 3, Credit 3 (F, S)**

**CMPE-497 Multidisciplinary Senior Design I**  
This is the first half of a two-semester design course oriented to the solution of engineering problems. The mission is to enhance engineering education through a capstone design experience that integrates engineering theory, principles and processes within a collaborative environment. Working in multidisciplinary teams and following an engineering design process, students will assess customer needs and engineering specifications, evaluate concepts, resolve major technical hurdles, and employ rigorous engineering principles to design a prototype which is fully tested and documented. (CMPE-460; fourth- or fifth-year standing and two terms of co-op completed) **Class 3, Credit 3 (F, S)**

**CMPE-498 Multidisciplinary Senior Design II**  
This is the conclusion of the capstone sequence. Students will have prepared for a major project in the previous term. The course begins with design reviews. Project performance, analysis and reliability are major metrics. Engineering ethics are also discussed. Students prepare a detailed report for inclusion on department website (CMPE-497) **Class 3, Credit 3 (F, S)**

**CMPE-499 Co-op**  
Computer Engineering students are required to register their co-op through the CE website; [www.ce.rit.edu/studentresources/forms.htm](http://www.ce.rit.edu/studentresources/forms.htm). Contact 475-5873 with any questions. **Class 0, Credit 0 (F, S, Su)**

**CMPE-530 Digital Integrated Circuit Design**  
This course will cover the basic theory and techniques of Digital Integrated Circuit Design in CMOS technology. Topics include CMOS transistor theory and operation, design and implementation of CMOS circuits, fabrication process, layout and physical design, delay and power models, static and dynamic logic families, testing and verification, memory and nanoscale technologies. Laboratory assignments and project facilitate in hands-on learning of circuit-level design and simulation, layout and parasitic extractions, pre and post-layout verification and validation, full-custom flow and Synthesis based flow, using industry standard CAD tools. (CMPE-260, EEEE-381) **Class 3, Lab 2, Credit 3 (F, S)**

**CMPE-540 Control Systems**  
Provides a comprehensive introduction to the basic theory and essential techniques for analysis and design of linear control systems and their digital implementation using transform methods and frequency response approaches. MATLAB, Control System Toolbox and SIMLINK are utilized for analysis, design and simulations. (MATH-231, CMPE-480) **Class 3, Credit 3 (S)**

**CMPE-550 Computer Architecture**  
The course covers various aspects of advanced uniprocessor computer architecture design. Instruction set architecture design alternatives are discussed with emphasis on the Reduced Instruction Set Computer (RISC) architecture. Techniques to enhance CPU performance such as pipelined execution optimizations, conditional branch handling techniques, exploitation of instruction-level parallelism, multiple-instruction issue and dynamic scheduling are studied. Cache, and memory hierarchy design and performance issues are also presented. The design aspects of efficient and reliable input/output systems are also covered. (CMPE-350) **Class 3, Credit 3 (F, S)**

**CMPE-570 Data and Communication Networks**  
This course will give an overview of the technologies, architectures and protocols used to build various types of computer and communication networks - wired or wireless. The emphasis will be placed on discussions of various network design problems and solution approaches. Specific issues covered in this course include: framing and coding, error detection, multiple access control, addressing, routing, flow and congestion control, scheduling and switching. (MATH-251) **Class 3, Credit 3 (F, S)**

**CMPE-599 Independent Study**  
Allows upper-level undergraduate students an opportunity to independently investigate, under faculty supervision, aspects of the field of computer engineering that are not sufficiently covered in existing courses. Proposals for independent study activities must be approved by both the faculty member supervising the independent study and the department head. (Permission of supervising faculty member and department head required) **Credit variable 1-4 (F, S, Su)**

## Electrical Engineering

**EGEN-099 Engineering Co-op Preparation**  
This course will prepare students for both the job search and employment in the field of engineering. Students will learn strategies for conducting a successful job search, including the preparation of resumes and cover letters, behavioral interviewing techniques, and effective use of social media in the application process. Professional and ethical responsibilities during the job search and for co-op and subsequent professional experiences will be discussed (At least second-year standing) **Class 1, Credit 0 (F, S)**

**EEEE-105****Freshman Practicum**

Introduction to the practice of electrical engineering including understanding laboratory practice, identifying electronic components, operating generic electronic instruments, building an electronic circuit (Wein Bridge oscillator), measuring and capturing an electronic waveform, schematic entry, modeling, and simulation of an electronic circuit (SPICE or equivalent), analyzing a waveform using a commercial software package (MATLAB), and building and studying an amplitude modulation radio receiver. This studio style lab course emphasizes a learn-by-doing approach to introduce the student to electrical engineering design practices and tools used throughout the undergraduate program and professional career. Each student will prototype and build a functioning electronic circuit. **Lab 3, Credit 1 (F, S)**

**EEEE-120****Digital Systems I**

This course introduces the student to the basic components and methodologies used in digital systems design. It is usually the student's first exposure to engineering design. The laboratory component consists of small design, implement, and debug projects. The complexity of these projects increases steadily throughout the quarter, starting with circuits of a few gates, until small systems containing several tens of gates and memory elements. Topics include: Boolean algebra, synthesis and analysis of combinational logic circuits, arithmetic circuits, memory elements, synthesis and analysis of sequential logic circuits, finite state machines, and data transfers. (EEEE-105) **Class 3, Lab 3, Credit 3 (S)**

**EEEE-220****Digital Systems II**

In the first part, the course covers the design of digital systems using a hardware description language. In the second part, it covers the design of large digital systems using the computer design methodology, and culminates with the design of a reduced instruction set central processing unit, associated memory and input/output peripherals. The course focuses on the design, capture, simulation, and verification of major hardware components such as: the datapath, the control unit, the central processing unit, the system memory, and the I/O modules. The lab sessions enforce and complement the concepts and design principles exposed in the lecture through the use of CAD tools and emulation in a commercial FPGA. This course assumes a background in C programming. (EEEE-120, CMPR-271) **Class 3, Lab 3, Credit 3 (S)**

**EEEE-221****Clean and Renewable Energy Systems and Sources**

This course covers the first principles and fundamentals of clean and renewable energy systems and sources. Various quantum-mechanical and electromagnetic devices and systems will be analyzed, designed and examined using software and CAD tools. Topics include: geothermal, hydro, nuclear, solar, wind, and other energy sources. Societal, ethical, economical, and environmental aspects of nanotechnology-enabled clean energy and power are also discussed. (Corequisite PHYS-212) **Class 3, Credit 3 (S)**

**EEEE-251****Principles of Analog Electronics**

The course covers basics of DC and AC circuit analysis starting with the definition of voltage, current, resistance, power and energy. Linearity and superposition, together with Kirchhoff's laws, are applied to analysis of circuits having series, parallel and other combinations of circuit elements. Thevenin, and maximum power transfer theorems are proved and applied. The complex plane is introduced along with the concepts of complex exponential functions, Phasors, impedances and admittances. Semiconductor diodes and diode circuits, including rectifying and clamping circuits, as well as Zener diode-based voltage regulation are introduced. Ideal operational amplifier (op amp) circuits in non-inverting and inverting configurations and design of analog integrated circuits using op amp are covered. Basic MOSFET current-voltage characteristics, DC and AC analysis of transistor circuits and design of single stage amplifiers are presented. (Department approval required) **Class 1, Credit 1**

**EEEE-252****Principles of Digital Systems**

This course introduces the basic components and methodologies used in digital systems design. The laboratory component consists of a small design, implement, and debug project. Topics include: Boolean algebra, synthesis and analysis of combinational logic circuits, arithmetic circuits, memory elements, synthesis and analysis of sequential logic circuits, finite state machines, and data transfers. (Department approval) **Class 1, Credit 1**

**EEEE-253****Principles of Linear Systems**

This course introduces the principles of continuous and discrete signal and system analysis. Topics include a description of continuous linear systems via differential equations, a description of discrete systems via difference equations, input-output relationship of continuous and discrete linear systems, the continuous time convolution integral, the discrete time convolution sum, exponential and trigonometric forms of Fourier series and their properties, sampling of continuous time signals, and the Laplace, Z and DTFT. The solution of circuit problems using Laplace transforms, transfer functions of physical systems, system frequency response are presented. Finally, an introduction to the design of analog and digital filters is introduced. (Department approval required) **Class 1, Credit 1 (F)**

**EEEE-260****Semiconductor Devices**

An introductory course on the fundamentals of semiconductor physics and principles of operation of basic devices. Topics include semiconductor fundamentals (crystal structure, statistical physics of carrier concentration, motion in crystals, energy band models, drift and diffusion currents) as well as the operation of pn junction diodes, bipolar junction transistors (BJT), metal-oxide-semiconductor (MOS) capacitors and MOS field-effect transistors (MOSFET). (PHYS-212) **Class 3, Credit 3 (F, S)**

**EEEE-281****Circuits I**

Covers basics of DC circuit analysis starting with the definition of voltage, current, resistance, power and energy. Linearity and superposition, together with Kirchhoff's laws, are applied to analysis of circuits having series, parallel and other combinations of circuit elements. Thevenin, Norton and maximum power transfer theorems are proved and applied. Circuits with ideal op-amps are introduced. Inductance and capacitance are introduced and the transient response of RL, RC and RLC circuits to step inputs is established. Practical aspects of the properties of passive devices and batteries are discussed, as are the characteristics of battery-powered circuitry. The laboratory component incorporates use of both computer and manually controlled instrumentation including power supplies, signal generators and oscilloscopes to reinforce concepts discussed in class as well as circuit design and simulation software. (MATH-182; corequisite PHYS-212) **Class 3, Lab 3, Credit 3 (F, S, Su)**

**EEEE-282****Circuits II**

This course covers the fundamentals of AC circuit analysis starting with the study of sinusoidal steady-state solutions for circuits in the time domain. The complex plane is introduced along with the concepts of complex exponential functions, phasors, impedances and admittances. Nodal, loop and mesh methods of analysis as well as Thevenin and related theorems are applied to the complex plane. The concept of complex power is developed. The analysis of mutual induction as applied to coupled-coils. Linear, ideal and non-ideal transformers are introduced. Complex frequency analysis is introduced to enable discussion of transfer functions, frequency dependent behavior, Bode plots, resonance phenomenon and simple filter circuits. Two-port network theory is developed and applied to circuits and interconnections. (EEEE-281) **Class 3, Credit 3 (F, S, Su)**

**EEEE-321****Energy Conversion**

This course covers: 1) the first principles and fundamentals of energy conversion: 2) The fundamentals of electromechanical, related electromagnetic topics, electric variables and electromagnetic forces. The basic concepts of energy conversion systems, DC electric machines, induction and synchronous electric machines (motors and generators) used in power systems, automotive, industrial, robotics and other applications are presented. The theory of energy conversion and electromechanical motion devices are covered. (EEEE-282) **Class 3, Credit 3 (S)**

**EEEE-346****Advance Programming**

Introduction to Object-Oriented Programming in C++. Topics will be review of C (control structures, functions, and arrays), pointers, classes, operator overloading, inheritance, polymorphism, data structures, class string, and STL. At the end of the semester, everyone will have the working knowledge of C++. Projects will be assigned to build your C++ programming skills. (CMPR-271) **Class 3, Credit 3 (F)**

**EEEE-353****Linear Systems**

Linear Systems provides the foundations of continuous and discrete signal and system analysis and modeling. Topics include a description of continuous linear systems via differential equations, a description of discrete systems via difference equations, input-output relationship of continuous and discrete linear systems, the continuous time convolution integral, the discrete time convolution sum, application of convolution principles to system response calculations, exponential and trigonometric forms of Fourier series and their properties, Fourier transforms including energy spectrum and energy spectral density. Sampling of continuous time signals and the sampling theorem, the Laplace, Z and DTFT. The solution of differential equations and circuit analysis problems using Laplace transforms, transfer functions of physical systems, block diagram algebra and transfer function realization is also covered. A comprehensive study of the z transform and its inverse, which includes system transfer function concepts, system frequency response and its interpretation, and the relationship of the z transform to the Fourier and Laplace transform is also covered. Finally, an introduction to the design of digital filters, which includes filter block diagrams for Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters is introduced. (EEEE-282, MATH-23,1 CMPR-271; corequisite MATH-381) **Class 4, Credit 4 (F, S, Su)**

**EEEE-374****EM Fields and Transmission Lines**

The course provides the foundations of EM fields, static and time varying, and a study of propagation, reflection and transmissions of electromagnetic waves in unbounded regions and in transmission lines. Topics include the following: electric field intensity and potential, Gauss' Law, polarization, electric flux density, dielectric constant and boundary conditions, Poisson's and Laplace's equations, methods of images, steady electric current and conduction current density, vector magnetic potential, Biot-Savart law, magnetization, magnetic field intensity, permeability, boundary conditions, Faraday's law, Maxwell's equations and the continuity equation. Time harmonic EM fields, wave equations, uniform plane waves, polarization, Poynting theorem and power, reflection and transmission from multiple dielectric interfaces, transmission line equations, transients on transmission lines, pulse and step excitations, reflection diagrams, sinusoidal steady state solutions, standing waves, the Smith Chart and impedance matching techniques, TE and TM waves in rectangular waveguides. Experiments using state-of-art RF equipment illustrating fundamental wave propagation and reflection concepts, design projects with state-of-art EM modeling tools. (MATH-231, PHY-212) **Class 4, Lab 2, Credit 4 (F, S)**

**EEEE-381****Electronics I**

This is the first course in a two-course sequence in analog electronic circuit design. The course covers the following topics: (1) basic MOSFET current-voltage characteristics; (2) DC and small-signal analysis and design of Metal-oxide-semiconductor (MOS) devices and circuits, including single-stage MOS amplifier configurations; (3) DC biasing circuits, such as basic current sources and current mirrors; (4) two-transistor amplifier stages, such as differential amplifiers, cascode amplifiers, and output stages; (5) analysis and design of multistage amplifiers; (6) frequency response of single and multistage amplifiers; (7) semiconductor diodes and diode circuits, including rectifying and clamping circuits, as well as Zener diode-based voltage regulation; and (8) ideal operational amplifier (op amp) circuits in non-inverting and inverting configurations. (EEEE-281) **Class 3, Lab 3, Credit 3 (F, S, Su)**

**EEEE-414****Control Systems Design**

This is the first course in the design of feedback control systems. Conventional design techniques, root locus and bode plots, are used to design controllers for continuous systems. Topics include review of transfer function models of physical systems, second order system response and transient specifications, its relationship to complex poles in S plane (Laplace transforms), effect of additional poles and zeros on transient specifications, steady state error, error constants; root locus analysis; design of lag, lead and PID controllers; design using frequency response techniques; review of Bode plots; Nyquist stability criterion, phase and gain margins and their relationships to transient specifications. Practical aspects in controller implementations. Students are expected to use computer aided design packages like MATLAB both in class assignments and laboratory projects. (EEEE-353) **Class 3, Lab 3, Credit 3 (F, S)**

**EEEE-420****Embedded Systems Design**

The purpose of this course is to expose students to both the hardware and the software components of a digital embedded system. It focuses on the boundary between hardware and software operations. Students will learn about a computer system from various abstraction levels from the digital logic gates to software applications. This course will also provide a solid foundation in computer systems architecture. The course focuses on the major hardware components such as: datapaths, the control unit, the central processing unit, the system memory, the I/O modules and on instruction set architectures. The lab sessions will cover the design, simulation and implementation of a 4-bit microprocessor core. (EEEE-220) **Class 3, Lab 3, Credit 3 (F, S)**

**EEEE-421****Electric Power Transmission and Distribution**

This course deals with the topics related to electric power transmission and distribution. Topics covered in this course include: three phase system—Wye and Delta connections, transformers—equivalent circuit—performance characteristics, balanced and unbalanced system analysis, transmission and distribution line design considerations, transmission line protection, transmission line faults and fault analysis. (EEEE-321) **Class 3, Credit 3 (S)**

**EEEE-422****Advances in Power Systems**

This course deals with improvements that can be made in the use of electric power that would result in better use of the available resources. Topics include adjustments of power tariffs, study of the load demand variations during the day, the use of smart sensors and meters to monitor real and reactive power usage, improve the efficiency of power transmission and the integration of renewable sources such as wind and solar into the grid. (EEEE-421) **Class 3, Credit 3 (S)**

**EEEE-450****Introduction to MATLAB Procedural Programming**

This course introduces the principles of MATLAB through the use of examples problems and a hands-on learning approach. MATLAB topics include: MATLAB online help, MATLAB basic function usage, matrix manipulation, polynomials, programming loops (for/while), operators, logical operations, conditional flow control (if-then statements), programming MATLAB (m-files), data import/export, plotting graphic routines, data analysis, custom functions, differential equation solutions, optimization, Fourier transforms, systems modeling, introduction to external interfaces. Several systems-level examples are presented. (Department approval) **Class 1, Credit 1**

**EEEE-451****Introduction to Simulink and Embedded Systems**

This course introduces the principles of Simulink through the use of examples problems and a hands-on learning approach. Simulink topics include: creating a model file, basic block manipulation, interface with MATLAB, modeling and solutions of systems, creating subsystems, S-functions, custom blocks. Several systems-level examples are presented. Introduction to embedded system programming with microprocessors focusing on measuring input, manipulating data, and controlling output. (Department approval) **Class 3, Credit 2**

**EEEE-482****Electronics II**

This is the second course in a two-course sequence in analog and digital electronic circuit analysis and design. The analog portion of the course covers the following topics: (1) DC and small signal analysis and design of bipolar junction transistor (BJT) circuits; (2) BJT DC biasing circuits; (3) simple and compound BJT amplifier stages; (4) analysis and design of BJT multi-stage amplifiers and op-amps; (5) frequency response of BJT-based single and multi-stage amplifiers; and (6) feedback and stability in BJT and MOSFET amplifiers. The digital portion of the course covers the essential concepts and applications of digital electronic circuits implemented in NMOS and CMOS technologies. Topics include the following: (1) static and dynamic behavior of NMOS and CMOS inverters; (2) combinational and sequential CMOS logic networks; (3) dynamic CMOS logic networks, including precharge-evaluate, domino and transmission gate techniques; and (4) special topics, including static and dynamic MOS memory and low-power logic. (EEEE-282, EEEE-381) **Class 4, Lab 3, Credit 4 (F, S)**

**EEEE-483****Mechatronics**

Fundamental principles of electric machines are covered. Sensors and actuators are studied. The primary actuators discussed are high-performance electromechanical motion devices such as permanent-magnet DC, synchronous and stepper motors. Topics in power electronics and control of electromechanical systems are studied. High-performance MATLAB environment is used to simulate, analyze and control mechatronic systems. Application of digital signal processors and microcontrollers in mechatronics are introduced. Case studies are covered. (EEEE-374, EEEE-414) **Class 3, Lab 2, Credit 3 (F, S)**

**EEEE-484****Communication Systems**

Introduction to Communication Systems provides the basics of the formation, transmission and reception of information over communication channels. Spectral density and correlation descriptions for deterministic and stationary random signals. Amplitude and angle modulation methods (e.g. AM and FM) for continuous signals. Carrier detection and synchronization. Phase-locked loop and its application. Introduction to digital communication. Binary ASK, FSK and PSK. Noise effects. Optimum detection: matched filters, maximum-likelihood reception. Computer simulation. (EEEE-353, MATH-251) **Class 3, Lab 2, Credit 3 (F, S)**

**EEEE-485****Robotic Systems**

This course will cover basic electrical and mechanical engineering topics related to Robotics, including but not limited to: basic electrical and electronics components (resistors, capacitors, inductors, diodes, transistors, op-amps, timers) and concepts (sensors, signal conditioning, oscillators) and basic mechanical components (chains, gears, ratchets and pawl belt and chain drives, bearing) and concepts (motion, dynamics equations, and force and torque analysis). In addition, robotics system modeling, control, and applications will be explored. Students will design electronic interfaces and controllers for mechanical devices. Finally, sensor and actuator selection, installation, and application strategies will be explored. (EEEE-346) **Class 3, Lab 2, Credit 3 (S)**

**EEEE-489****Special Topics**

Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. (Department approval) **Class 3, Credit 3 (F, S)**

**EEEE-497****Senior Design Project I**

MSD-I is the first half of a two-semester design course oriented to the solution of engineering problems. The mission is to enhance engineering education through a capstone design experience that integrates engineering theory, principles and processes within a collaborative environment. Working in multidisciplinary teams and following an engineering design process, students will assess customer needs and engineering specifications, evaluate concepts, resolve major technical hurdles, and employ rigorous engineering principles to design a prototype which is fully tested and documented. (EEEE-414, 482, and two completed co-ops) **Class 3, Credit 3 (F)**

**EEEE-498****Senior Design Project II**

MSD-II is the second half of a two-semester design course oriented to the solution of engineering problems. The mission is to enhance engineering education through a capstone design experience that integrates engineering theory, principles and processes within a collaborative environment. Working in multidisciplinary teams and following an engineering design process, students will assess customer needs and engineering specifications, evaluate concepts, resolve major technical hurdles, and employ rigorous engineering principles to design a prototype which is fully tested and documented. (EEEE-497) **Class 3, Credit 3 (S)**

**EEEE-499****Co-op**

One semester of paid work experience in electrical engineering. (At least third-year status in EE) **Class 0, Credit 0 (F, S, Su)**

**EEEE-510****Analog Electronics**

This is a foundation course in analog integrated electronic circuit design and is a prerequisite for the graduate courses in analog integrated circuit design EEEE-726 and EEEE-730. The course covers the following topics: (1) CMOS technology; (2) CMOS active and passive element models; (3) noise mechanisms and circuit noise analysis; (4) current mirrors; (5) differential amplifiers, cascode amplifiers; (6) multistage amps and common mode feedback; (7) stability analysis of feedback amplifiers; (8) advanced current mirrors, amplifiers, and comparators; (9) band gap and translinear cells; and (10) matching. (EEEE-482) **Class 3, Lab 3, Credit 3 (F)**

**EEEE-512****Advanced Semiconductor Devices**

This is an advanced undergraduate course in semiconductor electronics and device physics. The course covers the following topics: (1) bipolar junction transistor; (BJT) fundamentals; (2) advanced BJT topics; (3) metal-oxide-semiconductor field-effect transistor (MOSFET) fundamentals; and (4) advanced MOSFET topics. (EEEE-260) **Class 3, Credit 3 (F, S)**

**EEEE-520****Design of Digital Systems**

The purpose of this course is to expose students to complete, custom design of a CMOS digital system. It emphasizes equally analytical and CAD based design methodologies, starting at the highest level of abstraction (RTL, front-end)), and down to the physical implementation level (back-end)). In the lab students learn how to capture a design using both schematic and hardware description languages, how to synthesize a design, and how to custom layout a design. Testing, debugging, and verification strategies are formally introduced in the lecture, and practically applied in the lab projects. (EEEE-420) **Class 3, Lab 3, Credit 3 (F)**

**EEEE-521****Design of Computer Systems**

The purpose of this course is to expose students to the design of single and multicore computer systems. The lectures cover the design principles of instructions set architectures, non-pipelined data paths, control unit, pipelined data paths, hierarchical memory (cache), and multicore processors. The design constraints and the interdependencies of computer systems building blocks are being presented. The operation of single core, multicore, vector, VLIW, and EPIC processors is explained. In the first half of the semester, the lab projects enforce the material presented in the lectures through the design and physical emulation of a pipelined, single core processor. This is then being used in the second half of the semester to create a multicore computer system. The importance of hardware and software co-design is emphasized throughout the course. (EEEE-420) **Class 3, Lab 3, Credit 3 (S)**

**EEEE-525****Lab Applications in Mechatronics**

This course provides a culminating experience for the mechatronics engineering certificate, relying upon the completed course work and culminating in development of laboratory experiences related to mechatronics. Students enrolled in the course will design and prepare a novel lab experiment and complete lab experiments created by peers. (BS in engineering) **Class 2, Lab 1, Credit 2**

**EEEE-530****Biomedical Instrumentation**

Study of fundamental principles of electronic instrumentation and design consideration associated with biomedical measurements and monitoring. Topics to be covered include biomedical signals and transducer principles, instrumentation system fundamentals and electrical safety considerations, amplifier circuits and design for analog signal processing and conditioning of physiological voltages and currents as well as basic data conversion and processing technology. Laboratory experiments involving instrumentation circuit design and test will be conducted. (EEEE-381: corequisite EEEE-482) **Class 3, Lab 3, Credit 3 (S)**

**EEEE-531****Biomedical Sensors and Transducers I**

Biological entities represent one of the most difficult environments in which to obtain or generate accurate and reliable signals. This course will discuss the techniques, mechanisms and methods necessary to transfer accurate and reliable information or signals with a biological target. Various biomedical sensor and transducer types including their characteristics, advantages, disadvantages and signal conditioning will be covered. Discussions will include the challenges associated with providing a reliable and reproducible interface to a biological entity, the nature and characteristics of the associated signals, the types of applicable sensors and transducers and the circuitry necessary to drive them. (EEEE-482, EEEE-353) **Class 3, Lab 3, Credit 3 (F)**

**EEEE-532****Fundamental Electrophysiology**

Investigation and study of the concepts and underlying mechanisms associated with electrical signals in mammalian biology and physiology with a significant emphasis on methods, techniques and understanding of electrical potential distribution and current flow derived from circuit analysis. Intended to provide engineers with insight into the relationship between the study of electricity and its applicability to a wide variety of physiological mechanisms ranging from intracellular communication and control to cognitive function and bodily movement. Successful completion of the course will require generation of a significantly in-depth analysis report on some electrophysiological phenomenon or mechanism. (EEEE-281, EEEE-374, MEDS-251) **Class 3, Lab 3, Credit 3 (S)**

**EEEE-536****Biorobotics/Cybernetics**

Cybernetics refers to the science of communication and control theory that is concerned especially with the comparative study of automatic control systems (as in the nervous system and brain and mechanical-electrical communications systems). This course will present material related to the study of cybernetics as well as the aspects of robotics and controls associated with applications of a biological nature. Topics will also include the study of various paradigms and computational methods that can be utilized to achieve the successful integration of robotic mechanisms in a biological setting. Successful participation in the course will entail completion of at least one project involving incorporation of these techniques in a biomedical application. **Class 3, Credit 3 (S)**

**EEEE-546****Power Electronics**

The course involves the study of the circuits and devices used in the control and conversion of power. Devices include diodes, BJTs, power MOSFETs, IGBTs and thyristors. Power conversion includes rectifiers (AC-DC), DC-DC, AC-AC and inverters (DC-AC). DC circuit topologies include Buck Converter, Boost Converter, Buck-Boost Converter, and the Cuk converter. (EEEE-482) **Class 3, Lab 3, Credit 3 (S)**



**EEEE-547****Artificial Intelligence Explorations**

The course will start with the history of artificial intelligence and its development over the years. There have been many attempts to define and generate artificial intelligence. As a result of these attempts, many artificial intelligence techniques have been developed and applied to solve real life problems. This course will explore variety of artificial intelligence techniques, and their applications and limitations. Some of the AI techniques to be covered in this course are intelligent agents, problem-solving, knowledge and reasoning, uncertainty, decision making, learning (Neural networks and Bayesian networks), reinforcement learning, swarm intelligence, Genetic algorithms, particle swarm optimization, applications in robotics, controls, and communications. Students are expected to have any of the following programming skills listed above. Students will write an IEEE conference paper. **Class 3, Credit 3 (F)**

**EEEE-579****Analog Filter Design**

A study of the various techniques for the design of filters to meet the given specifications. The emphasis is on the design of active filters using op amps. The following topics are discussed in detail: Review of transfer functions, Bode diagrams and the analysis of op amp circuits; ideal filter characteristics, approximations to the ideal filter using Butterworth, Chebyshev and Bessel-Thompson polynomials; standard filter stages; magnitude and frequency scaling; low-pass filter design; design of high-pass, band-pass and band-reject filters; passive ladder filter network design; frequency dependent negative resistance networks; switched capacitor filters. (EEEE-482, EEEE-353) **Class 3, Credit 3 (F)**

**EEEE-585****Principles of Robotics**

An introduction to a wide range of robotics-related topics, including but not limited to sensors, interface design, robot devices applications, mobile robots, intelligent navigation, task planning, coordinate systems and positioning image processing, digital signal processing applications on robots, and controller circuitry design. Prerequisite for the class is a basic understanding of signals and systems, matrix theory, and computer programming. Software assignments will be given to the students in robotic applications. Students will prepare a project, in which they will complete software or hardware design of an industrial or mobile robot. There will be a two-hour lab additional to the lectures. (EEEE-353) **Class 3, Lab 2, Credit 3 (F, S)**

**EEEE-592****Communication Networks**

This course covers communication networks in general and the internet in particular. Topics include layers service models, circuit and packet switching, queuing, pipelining, routing, packet loss and more. A five-layer model is assumed and the top four levels are covered in a top-down approach: starting with the application layer, going down through the transport layer to the network layer and finally the data link layer. Emphasis is placed on wireless networks and network security. (EEEE-353, MATH-251) **Class 3, Credit 3 (F)**

**EEEE-593****Digital Data Communication**

Principles and practices of modern digital data communication systems. Topics include pulse code transmission and error probabilities, M-ary signaling and performance, AWGN channels, band-limited and distorting channels, filter design, equalizers, optimal detection for channels with memory, synchronization methods, non-linear modulation, and introduction to multipath fading channels, spread spectrum and OFDM. (EEEE-484) **Class 3, Credit 3 (F)**

**EEEE-599****Independent Study**

A supervised investigation within an electrical engineering area of student interest. Professional elective. (Permission of instructor) **Credit 1-4 (F, S, Su)**

**General Engineering****EGEN-100****Engineering Exploration Seminar**

A one-credit hour seminar course for engineering exploration students that provides information to introduce the seven engineering programs offered at RIT. Program curricula, sample lab/project work, and various career opportunities pertaining to each major are presented. **Class 1, Credit 1 (F)**

**EGEN-132****Concept Development**

The first course in a series of courses for engineering honors students focused on how innovative products are developed, designed and manufactured to effectively meet the expanding needs of a global economy. This one-credit hour seminar course focuses on the key elements associated with the process of concept creation; namely, how individuals identify promising ideas for new products and how these ideas are shaped and refined in ways that will optimize the product's success in the marketplace, from the perspective of customer demand. **Class 1, Credit 1 (S)**

**EGEN-231****Manufacturing and Supply Chain**

The second course in a series of three courses for engineering honors students focused on how innovative products are developed, designed and manufactured to effectively meet the expanding needs of a global economy. This course highlights key issues that decision-makers in industry need to understand as they shape their companies to be more competitive in a global context. Specific topics in the course include an in-depth discussion of the manufacturing supply chain and how active management of the supply chain can enhance profitability and customer satisfaction. Additionally, the course addresses issues such as the impact of government policies and monetary issues on globalization and outsourcing. **Class 1, Credit 1 (F)**

**EGEN-232****Leadership/Ethics/Sustainability**

The third course in a series of courses for engineering honors students focused on how innovative products are developed, designed and manufactured to effectively meet the expanding needs of a global economy. This course highlights key issues that decision-makers in industry need to understand as they shape their companies to be more competitive in a global context. A series of presentations by guest speakers address the topics of leadership, ethics, and sustainability. **Class 1, Credit 1 (S)**

**Industrial and Systems Engineering****EGEN-099****Engineering Co-op Preparation**

This course will prepare students for both the job search and employment in the field of engineering. Students will learn strategies for conducting a successful job search, including the preparation of resumes and cover letters, behavioral interviewing techniques, and effective use of social media in the application process. Professional and ethical responsibilities during the job search and for co-op and subsequent professional experiences will be discussed. (At least second-year standing) **Class 1, Credit 0 (F, S)**

**ISEE-120****Fundamentals of Industrial Engineering**

An introductory course in industrial engineering for first and second year students. Describes engineering in an overall sense and industrial engineering in particular. Includes an overview of contemporary engineering topics, and charting and analysis tools used in industrial engineering within the context of the product and process development cycle and lean production. Also reviews basic computer tools (e.g., Excel, Access) that can be used to solve IE problems. Projects and group exercises will be used to cover hands-on applications and problem solving related to topics covered in lectures. **Class 3, Credit 3 (F)**

**ISEE-140****Materials Processing**

A study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Processes covered include cutting, molding, casting, forming, powder metallurgy, solid modeling, engineering drawing, and welding. Students make a project in the lab portion of the course. **Class 2, Lab 2, Credit 3 (S)**

**ISEE-200****Computing for Engineers**

A first course in computational problem solving for engineers. Students will learn the theory necessary to develop algorithms to solve computational problems in the engineering disciplines. Topics include: program design and implementation, integrated development environment, mathematical operations, file input/output, data manipulations, functions, and arrays. Course also covers an introduction to implementing object-oriented programming and graphical user interface. **Class 3, Credit 3 (F)**

**ISEE-250****Engineering Economy**

Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration and capital budgeting. Cannot be used as a professional elective for ISE majors. Course provides a foundation for engineers to effectively analyze engineering projects with respect to financial considerations. **Class 3, Credit 3 (S)**

**ISEE-301****Operations Research**

An introduction to optimization through mathematical programming and stochastic modeling techniques. Course topics include linear programming, transportation and assignment algorithms, Markov Chains queuing and their application on problems in manufacturing, health care, financial systems, supply chain, and other engineering disciplines. Special attention is placed on sensitivity analysis and the need of optimization in decision-making. The course is delivered through lectures and a weekly laboratory where students learn to use state-of-the-art software packages for modeling large discrete optimization problems. (MATH-233 or instructor permission) **Class 4, Credit 4 (S)**

**ISEE-323 Systems and Facilities Planning**  
A basic course in quantitative models on layout, material handling, and warehousing. Topics include product/process analysis, flow of materials, material handling systems, warehousing and layout design. A computer-aided layout design package is used. (Corequisite ISEE-301) **Class 2, Lab 2, Credit 3 (S)**

**ISEE-330 Ergonomics and Human Factors**  
This course covers the physical and cognitive aspects of human performance to enable students to design work places, procedures, products and processes that are consistent with human capabilities and limitations. Principles of physical work and human anthropometry are studied to enable the student to systematically design work places, processes, and systems that are consistent with human capabilities and limitations. In addition, the human information processing capabilities are studied, which includes the human sensory, memory, attention and cognitive processes; display and control design principles; as well as human computer interface design. (CQAS-252 or permission of instructor) **Class 4, Credit 4 (S)**

**ISEE-350 Engineering Management**  
Development of the fundamental engineering management principles of industrial enterprise, including an introduction to project management. Emphasis is on project management and the development of the project management plan. **Class 3, Credit 3 (S)**

**ISEE-410 Simulation**  
Modeling and computer simulation of stochastic and dynamic manufacturing and service systems are emphasized. A high level simulation language (e.g., ARENA) will be used to model and examine system performance. (ISEE-200, ISEE-301; corequisite CQAS-252) **Class 2, Lab 2, Credit 3 (F)**

**ISEE-420 Production Planning and Scheduling**  
A first course in mathematical modeling of production-inventory systems. Topics include: forecasting, aggregate planning, inventory control models, and scheduling. (ISEE-301, CQAS-251) **Class 3, Credit 3 (F)**

**ISEE-421 Design and Analysis of Production Systems**  
This course will provide an introduction to concepts and techniques in the design and analysis of production systems. A blend of traditional and modern approaches is brought into the classroom. At the end of the quarter, the student will be able to assess and analyze the performance of a given manufacturing system as well as to provide a framework for system redesign and improvement. Modern aspects such as lean manufacturing are included in the context of the course. (Corequisite ISEE-420) **Class 2, Lab 2, Credit 3 (F)**

**ISEE-460 Applied Statistical Quality Control**  
An applied approach to statistical quality control utilizing theoretical tools acquired in other math and statistics courses. Heavy emphasis on understanding and applying statistical analysis methods in real-world quality control situations in engineering. Topics include hypothesis testing and control charts. Contemporary topics such as six-sigma are included within the context of the course. (CQAS-251; corequisite CQAS-252) **Class 3, Credit 3 (S)**

**ISEE-489 Special Topics**  
Topics and subject areas that are not among the courses listed here are frequently offered under the special topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a formal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior-level undergraduate technical course. **Class 3, Credit 3 (F, S)**

**ISEE-497 Multidisciplinary Senior Design I**  
This is a two course sequence oriented to the solution of real world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow an engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, completing systems and subsystems designs, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. (Fifth-year standing) **Class 3, Credit 3 (F)**

**ISEE-498 Multidisciplinary Senior Design II**  
This is a two course sequence oriented to the solution of real world engineering design problems. This is a capstone learning experience that integrates engineering theory, principles, and processes within a collaborative environment. Multidisciplinary student teams follow an engineering design process, which includes assessing customer needs, developing engineering specifications, generating and evaluating concepts, choosing an approach, completing systems and subsystems designs, and implementing the design to the extent feasible, for example by building and testing a prototype or implementing a chosen set of improvements to a process. (ISEE-497) **Class 3, Credit 3 (S)**

**ISEE-499 Co-op**  
One semester of paid work experience in industrial engineering. (At least third-year standing and department approval required) **Class 0, Credit 0 (F, S, Su)**

**ISEE-561 Linear Regression Analysis**  
In any system where parameters of interest change, it may be of interest to examine the effects that some variables exert (or appear to exert) on others. "Regression analysis" actually describes a variety of data analysis techniques that can be used to describe the interrelationships among such variables. In this course we will examine in detail the use of one popular analytic technique: least squares linear regression. Cases illustrating the use of regression techniques in engineering applications will be developed and analyzed throughout the course. (MATH-233, CQAS-252) **Class 3, Credit 3 (F)**

**ISEE-599 Independent Study**  
A supervised investigation within an industrial engineering area of student interest. Professional elective. (Permission of instructor) **Credit 1-4 variable (F, S, Su)**

## Mechanical Engineering

**EGEN-099 Engineering Co-op Preparation**  
This course will prepare students for both the job search and employment in the field of engineering. Students will learn strategies for conducting a successful job search, including the preparation of resumes and cover letters, behavioral interviewing techniques, and effective use of social media in the application process. Professional and ethical responsibilities during the job search and for co-op and subsequent professional experiences will be discussed. (At least second-year standing) **Class 1, Credit 0 (F, S)**

**MECE-102 Engineering Mechanics Laboratory**  
This course examines classical Newtonian mechanics from a calculus-based fundamental perspective with close coupling to integrated laboratory experiences. Topics include kinematics; Newton's laws of motion; work, energy, and power; systems of particles and linear momentum; circular motion and rotation; and oscillations and gravitation within the context of mechanical engineering, using mechanical engineering conventions and nomenclature. Each topic is reviewed in lecture, and then thoroughly studied in multiple accompanying laboratory sessions. Students conduct experiments using modern data acquisition technology; and analyze, interpret, and present the results using modern computer software. (Corequisite MATH-181) **Class 1, Lab 1, Studio 1, Credit 3 (F, S)**

**MECE-103 Statics**  
This basic course treats the equilibrium of particles and rigid bodies under the action of forces. It integrates the mathematical subjects of calculus, vector algebra and simultaneous algebraic equations with the physical concepts of equilibrium in two and three dimensions. Topics include concepts of force and moment, trusses, frames, machines, friction, centroids and moments of inertia. (MECE-102; corequisite: MATH-182) **Class 3, Credit 3 (F, S)**

**MECE-104 Engineering Design Tools**  
This course is an introduction to graphical communication as a tool in documenting the results of an engineering design. Emphasis is placed on the use of computer-aided drafting and 3-D solid modeling systems to prepare working drawings packages of basic components and assemblies. Students combine the practice of sketching along with computer-based solid modeling to produce a parametric design. At the conclusion of the course, students will be able to prepare working drawings, with appropriate views, dimensions, title blocks, and bill of materials. This course will also introduce students to the skills they will need to address open-ended engineering design problems which require the fabrication of a prototype from engineering drawings. Students will learn about problem definition, concept development, feasibility assessment, managing design parameter tradeoffs using engineering analysis, developing a preliminary design drawing package and constructing a working prototype. **Class 2, Lab 2, Studio 2, Credit 4 (F, S)**

**MECE-110** **Thermodynamics I**  
A basic course introducing the classical theory of thermodynamics. Applications of the first law of thermodynamics are used to introduce the student to thermodynamic processes for closed and open systems. The Clausius and Kelvin-Planck statements of the second law are then correlated with the concept of entropy and enthalpy to investigate both real and reversible processes and the thermodynamic properties of pure substances. (MECE-102; co-requisite: MATH-182) **Class 3, Credit 3 (F, S)**

**MECE-200** **Fundamentals of Mechanics**  
Statics: equilibrium, the principle of transmissibility of forces, couples, centroids, trusses, frames, machines and friction. Introduction to strength of materials: axial stresses and strains, statically indeterminate problems, torsion and bending. Dynamics: dynamics of particles and rigid bodies with an introduction to kinematics and kinetics of particles and rigid bodies, work, energy, impulse momentum and mechanical vibrations. Emphasis is on problem solving. For students majoring in industrial and systems engineering. (PHYS-211) **Class 3, Credit 3 (S)**

**MECE-203** **Strength of Materials I**  
A basic course in the fundamental principles of the mechanics of deformable media, including stress, strain, deflections and the relationships among them. The basic loadings of tension, compression, shear, torsion and bending are also included. (MECE-103) **Class 3, Credit 3 (F, S)**

**MECE-204** **Strength of Materials I Laboratory**  
A required laboratory course taken in support of MECE-203. Students are introduced to reduction and analysis of data, basic experimental techniques, and effective report writing. (Corequisite: MECE-203) **Lab 1, Credit 1 (F, S, Su)**

**MECE-205** **Dynamics**  
A basic course in the kinematics and kinetics of particles and rigid bodies. Newton's Laws and the theorems of work-energy and impulse momentum are applied to a variety of particle problems. Systems of particles are employed to transition to the analysis of rigid body problems. Absolute and relative motion are used to investigate the kinematics and kinetics of systems of rigid bodies. Newton's Laws and the theorems of work-energy and impulse-momentum are also applied to a variety of rigid body problems. (MECE-103) **Class 3, Credit 3 (F, S, Su)**

**MECE-210** **Fluid Mechanics I**  
Includes the physical characteristics of a fluid: density, stress, pressure, viscosity, temperature, vapor pressure, compressibility. Descriptions of flows: Lagrangian and Eulerian; stream-lines, path-lines, streak-lines. Classification of flows. fluid statics: hydrostatic pressure at a point, pressure field in a static fluid, manometry, forces on submerged surfaces, buoyancy, standard and adiabatic atmospheres. Flow fields and fundamental laws; systems and control volumes, Reynolds Transport theorem, integral control volume analysis of basic equations for stationary and moving control volumes. Inviscid Bernoulli and the Engineering Bernoulli equation, some applications. Incompressible flow in pipes; laminar and turbulent flows, separation phenomenon, dimensional analysis. (MECE-110) **Class 3, Credit 3 (F, S, Su)**

**MECE-211** **Engineering Measurements Lab**  
A required laboratory course taken concurrently with MECE-210. Includes the physical characteristics of a fluid: density, stress, pressure, viscosity, temperature, vapor pressure, compressibility. Descriptions of flows: Lagrangian and Eulerian; stream-lines, path-lines, streak-lines. Classification of flows. fluid statics: hydrostatic pressure at a point, pressure field in a static fluid, manometry, forces on submerged surfaces, buoyancy, standard and adiabatic atmospheres. Flow fields and fundamental laws; systems and control volumes, Reynolds Transport theorem, integral control volume analysis of basic equations for stationary and moving control volumes. Inviscid Bernoulli and the Engineering Bernoulli equation, some applications. Incompressible flow in pipes; laminar and turbulent flows, separation phenomenon. Dimensional analysis. (Corequisite: MECE-210) **Lab 2, Credit 2 (F, S, Su)**

**MECE-251** **Principles of Thermodynamics, Fluids, and Heat Transfer**  
This course introduces the principles of energy transfer through the use of first principles and empirical correlations. Topics include concepts of pressure, temperature, internal energy, enthalpy, entropy, thermodynamic cycles, Newtonian fluids, manometry, fluid flow, conduction, convection, and radiation. Techniques include the conservation of energy and momentum. This course introduces the principles of energy and its transport in cycles and systems. Rudimentary systems-level examples are presented. (Department approval required) **Class 1, Credit 1**

**MECE-253** **Fundamentals of Mechanical Design for Mechatronics**  
This course builds upon the core principles of mechanical engineering to introduce fundamental concepts of mechanical design as applied to mechatronics systems. Topics include thermal and mechanical failure modes or mechatronic systems, design considerations to mitigate failures modes; materials science considerations such as materials compatibility, corrosion and material selection; and solid modeling of mechatronic systems for parts, assemblies, parametric design, and revision control. (Department approval required) **Class 1, Credit 1**

**MECE-301** **Engineering Applications Laboratory**  
This course builds on prior laboratory experiences, by providing students with the opportunity to work in teams to design and perform open-ended experiments. Students will complete two open-ended experiments involving theoretical and empirical analyses of Mechanical Engineering systems, one based on thermo-fluids sciences and one based on solid mechanics. (MECE-102, MECE-104, MECE-204, MECE-211) **Lab 2, Credit 2 (F, S, Su)**

**MECE-304** **Fundamentals of Material Science**  
This course provides the student with an overview of structure, properties, and processing of metals, polymers, and ceramics. Materials selection is also discussed. There is a particular emphasis on steels, but significant attention is given to non-ferrous metals, ceramics, and polymers This course does not include a laboratory component. **Class 2, Credit 2 (S)**

**MECE-305** **Materials Science with Applications**  
This course provides the student with an overview of structure, properties, and processing of metals, polymers, and ceramics. Materials selection is also discussed. There is a particular emphasis on steels, but significant attention is given to non-ferrous metals, ceramics, and polymers This course does not include a laboratory component. (MECE-104) **Class 3, Credit 3 (F, S, Su)**

**MECE-306** **Materials Science with Applications Laboratory**  
A required laboratory course taken in support of MECE-305. (Corequisite: MECE-305) **Lab 2, Credit 1 (F, S, Su)**

**MECE-310** **Heat Transfer I**  
A basic course in the fundamentals of heat transfer by conduction, convection and radiation, together with applications to typical engineering systems. Topics include one- and two-dimensional steady state and transient heat conduction, radiation exchange between black and gray surfaces, correlation equations for laminar/turbulent internal and external convection, and an introduction to heat exchangers analysis and design by LMTD and NTU methods. (MECE-210) **Class 3, Credit 3 (F, S, Su)**

**MECE-317** **Numerical Methods**  
This course entails the study of numerical methods as utilized to model and solve engineering problems on a computing device. Students learn to implement, analyze and interpret numerical solutions to a variety of mathematical problems commonly encountered in engineering applications. Topics include roots of algebraic and transcendental equations, linear systems, curve fitting, numerical differentiation and integration, and ordinary differential equations. Applications are taken from student's background in engineering, science and mathematics courses. The MATLAB programming language is taught and utilized for computer implementation. (MATH-231, MECE-102) **Class 3, Credit 3 (F, S, Su)**

**MECE-320** **System Dynamics**  
This required course introduces the student to lumped parameter system modeling, analysis and design. The determination and solution of differential equations that model system behavior is a vital aspect of the course. System response phenomena are characterized in both time and frequency domains and evaluated based on performance criteria. Laboratory exercises enhance student proficiency with model simulation, basic instrumentation, data acquisition, data analysis, and model validation. (MATH-231, MECE-205, MECE-317; corequisite: EEEE-281) **Class 2, Lab 1, Credit 3 (F, S, Su)**

**MECE-350** **Strength of Materials II**  
The analysis and theory of machine design in the context of failure theories. Particular emphasis is placed on the design and analysis of machine elements and fatigue. A discussion of engineering professionalism and ethics is also included. (MECE-203) **Class 3, Credit 3 (F, S)**

**MECE-352** **Thermodynamics II**  
Advanced design and analysis of gas and vapor power cycles, including cogeneration and combined cycles, using concepts of energy based on the 2nd Law of Thermodynamics and the field of thermo-economics. Emphasis is also placed on determining entropy generation and irreversibility within fuel cells and fossil fuel combustion processes using chemical energy as well as developing equations of state. (MECE-110, CHMG-131 or higher) **Class 3, Credit 3 (S)**

**MECE-354** **Heat Transfer II**  
Consists of the numerical solution of heat transfer problems. One- and two-dimensional steady-state as well as transient conduction cases are analyzed. A detailed study of single-phase forced and natural convective heat transfer is presented. Heat transfer during pool boiling, flow boiling and condensation is studied. Design aspects of heat transfer equipment are introduced. The students undertake a major design project. (MECE-317, MECE-310) **Class 3, Credit 3**

**MECE-355** **Fluid Mechanics II**  
A second course in fluid mechanics, integrating concepts of heat and mass transfer. Use of the differential form of the fundamental equations of the conservation of mass, momentum and energy is derived and used throughout. Topics include potential flow, viscous internal plane and pipe flows, external boundary layers, and the convective transport of heat and mass. (MECE-210) **Class 3, Credit 3 (F)**

**MECE-356** **Contemporary Issues in Aerospace Engineering**  
Lays the foundation for studies in aerospace engineering. Topics include the history of aviation, basic aerodynamics, airfoils, wings and other aerodynamic shapes, airplane performance, stability and control, propulsion and aircraft structures. (Corequisite MECE-499) **Class 3, Credit 3 (F)**

**MECE-357** **Contemporary Issues in Energy and the Environment**  
This course lays the foundation for studies in energy and the environment. Topics include an introduction to energy intensive systems and how they interact with the environment. Specific attention is focused on current events both domestically and internationally, and how these events will shape our future energy production and utilization. (Corequisite MECE-499) **Class 3, Credit 3 (S)**

**MECE-358** **Contemporary Issues in Bioengineering**  
This course lays the foundation for studies in bioengineering. Topics include the principles of living systems, fundamentals of biomolecular and cellular engineering, engineering applications, and medical engineering. (Corequisite MECE-499) **Class 3, Credit 3 (S)**

**MECE-359** **Contemporary Issues in Automotive Engineering**  
An introduction to the design and manufacturing practices employed in typical automotive industries. Design practices that are currently being implemented in industry will be emphasized including the use of computer-aided engineering, software, and statistical analysis. The regularly scheduled lecture periods will include guest lecturers from automotive manufacturers to introduce students to current manufacturing technologies. (Corequisite MECE-499) **Class 3, Credit 3 (F)**

**MECE-360** **Advanced Computational Techniques**  
This extension of Numerical Methods, MECE-317, covers finite element and finite difference techniques and their applications in mechanical engineering (structural analysis, heat transfer, fluid mechanics). (MECE-317, MATH-231) **Class 3, Credit 3 (F)**

**MECE-401** **Refrigeration and Air Conditioning**  
A basic course in the principles and applications of refrigeration and air conditioning involving mechanical vapor compression and absorption refrigeration cycles, associated hardware, psychometrics, heat transmission in buildings and thermodynamic design of air conditioning systems. Students are expected to do a design project. (MECE-310) **Class 3, Credit 3 (S)**

**MECE-402** **Turbomachinery**  
Examines the basic principles applicable to all turbomachinery as well as the consideration of the operating and design characteristics of several basic classes of turbomachinery. Includes a major design project. (MECE-210) **Class 3, Credit 3 (F)**

**MECE-403** **Propulsion**  
The fundamentals of propulsion including the basic operating principles and design methods for flight vehicle propulsion systems. Topics include air-breathing engines (turbojets, ramjets, turboprops and turbofans) as well as liquid and solid propellant chemical rockets. (MECE-310) **Class 3, Credit 3 (F)**

**MECE-404** **Robotics**  
An applied course in the fundamentals and applications of industrial robots. Emphasis is placed on the use of microcontrollers to construct mobile robots. Topics include microcontroller programming, industrial robot fundamentals, DC servo and stepper motors, encoders, sensors, programming, gripper design, and safety. A major emphasis is placed in a design project involving the design, build, and test of a mobile robot for an application. (MECE-320) **Class 3, Credit 3 (F)**

**MECE-405** **Wind Turbine Engineering**  
This course explores the basic aerodynamic elements of small-scale, horizontal axis wind turbines. A major component of the course is a project involving the design, construction, and testing of various blade profiles for a simple test turbine facility, utilizing a novel foam-paper construction process. Students will make use of various software packages for the project, including ProEngineer (or similar), MATLAB, and LabVIEW. Some attention may be given to larger-scale turbines, siting and environmental issues, power generation concerns, and other related topics as time and interest allow. (MECE-210, MECE-317) **Class 3, Credit 3 (S)**

**MECE-406** **Advanced Solid Modeling and Design**  
This course covers advanced solid modeling concepts utilizing industry standard parametric 3D modeling software. Part modeling concepts include parametric design, surface modeling and 3D annotation. Assembly modeling concepts include top down assembly, mechanisms and assemblies. A team design project will reverse engineer a given assembly and suggest improvements. (MECE-104) **Class 3, Credit 3 (Su)**

**MECE-407** **Applied Biomaterials**  
This course is an introduction to the design of medical devices and issues that are unique to these devices. Course content includes some historical background, an overview of existing devices and trends, material selection, interfaces of medical devices with biological tissues, product testing, reliability, and regulations specific to the design and validation of medical devices. A substantial part of the course is a project, in which students will be required to work in teams to complete a preliminary design of a novel device, including appropriate analysis and documentation. Analysis methods learned from prior coursework in the students discipline will be applied to this component of the course. (MECE-203, MECE-210, MECE-310) **Class 3, Credit 3 (F)**

**MECE-409** **Aerodynamics**  
This course presents the essentials of aerodynamic theory. This course is used in place of Transport Phenomena for students enrolled in the aero option. Topics include differential equations of fluid mechanics, airfoil theory, wings of finite span, inviscid potential flows, laminar and turbulent boundary layer, Airfoil design is explored through software. A design project is required. (MECE-210) **Class 3, Credit 3 (F)**

**MECE-410** **Flight Dynamics**  
An applied course in the fundamentals and applications of industrial robots. Emphasis is placed on the use of microcontrollers to construct mobile robots. Topics include microcontroller programming, industrial robot fundamentals, DC servo and stepper motors, encoders, sensors, programming, gripper design, and safety. A major emphasis is placed in a design project involving the design, build, and test of a mobile robot for an application. (Corequisite: MECE-320) **Class 3, Credit 3 (S)**

**MECE-411** **Orbital Mechanics**  
This course introduces orbital mechanics and space flight dynamics theory with application for Earth, lunar, and planetary orbiting spacecraft. Content includes historical background and equations of motion, two-body orbital mechanics, orbit determination, orbit prediction, orbital maneuvers, lunar and interplanetary trajectories, orbital rendezvous and space navigation (time permitting). The two body orbital mechanics problem, first approximation to all exploration orbits or trajectories, is covered with an introduction to the three body problem. Students develop computer based simulations of orbital mechanics problems including a final mission project simulation from Earth to Mars and home again requiring a number of orbit phases and transfers between these phases. (MECE-320) **Class 3, Credit 3 (F)**

**MECE-412** **Aerostructures**  
The principles of deformable bodies as applied to the analysis and design of aircraft and space vehicle structures. Topics include the study of bending and torsion of thin-walled, multi-cell beams and columns; wing and fuselage stress analysis; and structural stability. Strain energy concepts and matrix methods are utilized throughout the course. (MECE-203) **Class 3, Credit 3 (S)**

**MECE-421** **Internal Combustion Engines**  
An introduction to the operation and design of internal combustion engines. Topics include engine types and cycles, fuels, intake and exhaust processes, emissions and emission control systems, heat transfer and lubrication. (MECE-110) **Class 3, Credit 3 (S, Su)**

**MECE-450 Introduction to MATLAB Procedural Programming**  
This course introduces the principles of MATLAB through the use of examples problems and a hands-on learning approach. MATLAB topics include: MATLAB online help, MATLAB basic function usage, matrix manipulation, polynomials, programming loops (for/while), operators, logical operations, conditional flow control (if-then statements), programming MATLAB (m-files), data import/export, plotting graphic routines, data analysis, custom functions, differential equation solutions, optimization, Fourier transforms, systems modeling, introduction to external interfaces. Several systems-level examples are presented. (Department approval required) **Class 1, Credit 1**

**MECE-451 Introduction to Simulink and Embedded Systems**  
This course introduces the principles of Simulink through the use of examples problems and a hands-on learning approach. Simulink topics include: creating a model file, basic block manipulation, interface with MATLAB, modeling and solutions of systems, creating subsystems, S-functions, custom blocks. Several systems-level examples are presented. Introduction to embedded system programming with microprocessors focusing on measuring input, manipulating data, and controlling output. (Department permission) **Class 1, Credit 1**

**MECE-489 Undergraduate Special Topics**  
In response to student and/or faculty interest, special courses that are of current interest and/or logical continuation of regular courses will be presented. (Permission of the supervising faculty member and the department head required) See instructor for more details. **Class 3, Credit 3**

**MECE-497 Multidisciplinary Senior Design I**  
The first of a two-course capstone design sequence. Students work in multidisciplinary design teams in an environment approximating an industrial setting. Emphasis is placed on teamwork and on developing good oral, written and interpersonal communication skills. In this course, student teams develop their proposed final design of a mechanical system after identifying possible alternative concepts. The final design must be supported by sound engineering analyses and by engineering drawings necessary to build a prototype. This course is intended to be taken as a capstone design experience near the conclusion of the student's program of study. (MECE-301, MECE-499) **Class 3, Credit 3 (F, S)**

**MECE-498 Multidisciplinary Senior Design II**  
The second of the two-course capstone design sequence. The same student teams from Senior Design I return to build and test a working prototype of their previously developed final design. Continued emphasis is placed on teamwork and on developing good oral, written and interpersonal communication skills. (MECE-497) **Class 3, Credit 3 (F, S)**

**MECE-499 Cooperative Education**  
One semester of full-time, paid employment in the mechanical engineering field. (MECE-110, MECE-203, EGEN-099) **(F, S, Su)**

**MECE-520 Introduction to Optimal Design**  
This course is an introduction to basic optimization techniques for engineering design synthesis. Topics covered include: techniques, the general problem statement, necessary conditions of optimization, numerical techniques for unconstrained optimization, constrained optimization through unconstrained optimization, and direct methods. Numerical solutions are obtained using MATLAB software. A design project is required. (MECE-317) **Class 3, Credit 3 (S)**

**MECE-523 Powertrain Systems and Design**  
This course will introduce the analysis and design of power transmission systems. Topics covered include spur, helical, bevel, and worm gears, gear trains, planetary gear systems, power transmission shafts, belt and chain drives, and systems such as electric and hydraulic power transmission. The transmission of power at the required speed and torque is the primary function of most power transmission systems, and is the focus of this course. Students will use this foundation to complete a case study project whereby they review and analyze how power is transmitted from the primary source to the remainder of the driveline by means such as manual transmissions, automatic transmissions, continuously variable transmissions, and direct drive systems. (MECE-350) **Class 3, Credit 3 (F)**

**MECE-524 Vehicle Dynamics**  
Deals with the fundamentals of ground vehicle stability and control. The contribution of tire lateral force, stiffness, and aligning torque to vehicle stability is discussed. Bicycle and four-wheel vehicle models are analyzed for neutral, under and oversteer characteristics. The effects of suspension geometry, chassis stiffness and roll stiffness on stability and handling are analyzed. (Corequisite MECE-320) **Class 3, Credit 3 (S)**

**MECE-525 Lab Applications in Mechatronics**  
This course provides a culminating experience for the mechatronics engineering certificate, relying upon the completed course work and culminating in development of laboratory experiences related to mechatronics. Students enrolled in the course will design and prepare a novel lab experiment and complete lab experiments created by peers. (Department approval required) **Class 2, Lab 1, Credit 3**

**MECE-529 Renewable Energy Systems**  
This course provides an overview of renewable energy system design. Energy resource assessment, system components, and feasibility analysis will be covered. Possible topics to be covered include photovoltaics, wind turbines, solar thermal, and hydropower. Students will be responsible for a final design project. (MECE-310, MECE-352) **Class 3, Credit 3 (F)**

**MECE-538 Design of Machine Systems**  
This is an applied course in the selection of components and integration of those components into electro-pneumatic-mechanical devices and systems. Topics involve all aspects of machine design, including drive components and systems, motion generation and control, and electrical control hardware and strategy. (MECE-205, MECE-350) **Class 3, Credit 3 (Su)**

**MECE-543 Continuous Control Systems**  
Introduces the student to the study of linear control systems, their behavior and their design and use in augmenting engineering system performance. Topics include control system behavior characterization in time and frequency domains, stability, error and design. This is accomplished through classical feedback control methods that employ the use of Laplace transforms, block diagrams, root locus, and Bode diagrams. An integrated laboratory will provide students with significant hands-on analysis and design-build-test experience. (MECE-320) **Class 2, Lab 1, Credit 3 (F)**

**MECE-544 Introduction to Composite Materials**  
Cooperative education is a central element of the BS degree program in mechanical engineering at RIT. BS students will complete one year of practical work experience during their program of study. Students will participate in two summer work experiences and two academic year work experiences. (MECE-203, MECE-305, MECE-360) **Class 3, Credit 3 (S)**

**MECE-556 Applied Biotransport**  
Review of the fundamentals of momentum, energy and mass transport within the context of biological systems ranging from the organelles in cells to whole plants and animals and their environments. Use of theoretical equations and empirical relations to model and predict the characteristics of diffusive, convective and radiative transport in complex biological systems and their environments. Emphasis is placed on the physical understanding of these systems through the construction of simplified mathematical models amenable to analytical, numerical or statistical formulations and solutions. (MECE-210, MECE-310) **Class 3, Credit 3**

**MECE-557 Applied Biomaterials**  
This course provides an overview of materials used in biomedical applications. Topics covered include structure and properties of hard and soft biomaterials, material selection for medical applications, material performance and degradation in hostile environments, and typical and abnormal physiological responses to biomaterials/environments. Some experiments will be performed in class and a major project is required. (MECE-212, MECE-305) **Class 3, Credit 3 (S)**

**MECE-558 Introduction to Engineering Vibrations**  
The theory of mechanical vibrations with an emphasis on design applications and instrumentation. Fourier analysis techniques, numerical and experimental analysis and design methods are presented in addition to theoretical concepts. Vibrations of single-degree of freedom systems are covered, including free-damped and undamped motion; and harmonic and transient-forced motion, such as support motion, machinery unbalance and isolation. Modal analysis of multidegree of freedom systems is introduced. In addition to laboratory exercises on vibration instrumentation, an independent design project is assigned. (MECE-320) **Class 3, Credit 3 (F)**

**MECE-599 Undergraduate Independent Study**  
An independent student project course encompassing one of (a) an analytical investigation, (b) an experimental investigation or (c) a major design project. All independent student projects require a formal written report. **Credit 1-4**

## Microelectronic Engineering

### EGEN-099

#### Engineering Co-op Preparation

This course will prepare students for both the job search and employment in the field of engineering. Students will learn strategies for conducting a successful job search, including the preparation of resumes and cover letters, behavioral interviewing techniques, and effective use of social media in the application process. Professional and ethical responsibilities during the job search and for co-op and subsequent professional experiences will be discussed. (At least second-year standing) **Class 1, Credit 0 (F, S)**

### MCEE-101

#### Introduction to Nanoelectronics

An overview of semiconductor technology history and future trends is presented. The course introduces the fabrication and operation of silicon-based integrated circuit devices including resistors, diodes, transistors and their current-voltage (I-V) characteristics. The course also introduces the fundamentals of micro/nanolithography, with topics such as IC masking, sensitivity, radiometry, resolution, photoresist materials and processing. Laboratory teaches the basics of IC fabrication, photolithography and I-V measurements. A five-week project provides experience in digital circuit design, schematic capture, simulation, bread-boarding, layout design, IC processing and testing. **Class 3, Lab 3, Credit 3 (F)**

### MCEE-201

#### IC Technology

An introduction to the basics of integrated circuit fabrication. The electronic properties of semiconductor materials and basic device structures are discussed, along with fabrication topics including photolithography diffusion and oxidation, ion implantation, and metallization. The laboratory uses a four-level metal gate PMOS process to fabricate an IC chip and provide experience in device design - and layout (CAD), process design, in-process characterization and device testing. Students will understand the basic interaction between process design, device design and device layout. **Class 3, Lab 3, Credit 3 (F, S)**

### MCEE-205

#### Statistics and Design of Experiments

Statistic and Design of Experiments will study descriptive statistics, measurement techniques, SPC, Process Capability Analysis, experimental design, analysis of variance, regression and response surface methodology, and design robustness. The application of the normal distribution and the central limit theorem will be applied to confidence intervals and statistical inference as well as control charts used in SPC. Students will utilize statistical software to implement experimental design concepts, analyze case studies and design efficient experiments. **Class 3, Lab 3, Credit 3 (S)**

### MCEE-320

#### E&M Fields for Microelectronics

An introduction to the fundamentals of electrostatic, magneto-static and time varying fields that culminate with the Maxwell's equations, continuity and Lorentz force that govern the EM phenomena. Importance of Laplace's and Poisson's equations in semiconductor applications is described. Electromagnetic properties of material media are discussed with emphasis on boundary conditions. Plane wave solution of Maxwell's equations is derived and discussed in loss-less and lossy media. Applications in optics include reflection/refraction and polarization of light. A strong knowledge of vector calculus is desired. (MATH-221) **Class 3, Credit 3 (F, S)**

### MCEE-360

#### Semiconductor Devices for Microelectronic Engineers

An extensive study of semiconductor physics, principles and device operation tied to realistic device structures and fabrication techniques. Topics include semiconductor fundamentals, pn junction diodes, metal-semiconductor junctions, metal-oxide-semiconductor field-effect transistors (MOSFETs), and bipolar junction transistors (BJT). Throughout the course, finite element simulation of realistic device structures (derived from a technology computer aided design tool) using a Poisson solving software package will be used to reinforce key concepts. (PHYS-212) **Class 3, Credit 4 (F, S)**

### MCEE-495

#### Senior Design I

A capstone design experience for microelectronic engineering senior students. Students propose a related to microelectronic process, device, component or system design, to meet desired specifications within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. The students plan a timetable and write a formal proposal. The proposal is evaluated on the basis of intellectual merit, sound technical/research plan, and feasibility. The proposed work is carried through in the sequel course, Senior Design Project II (MCEE-496). Each student is required to make a presentation of the proposal. (Fifth-year status and permission of instructor, corequisite MCEE-550) **Class 2, Lab 3, Credit 3 (F)**

### MCEE-496

#### Senior Design II

A capstone design experience for microelectronic engineering senior students. In this course, students conduct a hands-on implementation of the projects proposed in the previous course, Senior Design Project I. Technical presentations of the results, including a talk and a poster, are required at the annual conference on microelectronic engineering. A written paper in IEEE format is required and is included in the conference journal. (MCEE-495) **Class 2, Lab 3, Credit 3 (S)**

### MCEE-499

#### Microelectronic Engineering Co-op

One semester of paid work experience in microelectronic engineering. (Department approval required) **Class 0, Credit 0 (F, S, Su)**

### MCEE-502

#### VLSI Process Modeling

This is an advanced level course in silicon process technology. A detailed study of several of the individual processes utilized in the fabrication of VLSI circuits will be done, with a focus on engineering challenges such as shallow-junction formation and ultra-thin gate dielectrics. Front-end silicon processes will be investigated in depth including diffusion, oxidation, ion implantation, and rapid thermal processing. Particular emphasis will be placed on non-equilibrium effects. Device design and process integration details will also be emphasized. SUPREM-IV (Silvaco Athena) will be used extensively for process simulation. (MCEE-201, MCEE-360, or EEEE-260) **Class 3, Lab 2, Credit 3 (F, S)**

### MCEE-503

#### Thin Films

This course focuses on the deposition and etching of thin films of conductive and insulating materials for IC fabrication. A thorough overview of vacuum technology is presented to familiarize the student with the challenges of creating and operating in a controlled environment. Physical and Chemical Vapor Deposition (PVD and CVD) are discussed as methods of film deposition. Plasma etching and Chemical Mechanical Planarization (CMP) are studied as methods for selective removal of materials. Applications of these fundamental thin film processes to IC manufacturing are presented. (MCEE-201) **Class 3, Lab 3, Credit 3 (F, S)**

### MCEE-505

#### Lithography Materials and Processes

Microolithography Materials and Processes covers the chemical aspects of microlithography and resist processes. Fundamentals of polymer technology will be addressed and the chemistry of various resist platforms including novolac, styrene, and acrylate systems will be covered. Double patterning materials will also be studied. Topics include the principles of photoresist materials, including polymer synthesis, photochemistry, processing technologies and methods of process optimization. Also advanced lithographic techniques and materials, including multi-layer techniques for BARC, double patterning, TARC, and next generation materials and processes are applied to optical lithography. (CHMG-131) **Class 3, Lab 3, Credit 3 (F, S)**

### MCEE-515

#### Nanolithography Systems

An advanced course covering the physical aspects of micro- and nanolithography. Image formation in projection and proximity systems are studied. Makes use of optical concepts as applied to lithographic systems. Fresnel diffraction, Fraunhofer diffraction, and Fourier optics are utilized to understand diffraction-limited imaging processes and optimization. Topics include illumination, lens parameters, image assessment, resolution, phase-shift masking, and resist interactions as well as non-optical systems such as EUV, maskless, e-beam, and nanoimprint. Lithographic systems are designed and optimized through use of modeling and simulation packages. (MCEE-320, EEEE-353) **Class 3, Lab 3, Credit 3 (F, S)**

### MCEE-550

#### CMOS IC Processing

A laboratory course in which students manufacture and test CMOS integrated circuits. Topics include design of individual process operations and their integration into a complete manufacturing sequence. Students are introduced to work in process tracking, ion implantation, oxidation, diffusion, plasma etch, LPCVD, and photolithography. Students learn VLSI design fundamentals of circuit simulation and layout. Analog and Digital CMOS devices are made and tested. This course is organized around multidisciplinary teams that address the management, engineering and operation of the student run CMOS factory. (MCEE-505, MCEE-502, MCEE-360) **Class 2, Lab 6, Credit 4 (F)**

### MCEE-599

#### Independent Study

A supervised investigation within a microelectronic engineering area of student interest. (Permission of instructor) **Credit 1-4**

# College of Health Sciences and Technology

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Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

## Biomedical Sciences

**MEDG-101** **Human Biology I**  
This course investigates the biology of the human body through examinations of its structure (anatomy), its function (physiology), and the various disease states (pathology) that affect its health. This course will focus on the human reproductive cycle, the development of a new individual from a single cell, the principle of genetic inheritance, and the principle of homeostasis that governs the integrated control of all body organ systems. It will explore recent medical advances related to human reproduction, genetics and cancer. (MEDG-103 Human Biology Laboratory I recommended to be taken concurrently) **Class 3, Credit 3 (F)**

**MEDG-102** **Human Biology II**  
This course investigates the biology of the human body through an examination of its structure (anatomy), its function (physiology), and the various disease states (pathology) that affect its health. This course will focus on the principle of homeostasis that governs the integrated control of all body organ systems. It will explore the structure of function of each of the 11 organ systems and cover some of the more common diseases that afflict each system. (MEDG-104 Human Biology Laboratory II recommended to be taken concurrently) **Class 3, Credit 3 (S)**

**MEDG-103** **Human Biology Laboratory I**  
This laboratory complements the lecture material of Human Biology I. Experiments are designed to illustrate the dynamic characteristics of a cell during processes of inheritance, development and disease. (Corequisite: MEDG-101 Human Biology I or permission of instructor) **Lab 2, Credit 1 (F)**

**MEDG-104** **Human Biology Laboratory II**  
This laboratory course complements the lecture material presented in Human Biology II. Lab experiments are designed to illustrate the dynamic anatomy and physiology of the human body organ systems. (Corequisite: MEDG-102 Human Biology II or permission of instructor) **Lab 2, Credit 1 (S)**

**MEDG-105** **Health Awareness**  
This course explores the effects of wellness and disease prevention on the human lifecycle, lifestyles and overall health. Basic structure and function of selected human body systems are discussed and related to factors such as diet and nutrition, alcohol, drugs, smoking, stress and the environment in discussion of health promotion and disease prevention. Lecture and class discussion and student participation are used to explore health related issues. **Class 3, Credit 3 (F)**

**MEDG-106** **Microbiology of Health and Disease**  
An introductory course in microbiology including its history, significant contributions to medicine and history, as well as a survey of microbiological organisms as they relate to disease, industry and biotechnology. (Any course in biology) **Class 3, Credit 3 (S)**

**MEDG-107** **Human Diseases**  
A general survey of human diseases from a systematic approach with emphasis on disease symptoms, etiology, diagnosis and prognosis. Also included are the topics of immunology, oncology, endocrinology, and pathophysiology. Upon completion of this course students will have a basic knowledge of many diseases that afflict mankind. (High school biology or equivalent) **Class 2, Lab 1, Credit 3 (S)**

**MEDS-105** **Issues in Health, Science and Technology**  
This course will provide first-year students with an enhanced understanding of critical issues in global health, science and technology. It will explore cultural awareness and perspectives as well as the consequences of individual and group decisions on the health of communities. **Class 3, Lab 0, Credit 3 (F)**

**MEDS-201** **Language of Medicine**  
Language is a systematic means or method of communicating ideas, events, or feelings. It is a combination of words or symbols used to encode and decode information. Medicine has a language to communicate information regarding the human body, its functions, diseases, tests, and procedures. This course explores the language of medicine, the rules of "language," language mechanics that apply how to create words, define terms, and identify abbreviations. In addition to learning the fundamentals, the student will gain experience in writing, using the language of medicine, as well as interpreting that language into everyday English. (One semester of biology or permission of instructor) **Class 3, Credit 3 (F, S, Su)**

**MEDS-240** **History of Medicine**  
This course explores various discoveries in the history of medicine and the individuals credited with the discoveries. The course begins in ancient Greece and ends with modern times. Individuals such as Hippocrates, Vesalius, Harvey, Jenner, Leeuwenhoek and Roentgen will be discussed. (One year of college level biology) **Class 3, Lab 0, Credit 3, F**

**MEDS-245** **Medical Genetics**  
This course will serve as an introduction to the field of medical genetics. Throughout the course we will survey several human variations and diseases of medical importance. Clinical case reports will be incorporated to illustrate the underlying genetic principles. (One year of general biology or equivalent) **Class 3, Credit 3 (F)**

**MEDS-250** **Anatomy and Physiology I**  
This course is an integrated approach to the structure and function of the nervous, endocrine, integumentary, muscular and skeletal systems. Laboratory exercises include histological examination, actual and simulated anatomical dissections, and physiology experiments with human subjects. (BIOL-101 General Biology I, BIOL-102 General Biology II; or equivalent) **Class 3, Lab 3, Credit 4 (F)**

**MEDS-251** **Anatomy and Physiology II**  
This course is an integrated approach to the structure and function of the gastrointestinal, cardiovascular, immunological, respiratory, excretory, and reproductive systems with an emphasis on the maintenance of homeostasis. Laboratory exercises include histological examinations, anatomical dissections and physiological experiments using human subjects. (BIOL-101 General Biology I, BIOL-102 General Biology II; or equivalent) **Class 3, Lab 3, Credit 4 (S)**

**MEDS-270** **Immunology**  
Introduction to all of the fundamental facts and concepts related to immunology to include: innate immunity and adaptive immunity: cells, molecules, tissues and organs of the immune system; cell-cell communication and interaction; antibody structure and function; and the applications of these concepts to infectious diseases, vaccine design, autoimmune diseases, cancer, transplantation, regulation of the immune response, allergic reactions and immunosuppression. (BIOL-201 Cellular and Molecular Biology) **Class 3, Credit 2 (F)**

**MEDS-280** **Laboratory Teaching Assistant**  
This course provides students the opportunity to learn by teaching, as they assistant the laboratory instructor in facilitating student learning. **Class 3–9, Credit 1–3 (F, S, Su)**

**MEDS-281** **Classroom Teaching Experience**  
This course provides students the opportunity to learn by teaching, as they assistant the course instructor in facilitating student learning. (Depends upon course, permission of instructor) **Class 1–3, Credit 1–3 (F, S, Su)**



**MEDS-290** **Biomedical Research**  
This course provides an opportunity for in-depth experiential learning through collaborative work on an independent research project. **Credit 1-4 (F, S, Su)**

**MEDS-294** **Group Exercise**  
Group exercise has progressed to include a wide variety of activities, equipment and environments. This course explores both the dynamics of group participation as well as techniques of instruction across a number of modalities including; hi/low impact, step training, kickboxing, sport conditioning, stationary indoor cycling, water exercise, yoga, and Pilates. Students will not only learn theory but will also design and teach classes to one another. Graduates of the class will be prepared to achieve certification in many of the modalities included in the course. (BIOL-101 General Biology I, BIOL-103 General Biology I Lab, BIOL-102 General Biology II, BIOL-1004 General Biology Lab II or equivalent) **Class 3, Credit 3 (F)**

**MEDS-295** **Sports Physiology and Life Fitness**  
This course goes inside the science of physical fitness providing the student with an in depth physiological understanding of how the body adapts and improves through exercise activity. Students actively perform a series of self assessments which they must analyze in order to determine their current state of fitness. With this data students develop exercise programs tailored to their needs and interests. Stress management and nutrition are examined allowing students to incorporate these two important areas into their plans to be fit for life. (BIOL-101 General Biology I, BIOL-102 General Biology II; BIOL-121 Introductory Biology I or equivalent) **Class 3, Credit 3 (F, Su)**

**MEDS-296** **Fitness Prescription**  
This course is designed to provide instruction to prepare students for certification as a Personal Trainer. It examines the role exercise plays in both the enhancement of health and fitness as well as the improvement of athletic performance. Students will develop a basic understanding of how the human body functions while physically active. Case studies are utilized to assist in the development of practical skills. (BIOL-101 General Biology I, BIOL-102 General Biology II; BIOL-121 Introductory Biology I or equivalent) **Class 3, Credit 3 (S)**

**MEDS-297** **Exercise For Special Populations**  
This course is designed for those who are interested in the science of exercise and fitness for individuals with diagnosed disease states, or high performance requirements. The theoretical and diagnostic value of exercise testing will be reviewed. This information will then be used to create exercise prescriptions and understand the therapeutic benefit that exercise will have on specific conditions such as rheumatoid arthritis, diabetes, hypertension, heart disease, and obesity. High performance individuals functioning in challenging environments such as, astronauts, high altitude climbers and ultramarathoners will also be considered. (MEDS-295 Sports Physiology and Life Fitness or MEDS-296 Fitness Prescription) **Class 3, Credit 3 (S)**

**MEDS-298** **Strength Training for Performance**  
Stronger athletes make better athletes no matter what the sport and this course teaches techniques of optimal training to enhance the muscular fitness of all manner of athletes. Physiological principles of strength development and basic musculoskeletal anatomy are reviewed and general program design is discussed. Utilizing case studies, students develop sport specific programs which will be presented to the class. Students will also produce strength training manuals outlining appropriate guidelines for improved performance. (BIOL-101 General Biology I or equivalent) **LEL 3, Credit 3 (F)**

**MEDS-299** **Independent Study**  
This course will provide students the opportunity for independent study in a topic of strong interest. **Credit 1-4 (F, S, Su)**

**MEDS-300** **Premedical Studies Seminar**  
This course prepares students to navigate the admissions process and interviews for medical, osteopathic, optometry, podiatric and dental school. The preparation will also address issues related to the field of medicine, including alternatives, ethics, and financial concerns. (One year of biology, one year of chemistry, and either one year of physics or one year of organic chemistry) **Class 1, Credit 1**

**MEDS-301** **Croatian Healthcare System**  
This course has been created for students who are involved in the biomedical sciences study abroad program in Croatia. The course will explore the history of the Balkan countries that existed previously as Yugoslavia and their various roles in World War I, World War II, and the Balkan Wars of Independence in the 1990s. Students will visit various cities to observe the architecture, geography and customs of the people, including Dubrovnik, Zagreb, Rijeka, Mostar and Sarajevo. The course will also introduce students to the socialized healthcare system in Croatia and to the process of medical education, and it will provide them with opportunities through hospital rotations to observe several medical procedures. (MEDS-250 Human Anatomy and Physiology I, MEDS-251 Human Anatomy and Physiology II) **Class 3, Credit 3 (F)**

**MEDS-310** **Introduction to Pharmacology**  
This course provides an overview of the pharmacy profession (educational requirements, professional responsibilities and opportunities, role of the pharmacist in the health care team) and a detailed look into basic pharmacodynamics, pharmacokinetic, and pharmaceutical principles. The pharmacodynamics principles covered include mechanisms of drug action, drug-receptor interaction theory, dose-response relationships, structure-activity relationships, and principles of drug metabolism. Pharmaceutical topics include formulations, drug product design, excipients, dosage forms, and elimination rate. Lastly, specific disease states will be covered that will clearly, and effectively demonstrate many of the topics taught. The diseases will be approached by presenting the etiology followed by the pharmacotherapy, including the details of the multiple drug classes that are used for any one-disease state. (MEDS-250 Human Anatomy and Physiology I, MEDS-251 Human Anatomy and Physiology II) **Class 3, Credit 3 (F, S)**

**MEDS-311** **Diagnosing the Criminal Mind**  
This course will introduce students within the biomedical sciences, physician assistant, psychology and criminal justice fields to understand basic clinical diagnostic terms, symptoms and behaviors that pertain to clients who commit crime. The course will introduce students to the relationship between mental health, drug addiction, crime and violence. Students will be involved in mock trials, debates and case write ups. (PSYC-101 Introduction to Psychology; MEDS-250, Anatomy and Physiology I or MEDG-101; or permission of instructor) **Class 3, Credit 3 (F)**

**MEDS-313** **Introduction to Infectious Diseases**  
This is an advanced course in the mechanisms by which bacteria and fungi cause disease in humans. The course topics include the clinical signs of each disease, diagnosis of each disease, pathogenic mechanisms used by the organisms to cause disease, treatment of the disease, and prevention of the disease. The laboratory component of this course will consist of a mixture of methodologies used in the identification of the infectious agents, evaluation of the host response to the infection, case studies, student presentations of articles related to infectious disease and other assignments aimed at deepening the understanding the infectious disease process. (BIOL-201 Cellular and Molecular Biology) **Class 3, Credit 3 (S)**

**MEDS-315** **Medical Pathophysiology**  
This course is designed as an introductory course in pathophysiology, the study of disease and its consequences. It covers the basic mechanisms of disease, concentrating on the diseases that are most frequently encountered in clinical practice. The major topics of discussion will emphasize the general pathologic processes; this will provide a basis for understanding diseases affecting specific organ systems. Clinical correlations will be made as examples of how physiological processes can go awry in the generation of a particular disease. (MEDS-250 Anatomy and Physiology I and MEDS-251 Anatomy and Physiology II; or permission of instructor) **Class 3, Credit 3 (F)**

**MEDS-333** **Patient Care**  
This course will introduce key elements of integrated, high-quality patient care. Through lecture, role-play and hands-on practice, essential aspects of team-based patient care will be explored. Vital skills and behaviors such as professionalism, communication, documentation, workplace safety, patient assessment, patient positioning and transfers, and acute medical situations will be presented. Infection control, medications and their administration, and medical-legal issues will also be examined. (BIOL-101 General Biology I, BIOL-102 General Biology II, BIOL-103 General Biology I Lab, and BIOL-104 General Biology II Lab; or permission of the instructor) **Class 2, Credit 2 (S)**

**MEDS-345****Case-Based Genetic Counseling**

This course will provide students with an inside look at the profession of genetic counseling and its patients through in-depth case studies of actual patient scenarios, role playing and lectures focused on realistic challenges faced by genetic counselors. This course will focus on combining scientific information about genetic disorders with the psychosocial aspects of counseling sessions that will give provide an accurate perspective of the profession. Students will participate in role playing exercises, keep detailed journals and participate in mock patient interviews. (MEDS-245) **Class 3, Lab 0, Credit 3 (S)**

**MEDS-350****Exercise Physiology**

Exercise physiology is the scientific basis for the field of exercise science. This course provides students with an opportunity to deepen their understanding of the body's responses and adaptations to exercise. Neuromuscular physiology is reviewed along with energy systems and mechanisms of fatigue. The cardiorespiratory system is examined with a focus on control and regulation during activity and there is a look at the physiological components of exercise training. Environmental factors that impact sport activities as well as training techniques which optimize performance will be reviewed. The differences in performance and adaptation that exist between children, adolescents and adults as well as between males and females will be compared and contrasted. Exercises influence on long term health and fitness will conclude the course. Laboratory experiences will allow students to integrate and apply the concepts of exercise physiology through investigative experiments. There is no separate lab for this class and laboratory experiences will be incorporated into specifically designated lecture times. (MEDS-251 Anatomy and Physiology II or permission of instructor) **Class 3, Credit 3, (F)**

**MEDS-351****Sports Psychology**

"Keeping your head in the game" is one of the hallmarks of success for high performance athletes and this course explores the psychological aspects of achieving that capability. Through examining research based evidence of successful practices and techniques to produce, that winning edge, students will become versed in the process of coaching athletes to possess and function with athletic "mental toughness." (BIOL-101 General Biology I, BIOL-103 General Biology I Lab, BIOL-102 General Biology II, BIOL-1004 General Biology Lab II or equivalent) **Class 3, Credit 3 (S)**

**MEDS-352****Coaching Healthy Behaviors**

This course will teach students to encourage those with long standing lifestyle habits that contribute to their chronic illness to change is a very challenging proposition. It addresses this problem by incorporating psychological, sociological and counseling principles, along with coaching skills, into an intervention technique that emphasizes the positive and leads people to choose and adhere to a wellness lifestyle. Students will review case studies and meet with professionals in the field. (BIOL-101 General Biology I, BIOL-103 General Biology I Lab, BIOL-102 General Biology II, BIOL-1004 General Biology Lab II or equivalent) **Class 3, Credit 3 (S)**

**MEDS-353****Worksite Health Promotion**

A growing number of employers are recognizing the value of healthier, more physically fit employees and are providing health promotion programs through a variety of innovative means. This course will examine the theoretical basis for employee health programs as well review several case studies. Students will have the opportunity to visit and review local programs as well as design a model program to present to the class. (BIOL-101 General Biology I, BIOL-103 General Biology I Lab, BIOL-102 General Biology II, BIOL-1004 General Biology Lab II or equivalent.) **Class 3, Credit 3 (F)**

**MEDS-354****Senior Adult Fitness**

Our nation's growing population of senior citizens presents both challenges and opportunities to our healthcare system. This class explores the opportunities and the processes of enhancing the physical fitness and functional capacity of aging adults. Principles of assessment, prescription and adherence are modified to meet the needs of senior citizens and students will examine several case studies. Students get to apply what they've learned by designing and conducting exercise sessions with actual participants. (BIOL-101 General Biology I, BIOL-103 General Biology I Lab, BIOL-102 General Biology II, BIOL-1004 General Biology Lab II or equivalent) **Class 3, Credit 3 (F)**

**MEDS-360****Placebo, Suggestion, Research and Health**

This course provides a critical understanding of the history and science of suggestibility and the placebo effect with a focus on how these concepts influence research design, therapeutics and health. The course structure and process include assigned readings, exams and class discussion designed to provoke critical thinking. (BIOL-101, General Biology I; BIOL-102, General Biology II; BIOL-103, General Biology I Lab, BIOL-104 General Biology II Lab; or MEDG-101 Human Biology I; MEDG-102, Human Biology I Lab; MEDG-103, Human Biology II; MEDG-104, Human Biology II; or equivalent) **Class 3, Credit 3 (F)**

**MEDS-361****Applied Psychophysiology Self-Regulation**

This course explores the evolving field of psychophysiology and its applications for therapeutic self-regulation in health care as well as its implications in biomedical engineering, computer science, medical informatics and related fields. The course integrates lecture, demonstration and individual/group projects. Lectures introduce history, evolution, concepts and applications of applied psychophysiology and self-regulation including hypnosis, biofeedback, meditative strategies and psychophysiological monitoring. (BIOL-101, General Biology I; BIOL-102, General Biology II; or MEDG-101 Human Biology I; MEDG-102, Human Biology II) **Class 3, Credit 3 (F)**

**MEDS-400****Medical Botany**

This course is intended to introduce the student to the specialty of medical botany. A detailed study will be made of those members of the plant kingdom that are medically useful in preventing, treating, or curing disease states. Where possible the active chemical ingredient(s) will be defined for each medicinal plant investigated. Emphasis will be placed on those plant substances that are useful in the treatment of gastrointestinal disorders, urogenital diseases, respiratory tract problems, nervous system disorders, metabolic diseases, musculoskeletal disorders, skin and dental problems, immune deficiencies, and mood-altering botanicals (stimulants and depressants). (BIOL-101 General Biology I, BIOL-102 General Biology II, CHMO-231 Organic Chemistry I, CHMO-232 Organic Chemistry II) **Class 2, Lab 2, Credit 3 (S)**

**MEDS-401****Medical Physiology Case Studies**

This course has been created for students who are involved in the biomedical sciences study abroad program in Croatia. The course will use case study analysis to explore aspects of human medical physiology; the integration of multiple organ systems in the maintenance of homeostasis; and the etiology, development, diagnosis, and treatment of various human diseases. (MEDS-250 Human Anatomy and Physiology I, MEDS-251 Human Anatomy and Physiology II, permission of instructor) **Class 3, Credit 3 (F)**

**MEDS-402****Medical Ethics Case Studies**

This course has been created for students who are involved in the biomedical sciences study abroad program in Croatia. The course will use case study analysis to explore some of the key ethical principles, guidelines, and regulations that inform decisions made in clinical medical practice, including issues of informed consent, refusal of care, end-of-life decisions, termination of treatment, and physician assisted death. (MEDS-250 Human Anatomy and Physiology I, MEDS-251 Human Anatomy and Physiology II, permission of instructor) **Class 3, Credit 3 (F)**

**MEDS-403****U.S. Healthcare and Medical Education**

This course has been created for students who are involved in the biomedical sciences study abroad program in Croatia. The course will explore the beginnings of the healthcare delivery in America, the economics of the healthcare enterprise, and the education of physicians and other healthcare professionals. It will also explore the role of government in providing and regulating the delivery of healthcare services as well as ethical issues that affect the doctor-patient relationship. Finally, the course will examine the healthcare systems of other industrialized nations and compare and contrast those systems with that of the U.S. (MEDS-250 Human Anatomy and Physiology I, MEDS-251 Human Anatomy and Physiology II, permission of instructor) **Class 3, Credit 3 (F)**

**MEDS-405****Human Development I**

This course will provide a survey of the primary biological events, mechanisms and underpinnings of human development from conception through adolescence. It will use case studies, human clinical and laboratory research papers to enrich and illustrate key points related to important developmental milestones. A significant emphasis will be placed on understanding developmental disabilities, and also in relating biological events to an individual's larger psychosocial functioning. (MEDS-422 Endocrinology) **Class 3, Credit 3 (F)**

**MEDS-406****Human Development II**

This course will examine key biological, biochemical, neuroendocrine and neuropsychological events and mechanisms related to human adulthood and aging. We will use case studies, human clinical and laboratory research papers to enrich and illustrate key points from lecture material. A significant emphasis will be placed upon understanding aging-related degenerative diseases of the nervous system, muscle, cardiopulmonary and immune systems. (MEDS-422 Endocrinology) **Class 3, Credit 3 (S)**

**MEDS-407****Prevention and Treatment of Athletic Injuries**

Even the very best athletes experience injury and being able to recognize and respond to those conditions is a crucial skill for those who will work with athletes. Students will learn the signs and symptoms of injury and the process of first response as well as how to support athletes through rehab. Successful students will learn how to incorporate injury reduction techniques into the training programs they develop for the athletes they serve. (BIOL-101 General Biology I or equivalent) **Lab/Lecture 3, Credit 3 (S)**

**MEDS-410****Kinesiology**

As a study of human movement this course will cover topics that begin with a review of the functional anatomy of the musculoskeletal system including both the upper and lower extremity as well as the spinal column and thorax. Factors of linear and rotary motion are reviewed along with postural analysis and movement elements associated with pushing, pulling and throwing objects. There is no separate Lab for this class and laboratory experiences will be incorporated into specifically designated lecture times. At the conclusion of this course students will have a functional capability to assess the intricacies of human movement. (MEDS-250 Human Anatomy and Physiology I) **Lecture/Lab 3, Credit 3 (F)**

**MEDS-413****Training High Performance Athletes**

Aerobic capacity, strength, flexibility, speed, power, agility, nutrition, and rest are all crucial to the success of athletes and for trainers the need to appropriately coordinate all these factors is a significant challenge. This course explores the interrelationship of the multifactorial principles of athletic performance. Using case studies, modeling, flow sheets and scheduling plans students develop techniques that will lead athletes to success in their training routines. (BIOL-101 or equivalent) **Class 3, Credit 3 (S)**

**MEDS-415****Pathophysiology of Organ Systems I**

This course is designed to provide the students with the necessary foundation of the physiologic and pathologic processes that underlie the spectrum of human disease entities and is taught in the context of clinical scenarios that demonstrate the basic science principles in a real-world context of health care. Emphasis is placed on the fundamental principles of cell injury and repair, infection, neoplasia, and inflammation as well as hemodynamic disorders, thromboembolic disease and shock. Additional emphasis is placed on organ systems and their disorders such as the circulatory, liver, gallbladder and biliary systems. Material is presented in the context of case studies, utilizing clinical findings and addressing underlying basic physiologic, biochemical and immunologic processes as they relate to patient care and individual patient problem cases. (MEDS-250 and 260; third-year status in a CHST program or permission of instructor) **Class 3, Credit 3 (F)**

**MEDS-416****Pathophysiology of Organ Systems II**

This course is second in a sequence designed to provide the students with the necessary foundation of knowledge and understanding of the physiologic and pathologic processes that underlie the spectrum of human disease entities and is taught in the context of clinical scenarios that demonstrate the basic science principles in a real-world context of health care. Emphasis is placed on the pathophysiology of the central nervous system, lower urinary tract, male and female reproductive organs, gastrointestinal tract, spleen, pancreas, kidneys and endocrine system. Material is presented in the context of case studies, utilizing clinical findings and addressing underlying basic physiologic, biochemical and immunologic processes as they relate to patient care and individual patient problem cases. (MEDS-415 or permission by instructor) **Class 3, Credit 3 (S)**

**MEDS-417****Clinical Microbiology**

Clinical microbiology is a detailed study of the bacteria, viruses, fungi and parasites relevant to human infectious diseases, including their historical significance and impact on society. This course will also focus on giving the student an appreciation and clear understanding of emerging/re-emerging infectious disease agents particularly those infectious disease agents commonly encountered in a hospital setting. (BIOL-201 Cellular and Molecular Biology or equivalent; corequisite MEDS-418 Clinical Microbiology Lab) **Class 3, Credit 3 (F)**

**MEDS-418****Clinical Microbiology Lab**

Clinical microbiology is a detailed study of the bacteria, viruses, fungi and parasites relevant to human infectious diseases, including their historical significance and impact on society. This course provides a hands-on experience in identifying these types of agents. The course will also focus on giving the student an appreciation and clear understanding of emerging/re-emerging infectious disease agents particularly those infectious disease agents commonly encountered in a hospital setting. (BIOL-201 Cellular and Molecular Biology or equivalent; corequisite MEDS-417 Clinical Microbiology) **Lab 1, Credit 1 (F)**

**MEDS-420****Human Histology**

This foundational course in the study of human biology and medicine provides students with a detailed exploration of the microscopic and structural anatomy of normal human tissues and organs, with special emphasis given to the relationships between the cellular architecture of human organs and organ systems and their functions. The course also examines human pathologies as a manifestation of the loss of cellular integrity leading to alterations in the histological features of diseased organs. (MEDS-250 Human Anatomy and Physiology I, MEDS-251 Human Anatomy and Physiology II or equivalent, BIOL-201 Cellular and Molecular Biology) **Class 2, Lab 3, Credit 3 (S)**

**MEDS-421****Parasitology**

This course provides an introduction to parasites of medical importance and the diseases they cause, with an enhanced appreciation for the diverse implications of parasitism in the global community. It includes an investigation of a variety of parasites classified by diseases such as blood and intestinal protozoan parasites, nematodes, trematodes and cestodes. Examples of diseases of importance that will be covered include malaria, sleeping sickness, elephantiasis, river blindness, leishmaniasis (Baghdad boil), amebic dysentery, babesiosis. Coursework includes an examination of the distribution and transmission, pathogenesis, clinical signs and symptoms, diagnosis, treatment and control of the diseases as well as an examination of the role of parasitic diseases in global economic and health inequities between developed and developing countries. (BIOL-204 Introduction to Microbiology or BIOL-415 Virology or MEDS-313 Introduction to Infectious Diseases) **Class 3, Credit 3 (S)**

**MEDS-422****Endocrinology**

This course will combine lecture, literature review and small group discussions/presentations to introduce students to the fundamental concepts of human endocrinology. Topics covered will include: digestion and metabolism; growth and aging; arousal/mood; sexual dimorphism and reproduction; and neuroendocrinology. Discussion of relevant human diseases/disorders will be used to illustrate related biochemical/anatomical pathways and mechanisms. (1001-311, 1026-350) **Class 4, Credit 4 (F, S)**

**MEDS-425****Introduction to Neuroscience**

This course will focus on the human nervous system, and its regulation of behavior and complex function. Background information on neuroanatomy, cellular physiology, neurotransmission, and signaling mechanisms will pave the way for an in-depth analysis of specialization at the systems level. Our goal will be to understand the cellular and molecular mechanisms underlying normal human behaviors and pathogenic states. (BIOL-201 Cellular and Molecular Biology) **Class 3, Credit 3 (S)**

**MEDS-426****Addiction Pharmacology**

This course will explore the general concepts, social consequences, policy, and other aspects of substance abuse and addiction. Multiple perspectives will be presented, including those of addicts, health-care providers, and family/friends affected by addiction. Then, commonly abused drugs will be discussed in detail. Topics to be presented and discussed for each drug class include: epidemiology, pathophysiology, drug class information, pharmacokinetic and pharmacodynamics actions, short-term and long-term consequences of misuse (including overdose), and contemporary pharmacological and non-pharmacological treatment modalities. Availability of resources used to address substance abuse will also be presented. Lastly, the course will require visit(s) to one or more of the following meetings: alcoholics anonymous, narcotics anonymous, Al-Anon, and/or Nar-Anon. (MEDS-310 Introduction to Pharmacology, MEDS-250 Human Anatomy and Physiology I, MEDS-251 Human Anatomy and Physiology II) **Class 3, Credit 3 (S)**

**MEDS-430** **Epidemiology and Public Health**  
The course covers applications of epidemiologic methods and procedures to the study of the distribution and determinants of health and diseases, morbidity, injuries, disability, and mortality in populations. Epidemiologic methods for the control of conditions such as infectious and chronic diseases, mental disorders, community and environmental health hazards, and unintentional injuries are discussed. Other topics include quantitative aspects of epidemiology. Examples of these topics include: data sources; measures of morbidity and mortality; evaluation of association and causality; and study design. Contemporary topics of discussion in public health (e.g. swine flu, HIV/AIDS, SARS), outbreak investigation and containment strategies will be examined, analyzed and thoroughly discussed. (BIOL-204 Introduction to Microbiology or MEDS-422 Virology or MEDS-421 Parasitology or MEDS-313 Introduction to Infectious Diseases) **Class 3, Credit 3 (S)**

**MEDS-440** **Cardiac Imaging**  
This is an upper division course for students interested in the medical imaging of the heart. Students will review the anatomy and physiology of the heart and learn about the different imaging techniques used in the clinical diagnosis and assessment of cardiac disease or disorders. Students will read, discuss, and present related journal articles related to the subject matter. (MEDS-250, Anatomy and Physiology I; MEDS-260, Anatomy and Physiology II) **Class 3, Credit 3 (S)**

**MEDS-450** **Athletic Assessment**  
Gathering and analyzing data in order to establish the need and effectiveness of athletic training interventions is the focus of this course. Students will learn sport specific protocols and become familiar with analytical software as well as develop proficiency in the application of data in the design and implementation of training programs. (MEDS-350 Exercise Physiology) **Class 3, Credit 3 (S)**

**MEDS-451** **Cardiac Rehabilitation**  
Following a heart attack many people feel as though their health is lost, however those who participate in a cardiac rehabilitation program experience a much higher rate of recovery. Students will explore the physiological principles of rehabilitation through a thorough review of atherosclerosis and the process of adaptation by the cardiovascular system to proper exercise. Through the class, students will visit local cardiac rehab programs and design exercise prescriptions and educational programs for case studies. (BIOL-101 General Biology I, BIOL-103 General Biology I Lab, BIOL-102 General Biology II, BIOL-1004 General Biology Lab II or equivalent) **Class 3, Credit 3 (S)**

**MEDS-452** **Biomechanics**  
The study of mechanics as it pertains to living organisms is the basis of biomechanics. Principles of physics are applied to human motion with movements being analyzed for their relationship to statics and dynamics. Kinematics and kinetics are explored within the context of sports performance and functional human locomotion. (PHY-112 College Physics II, MEDS-250 Anatomy and Physiology I) **Class 3, Credit 3 (S)**

**MEDS-490** **Human Gross Anatomy**  
This course exposes students to details of human anatomy through cadaver dissection. Lecture material stresses functional and clinical correlates corresponding to laboratory exercises. (MEDS-250 Human Anatomy and Physiology I, MEDS-251 Human Anatomy and Physiology II or permission of instructor) **Class 3, Lab 6, Credit 4 (S)**

**MEDS-499** **Biomedical Co-op**  
One semester of paid work experience in a healthcare related field. **Credit 0 (F, S, Su)**

**MEDS-510** **Biomedical Research**  
This course provides an opportunity for in-depth experiential learning through collaborative work on an independent research project. **L 3-12, Credit 1-4 (F, S, Su)**

**MEDS-511** **Interdisciplinary Research**  
This course will provide an independent, interdisciplinary research opportunity to enhance the experiential learning component of the Biomedical Sciences Program. Students will engage in preparatory reading and original research in an academic discipline or environment outside of their immediate major. Proposed work may span a broad variety of disciplines within a unifying theme of project goals and potential outcomes with strong application to human health and development. Examples may include mechanical, electrical or biomedical engineering; imaging science and optics; entrepreneurship and biotechnology; epidemiology, community health and public policy. **Credit 1-4 (F, S, Su)**

**MEDS-599** **Independent Study**  
This course will provide students the opportunity for independent study in a topic of strong interest. **Credit 1-4 (F, S, Su)**

## Diagnostic Medical Sonography

**DMSO-301** **Sonographic Scanning Skills and Techniques I**  
The course provides students with hands-on experience by performing basic and general abdominal, small parts, obstetrical and gynecological ultrasound examinations. Sonographic examination protocols and techniques, review and recognition of normal anatomic structures, high quality image production, and image interpretation are stressed. (Completion of all required courses in the first two years of the DMS program or students in the DMS certificate program or permission of instructor) **Lecture/Lab 3, Credit 3 (F)**

**DMSO-302** **Sonographic Scanning Skills and Techniques II**  
The course is a continuation of Sonographic Scanning Skills and Techniques I (DMSO-301). The course provides students with further hands-on opportunities to perform advanced abdominal and OB/GYN, peripheral vascular (upper and lower) and carotid Doppler examinations including color flow. Ultrasound examination protocols and techniques, review and recognition of normal anatomic structures, high quality image production, Doppler and color flow optimization and image interpretation are stressed. (DMSO-301 Sonographic Scanning Skills and Techniques I and all required courses in the first two years of the DMS program or students in the DMS certificate program or permission of instructor) **Lecture/Lab 3, Credit 3 (S)**

**DMSO-309** **Sonography Physics and Instrumentation I**  
This course addresses how the principles of ultrasound physics are directly applied to the use of ultrasound instrumentation in medical imaging. Transducers, signal production, memory systems, data display, manipulation of controls, and artifacts, are discussed. Throughout the course, the student will integrate previous knowledge of anatomy with ultrasound physics and instrumentation. (PHYS-112 College Physics II or equivalent, acceptance in DMS program or permission of instructor) **Class 3, Credit 3 (F)**

**DMSO-310** **Sonography Physics and Instrumentation II**  
This course is a continuation of Sonography Physics and Instrumentation I (DMSO-309). It provides a foundation of the basic physical principles of ultrasound and the fundamentals of fluid dynamics, Doppler physics including color, power, and spectral Doppler, quality control, Doppler artifacts, and biological effects. Students will learn to integrate previous knowledge of anatomy, ultrasound physics and instrumentation with Doppler skills and techniques. Development of scanning techniques, use of instrument controls, and production of high quality diagnostic images utilizing laboratory equipment are stressed. (DMSO-309 Sonography Physics and Instrumentation I or permission of instructor) **Class 3, Credit 3 (S)**

**DMSO-312** **Human Cross-Sectional Anatomy**  
This course covers basic sectional anatomy of the abdomen, pelvis, fetus and small parts, building on the basic knowledge of anatomy. This course prepares the student to recognize sectional anatomy of major human structures, especially as they relate to medical imaging techniques. Lectures are augmented with exercises using prepared human sections, organ modeling and diagnostic imaging units. (Completion of all required courses in the first two years of the DMS program or students in the DMS certificate program or permission of instructor) **Class 3, Credit 3 (F)**

**DMSO-414** **Sonographic Vascular Evaluation**  
This course provides knowledge of general vascular evaluation with an emphasis on the sonographic approach. Two-dimensional real-time imaging and Doppler techniques are presented as well as a discussion of other imaging modalities and their use in vascular evaluation. Performance of examinations on laboratory equipment is stressed. (Completion of all required courses in the first three years of the DMS program or students in the DMS certificate program or permission of instructor) **Lecture/Lab 3, Credit 3 (S)**

**DMSO-452** **Obstetrical Sonography I**  
This course provides the ultrasound candidate with the knowledge necessary to perform obstetrical examinations. High-quality image production, recognition of normal structures and basic pathologic states are stressed. Examination protocols, review of specific anatomy and pathology, film reading, and use of other imaging techniques are also addressed. (Completion of all required courses in the first three years of the DMS program or students in the DMS certificate program or permission of instructor) **Lecture/Lab 3, Credit 3 (F)**

**DMSO-453****Gynecological Sonography**

This course provides information necessary to perform basic and advanced gynecologic sonographic examinations. Examination strategies for various procedures are explored, as well as the integration of ultrasound into established clinical practices. (Completion of all required courses in the first three years of the DMS program or students in the DMS certificate program or permission of instructor) **Lecture/Lab 3, Credit 3 (F)**

**DMSO-454****Obstetrical Sonography II**

This course provides information necessary to perform more sophisticated obstetrical procedures utilizing ultrasound equipment. Examination strategies for various procedures are explored as well as the integration of ultrasound into established clinical practices. (DMSO-452 Obstetrical Sonography I and Completion of all required courses in the first three years of the DMS program or students in the DMS certificate program or permission of instructor) **Lecture/Lab 3, Credit 3 (S)**

**DMSO-456****Abdominal and Small Parts Sonography I**

Laboratory simulation and classroom instruction are used to develop practical skills and clinical knowledge necessary to perform basic abdominal and small parts examinations utilizing ultrasound equipment. High-quality image production, recognition of normal abdominal structures and basic pathologic states are stressed. Examination protocols, review of anatomy, film reading and use of other scanning techniques are addressed. (Completion of all required courses in the first three years of the DMS program or students in the DMS Certificate program or permission of instructor) **Lecture/Lab 3, Credit 3 (F)**

**DMSO-457****Abdominal and Small Parts Sonography II**

This course is a continuation of Abdominal and Small Parts Sonography I (DMSO-456). Laboratory simulation and classroom instruction are used to develop the practical skills and clinical knowledge necessary to perform basic and advanced abdominal and small parts examinations utilizing ultrasound. High-quality image production, recognition of normal abdominal structures and basic and advanced pathologic states are stressed. Examination protocols, review of anatomy, film reading and use of other scanning techniques are addressed. (DMSO-456 and completion of all required courses in the first three years of the DMS program or students in the DMS certificate program or permission of instructor) **Lecture/Lab 3, Credit 3 (S)**

**DMSO-460****Administration and Research in Sonography**

Speaking, writing and researching skills are explored. Methods of basic research, developing writing strategies and oral presentations are stressed. Students develop or critique a research project and prepare a written document following common publishing guidelines in addition to making oral presentations. Additionally, candidates prepare a complete plan for an ultrasound department as if they had been hired to establish a new department in a hospital setting. The candidates work together to develop the physical facilities, administrative, and financial aspects of a department. (Completion of all required courses in the first three years of the DMS program or students in the DMS Certificate program or permission of instructor) **Class 3, Credit 3 (S)**

**DMSO-570****Clinical Sonography I**

This course prepares the student for application of classroom knowledge to the practice of ultrasound by means of a clinical internship. Performing basic-general ultrasound examinations in the areas of abdomen, small parts, obstetrics, gynecology and basic peripheral vascular in both the laboratory and clinical settings is stressed. Nursing procedures, ethical issues and medico-legal considerations are also discussed as they relate to the practice of ultrasound examinations. This is an internship course. (Completion of all required courses in the first three years of the DMS program or students in the DMS certificate program or permission of instructor) **Internship 7, Credit 7 (F)**

**DMSO-571****Clinical Sonography II**

This course provides the final development of ultrasound examination skills by means of clinical internship. The candidate is expected to perform basic and advanced general ultrasound examinations in the areas of abdomen, small parts, obstetrics, gynecology and peripheral ultrasound examinations with no assistance by the end of this course. This is an internship course. (DMSO-570 Clinical Sonography I) **Internship 5, Credit 5 (S)**

**Health Systems Administration****HLTH-300****Health Care Systems and Operations**

This course will provide an overview of the health care system in the United States. It includes a historical perspective, discussion of trends and contemporary issues of health care delivery. Building on this information, an overview will be provided of how health care facilities are organized and managed focusing on the application of general management principles unique to health care environments. A perspective will be provided on organizational structures, planning and performance monitoring, personnel management, finance and the respective roles of medical professionals and administrators who work within health facilities. (Department permission) **Class 3, Credit 3 (F)**

**HLTH-310****Health Care Quality Assurance**

An introduction to quality assurance in health care. It explores past and current definitions of quality and competing concepts of quality assurance. It also reviews: existing quality assurance requirements; accrediting organizations; federal and state agencies, and third party payers. Descriptions and explanations of quality assurance methods, tools, and their application in various settings will also be addressed. (Departmental consent) **Class 3, Credit 3 (F)**

**HLTH-320****Legal Aspects of Health Care**

This course provides an on overview of statutes and regulations as they apply to the health care system. Topics include: an overview of the American legal system; licensure of institutions; licensure and discipline of practitioners; physician-patient relationship; reproductive issues; the right to die; organ donations; medical records; legal liability; malpractice; and labor law. (Permission of department) **Class 3, Credit 3 (S)**

**HLTH-330****Health Planning and Program Development**

This course provides a review of the methodology of planning effectively for health care services. The use of data systems and the methods of forecasting, identifying, and analyzing problems are explored. The course will all address the process of strategic planning, setting priorities, developing projects and allocating resources. Students prepare actual application for new programs to regulatory agencies. (Permission of department) **Class 3, Credit 3 (S)**

**Nutrition Management****NUTR-125****Contemporary Nutrition**

An introductory course in contemporary nutrition issues. This course covers the study of specific nutrients and their functions, the development of dietary standards and guides and how these standards are applied throughout the life-cycle. Students learn to analyze their own diets and develop strategies to make any necessary dietary changes for a lifetime of good health. Current health and nutrition problems and nutrition misinformation will be discussed. **Class 3, Credit 3 (F, S)**

**NUTR-210****Nutrition and the Mediterranean Diet**

The focus of this course is on understanding the unique characteristics of the Mediterranean diet and the effects of adhering to the Mediterranean diet on one's health. The course will compare the Mediterranean diet to other ethnic cuisines and food guide tools. The student will become familiar with foods typically consumed on the Mediterranean diet and will demonstrate recipes using these foods. A culminating experience will involve a project whereby the students will develop a one week menu featuring the key characteristics of the Mediterranean diet including nutritional analysis. Course content will be introduced via weekly lecture/discussion and labs to provide hands-on application of topics discussed in the lecture. This course is offered to Wegmans employees at the New York Wine and Culinary Center. **Class 2, Lab 3, Credit 3 (S)**

**NUTR-300****Sports Nutrition**

This course will provide an introduction to the integration between exercise and nutrition-related topics by exploring the intimate link among nutrition, energy metabolism and human exercise response. The course content will sort fact from fiction and help students and practitioners obtain the knowledge they need to give sound advice to athletes and active individuals. (MEDS-295 Sports Physiology and Life Fitness) **Class 3, Credit 3 (F, S)**

**NUTR-333****Techniques of Dietetics Education**

This course prepares dietetics and nutrition specialists to prepare and give presentations for the purpose of informing, persuading, and training a variety of audiences. Topics include communications methods, audience analysis, learning theory, developing communications and training objectives, selecting media, designing and making presentations, and evaluating communications effectiveness. Students are required to make a presentation as part of the course. (Junior status in nutrition management program, CHMG-112, MEDS-251, MEDS-110, NUTR-125) **Class 3, Credit 3 (S)**

**NUTR-402****Dietetic Environment**

Introductory supervised practice/practicum course. This course explores the profession of dietetics which includes current dietetics practice as well as practice trends and career options. Students interact with a representative sampling of personnel in all areas of food and nutrition. Students will become familiar with current Academy of Nutrition and Dietetics Scope of Practice Framework, Standards of Professional Performance, and the Code of Ethics in the profession of Dietetics. The development of an outcome based professional portfolio is required. (Junior status in nutrition management program, CHMG-112, MEDS-251, MEDS-110, NUTR-125) **Class 2, Practicum 4, Credit 3 (F)**

**NUTR-499****Cooperative Work Experience**

Required career related experience. Employment within the food and health industry monitored by the Office of Cooperative Education and approved by the faculty in the Nutrition Management program. Designed for the student to become exposed to career opportunities in the industry and gain skills and contacts essential to securing a dietetic internship and becoming a Registered Dietitian. Three co-ops are required for graduation and students typically complete them during the summer. Students must complete at least one co-op in a healthcare environment and at least one co-op in the food industry. Freshmen begin co-op the summer following their first year studies. **Credit 0**

**NUTR-510****Nutrition in Complementary Medicine**

This class offers students in the Nutrition Management major an overview of controversial and accepted alternative diet therapies, basic medicine guidelines, and vitamin/mineral supplementation. (Junior status in nutrition management program, CHMG-112, MEDS-251, MEDS-110, NUTR-125) **Class 1, Credit 1 (F)**

**NUTR-525****Medical Nutrition Therapy I**

This course is the first course of a two course series. Review and application of biological metabolism and interrelationships of nutrients, hormones, enzymes and other biochemical substances in humans. Modification of nutritional intake to meet nutritional needs altered by diseases and stress as well as use of alternate methods of feeding (enteral/parenteral) to meet nutritional needs is discussed in depth. This course emphasizes the practical applications of medical nutritional therapy for use with patients/clients. (Senior status in nutrition management program, CHMG-112, MEDS-251, MEDS-110, NUTR-125; corequisite NUTR-402) **Class 3, Credit 3 (F)**

**NUTR-526****Medical Nutrition Therapy II**

This course is a continuation of NUTR-525 Medical Nutrition Therapy I. Review and application of biological metabolism and interrelationships of nutrients, hormones, enzymes and other biochemical substances in humans. Modification of nutritional intake to meet nutritional needs altered by diseases and stress as well as use of alternate methods of feeding (enteral/parenteral) to meet nutritional needs is discussed in depth. This course emphasizes the practical applications of medical nutritional therapy for use with patients/clients. (NUTR-525, senior status in nutrition management program) **Class 3, Credit 3 (S)**

**NUTR-550****Community Nutrition**

Study of current nutrition issues and delivery of food and nutrition services in the community. The course is designed to allow senior level students to acquire skills necessary to deliver services in the public health and private sector markets. Individual practicum in community facility is required and arranged by the instructor. All students will also participate in industry related research to identify innovative and effective delivery strategies for nutrition services and will have the opportunity to accomplish peer dissemination of their previously completed individual research project at an industry conference. (NUTR-525, NUTR-402, and senior status in the nutrition management program) **Class 2, Practicum 8, Credit 3 (S)**

**NUTR-554****Life Cycle Nutrition**

An applied course for the nutrition management major regarding the nutritional needs throughout the life cycle. Emphasis is given to nutrition during pregnancy, infancy, early childhood, adolescence, young and middle adulthood, and the elderly. Practicum in facilities delivering nutrition services to these age groups is required. Practicum hours by arrangement. (Junior status in nutrition management program, CHMG-112, MEDS-251, MEDS-110, NUTR-125, NUTR-402) **Class 3, Practicum 1, Credit 4 (S)**

**Physician Assistant****PHYA-206****Medical Microbiology**

This course will introduce students to key elements and concepts of the biology of human pathogens. Students will study how this understanding impacts the therapeutic modalities for the treatment and prevention of human infectious disease. Students will have the opportunity to master specific laboratory skills that will be central to future roles as healthcare providers. (Matriculation into the second year of PA program, BIOL-101 General Biology I, BIOL-103) **Class 3, Lab 2, Credit 4 (S)**

**PHYA-401****History and Physical Diagnosis I**

This is the first in a two-course sequence which introduces and develops the clinical psychosocial skills and anatomic/physiologic science involved in interviewing and examining patients. This course includes practical medical terminology, attitude development and values clarification strategies to aid students in adopting a humanistic approach, interviewing techniques used during patient interaction, comprehensive database development, demonstrated techniques for complete physical examination of all body systems and explanation/implementation of the Problem-Oriented Medical Record (POMR). The course involves weekly patient contact. (Matriculation into the third year of PA program and PHYA-206 Medical Microbiology) **Class 6, Credit 4 (F)**

**PHYA-402****History and Physical Diagnosis II**

This second of a two-course sequence introduces and develops the clinical psychosocial and anatomic/physiologic science involved in examining patients. The course includes performing and writing complete, accurate medical histories and physical examinations with small group instruction. (Matriculation into the third year of PA program, PHYA-401 History and Physical Diagnosis I). Weekly patient contact. **Class 6, Credit 4 (S)**

**PHYA-405****Pathophysiology I**

This introductory course in the Pathophysiology of Disease course sequence will present the physician assistant student with normal and abnormal function of cells in general, illustrating how these cellular abnormalities affect function of specific organ systems. The respiratory, renal, and cardiovascular organ systems will be highlighted and mechanisms of neoplasia will be introduced. The, endocrine, and gastrointestinal organ systems will be highlighted. (Matriculation into third year of PA program; special permission of program and instructor) **Class 2, Credit 2 (F)**

**PHYA-406****Pathophysiology II**

This second course in the pathophysiology course sequence will present the physician assistant student with normal and abnormal function of cells in general, illustrating how these cellular abnormalities affect function of specific organ systems. The skin, hematologic, and musculoskeletal organ systems will be highlighted along with a foundation in special populations (aging, exercise and pregnancy). (Matriculation into third year of PA program or permission of instructor) **Class 2, Credit 2 (S)**

**PHYA-409****Clinical Lab Medicine**

In this course, students will learn the approach to the interpretation of the electrocardiogram (EKG). Students will be given the opportunity to interpret different EKGs which illustrate a number of different pathologic conditions. The latter half of this course will focus on laboratory testing with review of indications for ordering common and specialized laboratory tests in the care of patients. Using case-based scenarios, students will demonstrate an ability to appropriately interpret these laboratory results in order to properly evaluate and care for patients with selected conditions. (Matriculation into the third year of PA program; corequisite PHYA-423 Clinical Medicine II) **Class 1, Credit 1 (S)**

**PHYA-415****Pharmacology I**

This introductory course in the clinical pharmacology course sequence presents the physician assistant student with the necessary foundation of knowledge to safely and effectively prescribe medication for common and/or important disorders. The course will begin with a study of the mechanics of pharmacology: pharmacodynamics and pharmacokinetics. Following this introduction, an organ systems approach, paralleling the systems presented in Clinical Medicine I, is utilized to study medications relevant to gastrointestinal disease. (Matriculation into the third year of PA program, PHYA-206 Medical Microbiology) **Class 1, Credit 1 (F)**

**PHYA-416****Pharmacology II**

This is the second course in the clinical pharmacology course sequence that presents the physician assistant student with the necessary foundation of knowledge to safely and effectively prescribe medication for common and/or important disorders. Course content will complement material presented simultaneously in the Clinical Medicine II course including key concepts of pharmacodynamics and pharmacokinetics. These will be utilized to study medications relevant to treat human diseases. (Matriculation into the third year of PA program, PHYA-415 Pharmacology I) **Class 2, Credit 2 (S)**

**PHYA-417****Pharmacology III**

This is the final course in the clinical pharmacology course sequence that presents the physician assistant student with the necessary foundation of knowledge to safely and effectively prescribe medication for common and/or important disorders. Course content will complement material presented simultaneously in the Clinical Medicine III course including key concepts of pharmacodynamics and pharmacokinetics. These will be utilized to study medications relevant to treat diseases with a focus on the pediatric and geriatric populations. (Matriculation into the fourth year of PA program, PHYA-416 Pharmacology II) **Class 2, Credit 2 (F)**

**PHYA-419****Advanced Gross Anatomy**

This is a course designed as a laboratory-intensive overview of normal structure in prosected (dissections performed ahead of time by staff) examples of cadaver anatomy. Special emphases will be placed on the anatomical correlates associated with upper/lower extremity, neck, and back muscle groups/joints/bones, peripheral nerve plexuses (including spinal and cranial nerves), major arterial/venous pathways, and body viscera in areas of the head/neck, thorax, abdomen, and pelvis. Where appropriate, evidence of pathologies will be discussed at the cadaver side. Additionally, students will participate in clinical case presentations that correspond to the particular dissection subject at-hand throughout the semester. (Matriculation into the third year of PA program, PHYA-206 Medical Microbiology) **Class 2, Credit 2 (F)**

**PHYA-420****PA Seminar**

This course provides physician assistant students with an introduction to the PA profession. The course encompasses historical origins and early educational models. The course covers various professional entities; licensure, certification, accreditation, professional organizations, and medical ethics. (Matriculation into the third year of PA program, PHYA-206 Medical Microbiology) **Class 1, Credit 1 (F)**

**PHYA-421****Diagnostic Imaging**

This course introduces the PA student to the most clinically relevant diagnostic imaging modalities, emphasizing the risks and benefits of different modalities, as well as the appropriate indications for obtaining a variety of radiographic studies. The student will be exposed to the most common plain radiographic diagnoses likely to be encountered in clinical practice as well as important life threatening diagnoses. At the conclusion of this course, the student will have foundational skills and competency to interpret plain radiographs demonstrating these important diagnoses. (Matriculation into the fourth year of the PA program) **Class 2, Credit 2 (F)**

**PHYA-422****Clinical Medicine I**

This is the first of the clinical medicine sequence of courses. The student will be presented with the necessary foundation of knowledge to begin to understand the patient's condition within a clinical context. A body systems approach is utilized in this course to study diseases of the musculoskeletal, gastrointestinal, endocrine and hematologic systems. In addition, common and/or important diseases of the skin and oral cavity, as well as selected infectious diseases, will be presented. Principles of preventive medicine will be woven throughout the curriculum. (Matriculation into the third year of PA program and PHYA-206 Medical Microbiology) **Class 10, Credit 5 (F)**

**PHYA-423****Clinical Medicine II**

This is the second in the sequence of clinical medicine courses. The course will present the physician assistant student with the necessary knowledge to understand the patient within a clinical context. A body systems approach is utilized in this course to study diseases of the cardiovascular, renal, pulmonary, nervous and otologic and immune systems. Principles of preventive medicine will be woven throughout the curriculum. (Matriculation into third year of PA program and PHYA-422 Clinical Medicine I) **Class 10, Credit 5 (S)**

**PHYA-424****Clinical Medicine III**

This is the final course in the clinical medicine sequence of courses and is designed to complete the introduction to human disease. The format will be primarily a population-based approach to presenting disease: The unique diseases and developmental issues encountered in pediatrics, geriatrics, men's health and women's health will be addressed, and an introduction to the important medical issues relevant to caring for surgical patients will be presented. Psychiatric illness and disorders of the head, eyes, ears, nose and throat will be presented. Special topics in infectious diseases and emergency medicine will complete the course. The principles of preventive medicine will continue to be integrated throughout the curriculum. (Matriculation into fourth year of PA program and PHYA-423 Clinical Medicine II) **Class 10, Credit 5 (F)**

**PHYA-430****Clinical Genetics**

This course provides students with an introduction to medical genetics and relevant diseases, syndromes, and clinical disorders. Course focuses on major disorders as subgroups and provides relevant overviews of associated diseases and syndromes within each subgroup. Course also confronts current needs and comprehensive nature of genetic counseling, detailing various patient populations in which this is critical. (Matriculation into third year of PA program , PHYA-422) **Class 2, Credit 2 (S)**

**PHYA-440****Society and Behavioral Medicine**

This course is the introduction to professionalism, professional behaviors for the PA, and behavior science for the PA student. We will explore stereotypes and providers' inappropriate (or lack of) knowledge and how this might influence access to care. The focus is non-somatic medical skills and knowledge needed to become a clinician who manages these issues with insight into human behavior. Topics will include issues related to age, socioeconomic status, cultural, racial, religious, ethnic and family diversity etc. We will seek out and develop tools to recognize facets (including risk factors for and signs/symptoms) of the above issues and of abuse issues. Setting this foundation in basic psychopathology and its relationship to understanding human illness is core to the PA student's developing professionalism. (Matriculation into fourth year of PA program and PHYA-423 Clinical Medicine II) **Class 3 Credit 3 (F)**

**PHYA-510****Hospital Practice I**

The student will begin working with hospitalized patients prior to their clinical year of rotations in small group lead instruction. This course engages the student in the critical thinking process used in the daily care and management of a patient. Student-generated patient cases (from hospital work) will be utilized to work through the critical thinking process that is employed in the day-to-day management of a patient. Enhancement of the development of differential diagnosis, assessment and the treatment plans will be emphasized. Order writing, daily progress notes and clinical procedures for each case will be thoroughly explored. (PHYA-402 History and Physical Diagnosis II) **Credit 4, Class 6 (F)**

**PHYA-520****Clinical Integration**

This course builds upon the foundation developed during the professional didactic phase of the physician assistant program. Drawing upon this foundation, students will analyze simple and complex case-based patient scenarios. Working individually and in groups, and using computer-assisted patient simulators when possible, the students will be asked to gather data from physical examination, data from EKG and laboratory data. Based on the data gathered, the student will recommend further diagnostic evaluations, suggest appropriate treatment, and develop follow-up plans based on the scenario presented. The development of thorough and relevant differential diagnoses for each case study will be an integral part of this process. The case studies will be drawn from a broad variety of clinical disciplines, with an emphasis on 1) screening for and preventing disease; and 2) common and/or important disorders encountered in primary care; emergency medicine, and surgical medicine. (Matriculation into fourth year of PA program and PHYA-424 Clinical Medicine III) **Class 8, Credit 4 (S)**



**PHYA-550****Procedural Clinical Skills**

This course provides the PA student with the requisite skills for professional courses and internships. Emphasis is on developing competence in basic skills in conjunction with patient care. Current hepatitis B immunization status highly recommended. (PHYA-510 Hospital Practice) **Class 4, Credit 3 (S)**

**PHYA-560****Healthcare Policy and Law**

This course will provide an overview of health care law, principles and ethics as it relates to the health care provider. Lecture topics will cover an introduction to law, criminal aspects of health care, patient consent issues, legal reporting obligations, contracts and antitrust, information management and health care records, HIPAA regulations, legal risk to the health care provider, end of life issues, job negotiations and malpractice insurance issues. (PHYA-440 Society and Behavioral Medicine). **Class 2, Credit 2 (S)**

# College of Imaging Arts and Sciences

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Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

## Interdisciplinary Imaging Arts

### Interdisciplinary Courses

#### ITDI-101

#### Honors Leadership

This course is designed to give students in the Honors Program out-of-classroom learning opportunities. All students are required to keep a journal, attend pre-departure meetings, and present their project at the end of the course. Each student will develop their own project in consultation with the faculty member based on their academic field and the location of the course. (Permission of instructor) **Class 20, Lab 0, Credit 0–3 (S)**

#### ITDI-105

#### Design in Dessau

This is a full-time, 12 unit course for matriculated RIT students wishing to take approved courses at the Anhalt University of Applied Sciences in Dessau. Enrollment will give the students official status at RIT and allow them to take courses at the host institution. These courses will be chosen by agreement between an RIT faculty adviser and a faculty sponsor in the host school. Requests for participation must be initiated at least 6 months in advance to allow for completion of institute and international paperwork. Department approval required. **Class 0, Lab 0, Credit 12 (S)**

#### ITDI-216

#### Calligraphy

This course will introduce students to a calligraphic hand for the purpose of acquiring a comprehensive understanding of letterform design and application for personal and professional application. Students will learn to letter using traditional and current tools and techniques. This course is open to anyone who is interested in learning more about lettering, the historical evolution of calligraphy as a precursor to typography and about past, present and emerging styles and practitioners in the fields of lettering, calligraphy and typography. (Open to RIT students) **Class 0, Studio 6, Credit 3, (F, S)**

#### ITDI-233

#### Typeface Design

Exploration of calligraphic letterforms, typographic history, and practical production with an emphasis on developing concepts, nomenclatures and techniques involved in the design of a digital typeface. An understanding of basic typography and calligraphy is needed. (RIT students YR 3-4 with instructor approval) **Class 0, Studio 6, Credit 3 (S)**

## School of Art

### Foundation Courses

#### FDTN-111

#### Drawing I

This course is an introduction to the visualization of form, thought and expression through the drawing process. Concepts are introduced by lectures, discussions, demonstrations, research and assigned projects. Designed to provide a broad introductory experience, students will experiment with a wide variety of media, tools, techniques and subjects to develop drawing expertise and problem solving skills related to design and composition. Course work will be assessed through critique, facilitating self-assessment and the growth of both a visual and verbal vocabulary. The focus of the course is to provide awareness of the full range of ways in which drawing is used as a tool for both self-expression and communication. **Class 2, Lab 4, Credit 3 (F, S)**

#### FDTN-112

#### Drawing II

This course is an introduction to the visualization of form, thought and expression through the drawing process. Concepts are introduced by lectures, discussions, demonstrations, research and assigned projects. Designed to provide a broad introductory experience, students will experiment with a wide variety of media, tools, techniques and subjects to develop drawing expertise and problem solving skills related to design and composition. Course work will be assessed through critique, facilitating self-assessment and the growth of both a visual and verbal vocabulary. The focus of the course is to provide awareness of the full range of ways in which drawing is used as a tool for both self-expression and communication. (FDTN-111 Drawing I) **Class 2, Lab 4, Credit 3 (F, S, Su)**

#### FDTN-121

#### 2D Design I

This course is a structured, cumulative introduction to the basic elements and principles of two-dimensional design. Organized to create a broad introductory experience, the course focuses on the development of both a visual and a verbal vocabulary as a means of exploring, developing and understanding two-dimensional compositions. Concepts are introduced through lectures, discussions, demonstrations, research, assigned projects and critiques. The course addresses a wide variety of media, tools, techniques both traditional and technological, and theoretical concepts to facilitate skill development and experimentation with process. Visual comprehension, the ability to organize perceptions and horizontal thinking that crosses other disciplines and theories, are key foundational components to the development of problem solving skills. Accumulative aspects of the curriculum included the exploration of historical and cultural themes and concepts intertwined with aspects of personal interpretation and experience. **Class 2, Lab 4, Credit 3 (F, S)**

#### FDTN-122

#### 2D Design II

This course is the second semester of a sequential, structured introduction to the basic elements and principles of two-dimensional design. Organized to create a broad introductory experience, students will build upon the visual and a verbal vocabulary, media, techniques, skill development and processes acquired during the fall semester. This term will also focus on the comprehensive exploration of color theory as well as dealing with conceptualization and more advanced issues related to problem solving. Accumulative aspects of the curriculum included the exploration of historical and cultural themes and concepts intertwined with aspects of personal interpretation and experience. (FDTN-121 2D Design I) **Class 2, Lab 4, Credit 3 (F, S, Su)**

#### FDTN-131

#### 3D Design I

This course presents a progressive study over two-semesters in terminology, visual principles, exploration, concept generation, process, and techniques of three-dimensional design. Using hands-on problem solving, student will develop an informed understanding of the three-dimensional form and space with an emphasis on the elements and principles of visual design and their function as the building blocks and guidelines for ordering a three-dimensional composition. A heightened awareness of form and space will be developed through lecture, assigned projects, and critiques. Students will also develop a personal awareness of problem seeking and solving, experimentation and critical analysis. (Note: May be taken as a one-semester offering) **Class 2, Lab 4, Credit 3 (F, S)**

**FDTN-132**

This is the second-semester of a sequential course. The focus is on composing three-dimensional form and its relationship to space. Students will build on their prior term experiences, which include the introduction to three-dimensional principles, materials, and building processes. Students will develop the sophisticated skill of conceptualization. More advanced problems will be assigned and students will have the opportunity to explore a wide range of material and process possibilities for their resolution. A heightened awareness of idea development and design research will be explored. Inclusion of 21st century themes in the arts of social cultural and community. (FDTN-131 3D Design I) **Class 2, Lab 4, Credit 3 (S, Su)**

**FDTN-141**

4D Design introduces students to the basic concepts of art and design in time and space. Computers, video, photo, sound and lighting equipment are used to create short-form time-based work. This work explores the elements of moving images, serial, sequential and narrative ordering, still and moving image editing, sound and image relations, and object and event analysis. The course will address the historical conventions of time in art and their relationship to recent technological advances, which have redefined the fields of Fine Art and Design. In focusing on the relations between students' spacing and timing skills, 4D Design extends and supplements the other Foundation courses, and prepares students for further work with time-based media. **Class 2, Lab 4, Credit 3 (F, S)**

**3D Design II****4D Design****Art History****ARTH-135****Survey of Western Art and Architecture I**

The subject of this year-long course is the history of Western art and architecture from prehistory through the early 20th century. We will examine the form, style, function, and meaning of important objects and monuments of the past, and consider these in their social, historical and cultural contexts. A chronological study will allow us to recognize when, where and by whom a given object was produced. Once these decisive factors are established, we may try to determine why the object was made, what it meant in its time, place and culture, and whose ideology it served. Since we are dealing with visual information, the primary goals of this class are to learn how to look, and how to describe and analyze what we see. At the end of the year, students will be prepared to pursue more advanced courses in the discipline, for they will have gained a foundational knowledge of the object, scope and methods of art history. The knowledge obtained in this introductory course will also guide students in their own creative endeavors. **Class 3, Lab 0, Credit 3 (F)**

**ARTH-136****Survey of Western Art and Architecture II**

The subject of this year-long course is the history of Western art and architecture from Prehistory through the early 20th century. We will examine the form, style, function, and meaning of important objects and monuments of the past, and consider these in their social, historical and cultural contexts. A chronological study will allow us to recognize when, where and by whom a given object was produced. Once these decisive factors are established, we may try to determine why the object was made, what it meant in its time, place and culture, and whose ideology it served. Since we are dealing with visual information, the primary goals of this class are to learn how to look, and how to describe and analyze what we see. At the end of the academic year, students will be prepared to pursue more advanced courses in the discipline, for they will have gained a foundational knowledge of the object, scope and methods of art history. The knowledge obtained in this introductory course will also guide students in their own creative endeavors. (ARTH-135 Survey of Western Art and Architecture I) **Class 3, Lab 0, Credit 3 (S)**

**ARTH-221****Contemporary Design Issues: The Future of Design**

Design History courses examine our past, Contemporary Design Issues examines our future, and will endeavor to explore key social, political, and economic events that influence and shape the contemporary and future practice of design. The impact of green design, economic sustainability, universal design and design for all, professional ethics, corporatization, and globalism, will be carefully examined. **Class 3, Lab 0, Credit 3 (S)**

**ARTH-345****History of Architecture, Interiors and Furniture I**

The first of a two sequential course will provide the student with an overview of the components of style, construction, and material as represented by architecture and home furnishings from the late 17th century through the nineteenth century. We are also concerned with the social context of architecture and home furnishings. Since this is an enormous undertaking, the material for study will necessarily be selective. The course will focus on the relationships between the three disciplines and their cultural, technological, and historical development. (ARTH-136 Survey of Western Art and Architecture II) **Class 3, Lab 0, Credit 3 (F)**

**ARTH-346****History of Architecture, Interiors and Furniture II**

The second sequential course will provide the student with an overview of the components of style, construction, and material as represented by architecture and home furnishings from the late 19th century through the twentieth century. We are also concerned with the social context of architecture and home furnishings. Since this is an enormous undertaking, the material for study will necessarily be selective. The course will focus on the relationships between the three disciplines and their cultural, technological, and historical development. (ARTH-136 Survey of Western Art and Architecture II and ARTH-345 History of Architecture, Interiors and Furniture I) **Class 3, Lab 0, Credit 3 (S)**

**ARTH-366****18th, 19th Century Art**

This course will examine Western art in the period leading up to the French Revolution and the early Modern period - generally, the mid-19th century. This process will include a close examination of the works and careers of individual artists who are considered some of the best-known representatives of the most significant art movements of the era, such as rococo, neoclassicism, romanticism, realism, and impressionism. Students will learn a new vocabulary for discussing visual representations and attempt to situate issues within political, religious, literary, and historical contexts. Throughout the course, a series of questions about art will be presented and students will assess how the nature of those questions affects the way they see images. **Class 3, Lab 0, Credit 3 (F)**

**ARTH-368****20th Century Art: 1900-1950**

A critical study of the art and visual culture of the first five decades of the twentieth century. Major stylistic movements in Europe and America will be examined with special attention to innovations in materials, subject matter, and philosophy. Central themes include: the relationship between art and politics, abstraction vs. figuration, primitivism, anti-modernism, and the search for origins, reactions to modernity and the rise of technology, the tension between the avant-garde and popular culture, utopian and dystopian views of art and society, the institutional critique, artistic responses to Phenomenology, Existentialism, Nihilism, and the special role of art and artists in modern society. Part I of a two semester historical sequence devoted to 20th century art. (ARTH-136 Survey of Western Art and Architecture II) **Class 3, Lab 0, Credit 3 (F or S)**

**ARTH-369****20th Century Art Since 1950**

A critical study of the art and visual culture of the second half of the twentieth century. Major stylistic movements in Europe and America will be examined with special attention to innovations in materials, subject matter, and philosophy. Central themes include: Abstract Expressionism, Pop Art, West Coast Junk, Funk and Beat, Nouveau Réalisme, CoBRA and Situationism, Arte Povera, Earthworks, Site Specificity, Allegory, Conceptualism, Minimalism, Feminism, Performance, Happenings, Installation, and New Media. Part II of a two semester historical sequence devoted to 20th century art. (ARTH-136 Survey of Western Art and Architecture II) **Class 3, Lab 0, Credit 3 (F or S)**

**ARTH-373****Art of the Last Decade**

A critical study of the art and visual culture of the last decade with a strong emphasis on the current American and international scene. The primary focus will be on living artists and artists who remain crucial to contemporary debates with special attention paid to recent, current, and forthcoming exhibitions, their methodological frameworks, and historical context, as well as the key critics, theorists and curators who are shaping the visual culture of the present. (ARTH-136 Survey of Western Art and Architecture II,, and either ARTH-368 Twentieth Century Art 1900-1950 or ARTH-369 Twentieth Century Art Since 1950) **Class 3, Lab 0, Credit 3 (S)**

**ARTH-392****Theory and Criticism of 20th Century Art**

A critical study of some of the major theoretical and philosophical texts that ground twentieth century art as well as their impact on artists and art historians/critics. Taken together they constitute what is presently called 'critical theory' across a wide range of the humanities and social sciences, as well as the emergence of an alleged 'postmodernism.' Major issues include: the theory of autonomy and self-reflexivity, the structuralist paradigm, post-structuralist and Marxist critiques of modernism, feminist approaches to spectacle, semiotics, and the theory of the sign, spectatorship, and commodity fetishism, the relation of vision to constructions of identity and power. Key authors to be discussed include: Lessing, Kant, Greenberg, Foucault, Barthes, Benjamin, Saussure, Pierce, Levi-Strauss, Lacan, Lyotard, Bataille, Debord Baudrillard, and Ranci. (ARTH-136 Survey of Western Art and Architecture II and either ARTH-368 20th Century Art 1900-1950 or ARTH-369 20th Century Art Since 1950) **Class 3, Lab 0, Credit 3 (S)**

**ARTH-457****Art and Activism**

This course will focus on artists using their work for the purpose of changing society. Students will consider work by both individual artists and artists of the last three decades, working in groups that cause critics, art historians, other artists and the viewing public to ask if what they are doing is art. Students will examine texts that propose art to be a form of activism and persuade artists to be responsible for the way they represent the world and determine 'What is Art?' 'What should Art be?' 'What should Art do?' 'But is It Art?'— questions that are asked when art comes into contact with the political or social change, i.e., when art becomes action. The artists and theorists that we will discuss are concerned with problems in our society that effect gender, race, sexuality, poverty, labor issues, and the environment. Most of these theorists and artists can be classified as angry and confrontational or at least evoking a form of contestation and, therefore, their art and ideas are reflective of these positions. (ARTH-136 Survey of Western Art History II and either ARTH-368 20th Century Art 1900-1950 or ARTH-369 20th Century Art Since 1950) **Class 3, Lab 0, Credit 3 (S)**

**ARTH-511****Art and Architecture of Italy: 1250-1400**

The subject of this course is painting, sculpture and architecture of the second half of the Dugento and the Trecento in Italy. This is the period that was singled out by Petrarch and Vasari as marking the beginning of a new age, when the values of the classical tradition were being revived in the visual arts. 1250 marks the death of the last Hohenstaufen Holy Roman Emperor Frederick II, who ruled from the south of Italy, and 1401 is considered by many to mark the beginning of the Early Renaissance, with the competition for the second set of bronze doors for the Baptistery of Florence. Artists we will study will include Nicola and Giovanni Pisano, Arnolfo di Cambio, Cimabue, Pietro Cavallini, Giotto, Duccio, Simone Martini, Pietro and Ambrogio Lorenzetti, Tino da Camaino, Andrea Pisano, Orcagna, Andrea Bonaiuti, Giusto de' Menabuoi, Altichiero, and Paolo Veneziano. The works we will study will include altarpieces, private devotional images, mural cycles, tombs, churches, chapels, town halls, palazzi and piazze. Questions for consideration will include: the nature and meaning of this proto-Renaissance, the importance of Antique and Medieval precedents, the increasing attention to the effects of nature, the role of the patron, and the relevance of documents, literary sources and visual precedents for our interpretation of images. **Class 3, Lab 0, Credit 3 (F)**

**ARTH-512****Art and Architecture of Italy: 1600-1750**

This course focuses upon Italian artists working in Italy from circa 1600 to circa 1750. Although we will explore painting, sculpture and architecture in this sequence and more or less chronologically in each major artistic center of Italy, we will often have the opportunity to explore how these different media coalesce to create an overwhelming visual experience. We will pay particular attention to major commissions given to Annibale Carracci, Michelangelo da Caravaggio, Gianlorenzo Bernini, Alessandro Algardi, Francesco Borromini, Pietro da Cortona, Guarino Guarini, Filippo Juvarra and Giambattista Tiepolo, as we seek to define the nature and meaning of the Italian Baroque and Rococo. **Class 3, Lab 0, Credits 3 (S)**

**ARTH-517****Art and Architecture in Florence and Rome: 15th Century**

The subject of this course is 15th century painting, sculpture and architecture in Florence and Rome. 1401 is the year when the Calimala Guild announced a competition for a second set of bronze doors for the Baptistery of Florence, a date many take to mark the beginning of the Early Renaissance, and 1500 is the year when Michelangelo completed work on the Roman Pieta?, a significant milestone in the career of this extremely influential artist. Artists we will study include Filippo Brunelleschi, Lorenzo Ghiberti, Donatello, Nanni di Banco, Luca della Robbia, Michelozzo, Leon Battista Alberti, Lorenzo Monaco, Gentile da Fabriano, Masaccio, Fra Angelico, Fra Filippo Lippi, Paolo Uccello, Bernardo and Antonio Rossellino, Andrea del Verrocchio, Antonio del Pollaiuolo, Sandro Botticelli, Domenico del Ghirlandaio, Leonardo da Vinci, Filippino Lippi and Michelangelo. The works we will study will include altarpieces, private devotional images, portraits, mural cycles, paintings and sculpture of mythological subjects, allegories, ceilings, doors, tombs, churches, chapels, palazzi, villas and piazze. Questions for consideration will include: the nature and meaning of the Early Renaissance, developments in artistic theory and practice, the importance of Antique and Medieval precedents, the increasing attention to the effects of nature, the role of the patron, and the relevance of documents, literary sources and visual precedents for our interpretation of images. **Class 3, Lab 0, Credit 3 (S)**

**ARTH-518 Art and Architecture in Florence and Rome: The 16th Century**

The subject of this course is 16th century painting, sculpture and architecture in Florence and Rome. 1501 is the year when Michelangelo returned from Rome to Florence to begin carving the colossal marble David that established his reputation across the Italian peninsula, and 1600 marks the emergence of the Baroque style in Rome. Artists we will study include Leonardo da Vinci, Bramante, Michelangelo, Raphael, Sebastiano del Piombo, Jacopo Sansovino, Baccio Bandinelli, Jacopo Pontormo, Agnolo Bronzino, Benvenuto Cellini, Bartolommeo Ammannati, Giorgio Vasari, and Giovanni Bologna. The works we will study will include altarpieces, private devotional images, portraits, mural cycles, paintings and sculpture of mythological subjects, allegories, ceilings, tombs, churches, chapels, palazzi, villas, piazze, fountains and equestrian monuments. Questions for consideration will include: the nature and meaning of the High Renaissance, Mannerism, and the late Renaissance, developments in artistic theory and practice, the importance of Antique and Medieval precedents, the increasing attention to the effects of nature, the role of the patron, and the relevance of documents, literary sources and visual precedents for our interpretation of images. **Class 3, Lab 0, Credits 3 (F)**

**ARTH-521****The Image**

The image remains a ubiquitous, controversial, ambiguous and deeply problematic issue in contemporary critical discourse. This course will examine recent scholarship devoted to the image and the ideological implications of the image in contemporary culture. Topics will include: the modern debate over word vs. image, the mythic origins of images, subversive, traumatic, monstrous, banned and destroyed images (idolatry and iconoclasm), the votive and effigy, the mental image, the limits of visibility, the moving and projected image, the virtual image, image fetishism, the valence of the image, semiotics and the image, as well as criteria by which to assess their success or failure (their intelligibility) and their alleged redemptive and poetic power. (ARTH-136 Survey of Western Art and Architecture II) **Class 3, Lab 0, Credit 3 (F or S)**

**ARTH-541****Art and Architecture of Ancient Rome**

In this course, students will examine the visual culture of ancient Roman civilization from the foundations of Roman culture through the Late Imperial era. Roman culture was heavily reliant on images as a means of transmitting concepts of lineage, status, and power; students will learn how these images may have been perceived in the context of Roman social and political history, and how style may have been used as an ideological tool. **Class 3, Lab 0, Credit 3 (F, S)**

**ARTH- 544****Illuminated Manuscripts**

Students in this course will examine the history of illuminated manuscripts, learning about the working methods of artists as well as the cultural significance of the illuminated book. Issues of production, style, function, and patronage will be introduced, and students will explore the relationships between images, texts, and readers. **Class 3, Lab 0, Credit 3 (F, S)**

**ARTH-554****Late Medieval Art**

This course will examine architecture, sculpture, painting, and decorative arts in Europe from the mid-twelfth century to the Renaissance. Students will analyze the visual culture of the period in relation to the historical, social, and political contexts of its production. Primary issues to be considered include the concept of Gothic, architectural design and construction, the format, function, and creation of manuscripts, art and religious practice, the status and organization of artists, artistic patronage, regional styles, and cross-media influences. **Class 3, Lab 0, Credit 3 (F, S)**

**ARTH-558****The Gothic Revival**

This class covers the Gothic Revival of the eighteenth, nineteenth, and twentieth centuries. Issues to be examined include the question of stylistic revival vs. stylistic survival; the origin and meanings of Gothic as a stylistic category; the impact of antiquarianism on the Gothic Revival in the eighteenth century; Gothic and eighteenth century modes of vision; Gothic in the private and public spheres; Gothic's associations with science, gender, nationalism, and morality; the Gothic Revival and the Pre Raphaelites, and major figures within the movement such as A.W.N. Pugin and John Ruskin. **Class 3, Lab 0, Credit 3 (F, S)**

**ARTH-561****Latin American Art**

This is a survey course of the historical development of the art of Latin America from colonial times to the present. Included will be a consideration of painting, sculpture, architecture, graphic, and photographic arts. Potential themes to be addressed include the dependence on the European neo-classical academic model; indigenism; nationalism and the resurgence of "popular" art; the role of the visual arts in the construction of history; the conflicts and tensions involved in the search for a cultural identity. **Class 3, Lab 0, Credit 3 (S)**

**ARTH-566****Early Medieval Art**

This class will examine medieval European artistic production—including architecture, architectural and free standing sculpture, metalwork, painting, and manuscript illumination - from the sixth to the twelfth centuries. The visual culture of the period will be analyzed in relation to the historical, social, and political context of its production. Primary issues to be considered include architectural structure, art and religious practice, the status and organization of artists and builders, art as an expression or enforcer of identity, the question of regional styles, contact with other cultures, and the relationship between medieval art and the past. **Class 3, Lab 0, Credit 3 (F, S)**

**ARTH-568****Art and Technology:****from the Machine Aesthetic to the Cyborg Age**

This course explores the link between art and technology in the 20th century with special focus on the historical, theoretical, and ideological implications. Topics include the body in the industrial revolution, utopian, dystopian, and fascist appropriations of the machine, engendering the mechanical body and machine-eroticism, humanism, the principles of scientific management, the paranoid and bachelor machine, multiples, mass production, and the art factory, industrial design and machines for living, the technological sublime, cyborgs, cyberpunk and the post-human. Key theorists to be discussed include: Karl Marx, Norbert Weiner, Reynier Banham, Siegfried Gideon, Marshall McLuhan, Michel Foucault, Deleuze and Guattari, Donna Haraway, and Martin Heidegger, as well as examples from film (*Modern Times*, *Metropolis*, *Man with the Movie Camera* and *Blade Runner*) and literature (Shelley's *Frankenstein*, and Zamyatin's *We*). Artists covered include: Tatlin, Rodchenko, Malevich, Moholy-Nagy, Legér, Sheeler, Picabia, Duchamp, Calder, Ernst, Le Corbusier, Klee, Tinguely, Oldenburg, Rauschenberg, Warhol, Beuys, Kiefer, Lewitt, Fischli and Weiss, Acconci, Nam June Paik, Survival Research Laboratories, Bureau of Inverse Technology, Stelarc, Orlan, Dara Birnbaum, Roxy Paine, Marina Abramovic, Kac and Bill Viola. (ARTH-136 Survey of Western Art History II) **Class 3, Lab 0, Credit 3 (F or S)**

**ARTH-572****Art of the Americas**

This is a survey course of Native North and South American visual arts within an historical and anthropological framework. Included will be an examination of the development of principal styles of Ancient American architecture, sculpture, painting, and ceramics up to the sixteenth century when the Spanish conquistadors defeated the Aztec and Inca empires and imposed colonial rule. Consideration is also given to materials used, techniques of construction, individual and tribal styles, as well as to the meaning and function of various art forms within Native American societies. **Class 3, Lab 0, Credit 3 (F)**

**ARTH-573****Conceptual Art**

This course examines the widely influential mid-1960s art movement that questioned the fundamental nature of art itself by renouncing the material art object as well as the phenomenon of art making. The definition of art as well as its institutional framework was thereby expanded, and the idea, concept, or intellectual dimension of the work was underscored. Students will be acquainted with the philosophical foundations and critical implications of this global movement across a wide spectrum of works and practices (paintings, performance, installations, books and texts, photography, film, and video) and its relevance to contemporary concerns. **Class 3, Lab 0, Credit 3 (F or S)**

**ARTH-574****Dada and Surrealism**

This course examines the widely influential Dada and Surrealist movements in Europe and the United States from 1916 through the post-World War II period as well as their relevance to contemporary concerns. Emphasis is on identifying the major works of artists involved in these movements as well as their philosophical foundations, critical implications, as well as broader literary and ideological contexts (e.g., Freud, Breton, Lautréamont, Leiris and Bataille). A wide range of works and practices (paintings, performance, installations, literary texts, photography, film, and ephemeral objects) will be studied, and the work of certain key artists (Höch, Heartfield, Schwitters, Duchamp, Picabia, Dalí, Ernst, Giacometti, Man Ray, Bellmer, Cahun, Cornell, Magritte, Miro, Oppenheim, Toyen and Picasso) will be analyzed in depth. (ARTH-136 Survey of Western Art History II) **Class 3, Lab 0, Credit 3 (F or S)**

**ARTH-576****Modernism and Its Other:  
Realism in the Shadow of Expressionism**

This course is an inquiry into one of the major debates of modern art. This debate had a seemingly clear victor. The idea that the artist expresses his or her individuality and then communicates that self to the rest of humanity through a higher, transcendental, language has dominated the discourse and practice of modernist art. In retrospect, the art that dominated most of the first half of the 20th century was of an Expressive nature. On the other hand art that addressed the social and in anyway addressed direct and specific social issues was banished by art's major institutions. Realism was dead. In this course we will look at the circumstances of how Realism became subordinated to Expressionism. We will also address the question of what exactly constituted the practice of realist art. We will look at the roots of both movements that will take us at times into 18th and 19th centuries. But mostly we will concentrate on how institutions like the Museum of Modern Art helped define how we see the history of 20th century art as being determined. We will also explore how Modernism's other, Realism, survived and gained new currency in practices of late 20th and early 21st century art. (ARTH-136 Survey of Western Art History II and either ARTH -368 20th Century Art 1900-1950 or ARTH-369 20th Century Art Since 1950) **Class 3, Lab 0, Credit 3 (F)**

**ARTH-577****Displaying Gender**

This course brings together two of the most significant strains of recent art historical scholarship: the study of gender in representation and the critical examination of exhibitions and museums with particular focus given to key examples of curatorial practice from the late 19th century to the present day. Through readings, possible museum visit(s), class discussions, and guided individual research, questions of gender in exhibitions will be considered in relation to other aspects of identity including sexuality, race, and class. **Class 3, Lab 0, Credit 3 (S)**

**ARTH-578****Edvard Munch**

The Norwegian artist Edvard Munch (1863-1944) continues to generate a great deal of popular interest, critical scholarship, and reflection. The 4-volume catalogue raisonné of his paintings was published in 2009, and the graphic work appeared in 2001. A painter, printmaker, photographer, and filmmaker, Munch was also a prolific writer, well acquainted with the symbolist poets and playwrights, as well as the broad intellectual drift of the fin-de-Siècle. He is the one Scandinavian artist included within the Modernist canon and his image, *The Scream* (1893), is an icon of the modern age. Munch traveled widely throughout Europe and his work was exhibited in North America beginning with the famous 1913 Armory Show. This course will examine recent scholarship devoted to Munch and the critical issues that his work addresses. It will also place him within the broader cultural context of Scandinavian and European modernism, while examining his impact on subsequent generations. (ARTH-136 Survey of Western Art History II) **Class 3, Lab 0, Credit 3 (F or S)**

**ARTH-581****Realism and the Avant-Garde in Russian Art**

The term avant-garde was originally used to describe the foremost part of an army advancing into battle. The concept of the avant-garde is considered by some to be synonymous with Modernism. The radical move away from classical forms of representation in the late 19th and early 20th centuries is typical of how one understands the avant-garde. In Russia, the experiments in art from the mid 1890's through 1922 are seen as modernist avant-garde practices that were extreme departures from art practices of the earlier 19th century. We will examine the avant-garde's social and, therefore, political underpinnings. In order to get to the roots of an earlier understanding of the avant-garde, we find in its beginnings the writings of Claude Henri de Rouvroy, comte de Saint-Simon, and Olinde Rodrigues. In Russia the artists who painted images that represented the social world, and therefore put themselves in opposition to the status quo, were known as the *Peredvizhniki*. We will try to amend this misunderstanding and connect this group of artists to the Russian formal and political avant-garde of the early 20th century and to the latter non-conformist artists of the second half of the 20th century that coincides with Perestroika and the eventual demise of the Soviet Union. (ARTH-136 Survey of Western Art History II and either ARTH-368 20th Century Art 1900-1950 or ARTH-369 20th Century Art Since 1950) **Class 3, Lab 0, Credit 3 (F)**

**ARTH-582****Medieval Craft**

In this course, we will explore the history of craft production throughout the Middle Ages. While modern scholars have often divided art from craft, this distinction did not exist in medieval Europe: artists were craftspeople, producing objects that were both practically and symbolically functional. This class will focus on the decorative arts including stained glass, ivories, textiles, and metalwork to produce a more integrated picture of medieval visual culture. Students will study both practical aspects of production and the reception and meaning of these objects within medieval society. **Class 3, Lab 0, Credit 3 (F, S)**

**ARTH-583****Installation Art**

This course will introduce students to historic, contemporary, and critical issues surrounding installation art. There will be an introduction to the development of installation art as a genre. We will examine the changes, which have developed over the past three decades, of object sculpture to non-object. There will be an emphasis on the development of the concept of an installation project and its relationship to site and/or audience. Both public and gallery spaces will be discussed. (ARTH-136 Survey of Western Art and Architecture II and ARTH-368 20th Century Art 1900-1950 and ARTH-369 20th Century Art Since 1950) **Class 3, Lab 0, Credit 3 (F)**

**ARTH-584****Scandinavian Modernism**

This course examines the decorative arts and visual culture of modern Scandinavia from 1860 to the present, with special emphasis on the social, economic, and political impulses that have shaped them. Scandinavian Modern design plays a significant role in the postwar epoch; it is equated with such leading brands as Volvo, Saab, Ericsson, Nokia, H&M, Electrolux Orrefors, Georg Jensen, ARTEK, Iittala, and IKEA and the idea of progressive, social democracy. The myths and realities of its success will be examined and related to emerging cultural and national identities, as well as its impact on contemporary design. (ARTH-136 Survey of Western Art History II) **Class 3, Lab 0, Credit 3 (F or S)**

**ARTH-586****History of Things: Studies in Material Culture**

This course is an examination of techniques and materials together with a historical overview of the artistic achievements of craftsmen and women in the past, with particular emphasis on ceramics and metalsmithing. It includes study of Renaissance and early modern earthenware and stoneware as a prelude to the consideration of the history of porcelain and explores creative thinking and designing in other traditional craft areas such as fiber, glass, and wood. **Class 3, Lab 0, Credit 3 (F)**

**ARTH-587****The Gothic Cathedral**

This class will examine the Gothic cathedral and related art production (stained glass, sculpture, and metalwork within the cathedral context) from the twelfth through the fifteenth century. Students will study cathedrals of the late middle-ages within their cultural contexts and examine the meanings such buildings conveyed to their intended audiences. The class will explore the design, structure, and construction of Gothic cathedrals throughout Europe, and will also examine the decorative programs of sculpture, stained glass, and liturgical objects integral to the meaning and function of these structures. Issues to be considered include the production of cathedrals; the stylistic variations of Gothic; the relationship between function and form; the urban context of Gothic cathedrals; and the holistic view of the Gothic cathedral. **Class 3, Lab 0, Credit 3 (F, S)**

**ARTH-588****Psychoanalytic Perspectives on Art**

This course explores the links between psychoanalytic theory, art history and visual culture with special focus on the work of Sigmund Freud, Carl Jung, and their followers. A central aim is to examine the way in which psychoanalytic theory has been employed by art historians and theorists as a mode of interpretation, as well as to study how, why, and what several of the most notable psychoanalysts have written about art. Topics include the interpretation of dreams, transference, the Oedipal myth, melancholia, narcissism, abjection, the structure of the unconscious, the fetish, Archetypes and the Collective Unconscious, as well as outsider art, and the art of the insane. Key theorists to be discussed include: Freud, Jung, D.W. Winnicott, Melanie Klein, Jacques Lacan, Otto Rank and Julia Kristeva; individual artists studied include: Albrecht Dürer, Leonardo da Vinci, Edvard Munch, Lars Hertervig, Max Ernst, Jackson Pollock, Antonin Artaud, Louise Bourgeois, Mary Kelly and Victor Burgin; in addition to examples from film (Maya Deren, Luis Bunuel and Salvador Dali, and Stan Brakhage) (ARTH-136 Survey of Western Art History II) **Class 3, Lab 0, Credit 3 (F or S)**

**Fine Arts Studio****FNAS-201****Introduction to New Forms**

As one of five required Sophomore courses that introduce the techniques, processes, and technologies of the visual fine arts to Fine Arts Studio students, Introduction to New Forms focuses on the diverse new forms of expression that have emerged in contemporary fine art including: installation, performance, video, light, sound, and numerous digital media. Students will research and produce artwork utilizing some of these new forms of personal expression. (FDTN-122 2D Design II, FDTN-132 3D Design II, FDTN-112 Drawing II, FDTN-141 4D Design) **Class 1, Studio 4, Credit 3 (S)**

**FNAS-202****Introduction to Non-Toxic Printmaking**

This course is designed to introduce non-toxic printmaking concepts and techniques. (FDTN-122 2D Design II, FDTN-132 3D Design II, FDTN-112 Drawing II) **Class 1, Lab 4, Credit 3 (F, S)**

**FNAS-203****Introduction to Painting**

Students begin a personal exploration of techniques in painting to advance their understanding, using color theory, building compositions and effective use of painting materials. Individual approaches to content range from abstraction through representational art, as students address contemporary visual arts issues. (FDTN-122 2D Design II, FDTN-132 3D Design II, FDTN-112 Drawing II) **Class 1, Studio 4, Credit 3 (F, S)**

**FNAS-204****Introduction to Sculpture**

This course is designed for students to develop ideas through investigation of basic sculpture practices, processes, and materials. Introduction to additive, subtractive, assemblage, and substitution processes of making sculpture will be covered with expectations that students will develop these skills in relation to individual concepts and directions. (FDTN-122 2D Design II, FDTN-132 3D Design II, FDTN-112 Drawing II) **Class 1, Lab 4, Credit 3 (F)**

**FNAS-205****Introduction to Fine Art Drawing**

This class is devoted to building upon each student's skills in drawing with attention to use of a variety of mark making materials and surfaces. Drawing uses perceptual and conceptual approaches to creative visual art making. Students engage in issues of representation and abstraction through relationships of marks, lines and other graphic notations. Contemporary drawing can focus on direct observations or imaginative compositions among many other valid approaches. (FDTN-122 2D Design II, FDTN-132 3D Design II, FDTN-112 Drawing II) **Class 1, Lab 4, Credit 3 (F)**

**FNAS-269****Sculpture for Non-Majors**

This course offers an introduction to sculpture and will expose students to basic concepts, forms, methods, and materials of the art form. The principles of space, volume, surface texture, multiple viewpoints, and gravity will be explored in three-dimensional projects. **Class 1, Studio 5, Credit 3 (F, S)**

**FNAS-305****Fine Art Drawing: Figure**

Figure drawing skills are taught in a traditional life drawing class format with emphasis on dynamic line quality, visual perception and contemporary approaches to figure drawing. (FNAS-205 Introduction to Fine Art Drawing) **Class 1, Lab 4, Credit 3 (F)**

**FNAS-401****Senior Show**

This course gives fine arts studio students a capstone experience focused on the exhibition of a culminating body of artwork. Professional presentation through oral, written, and visual means as relevant to the contemporary art world will be stressed. Students will be involved in every aspect of their senior show from creating the work, hanging the exhibition, and preparing marketing materials. (FNAS-514 Ideation and Series) **Class 1, Lab 4, Credit 3 (S)**

**FNAS-498****Fine Arts Studio Internship**

The Fine Arts Studio Internship will provide students with the option to work with established artists or in fine art related businesses. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the independent study permission form to enroll. **Class 0, Studio 0, Credit 1-6 (F, S)**

**FNAS-499****Fine Arts Studio Co-op**

The Fine Arts Studio Co-op will provide students with the option to work with established artists or in fine art related businesses. Students may apply for co-ops with businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the co-op form to enroll. **Class 0, Lab 0, Credit 0 (F, S)**

**FNAS-501****Fine Arts Studio: New Forms**

Fine Arts Studio: New Forms examines the diverse new forms of expression that have emerged in contemporary fine art, including installation, performance, video and digital art among the many other possibilities. Students will research some of these new forms and produce artwork in at least one of these forms. Students in the fine arts studio program may choose any combination of Fine Arts Studio (Painting, Non-Toxic Printmaking, Sculpture or New Forms) classes to meet the 18 credit course requirements in their major. (FNAS-201 Introduction to New Forms) **Class 1, Studio 4, Credit 3 (F, S)**

**FNAS-502** **Fine Arts Studio: Non-Toxic Printmaking**  
This course is designed to introduce advanced non-toxic printmaking concepts and techniques. The focus will be on non-toxic intaglio printmaking research and how to creatively apply techniques that will result in sophisticated works of art. Students in the fine arts studio program may choose any combination of Fine Arts Studio (Painting, Non-Toxic Printmaking, Sculpture or New Forms) to meet the 18 credit course requirements in their major. (FNAS-202 Introduction to Non-Toxic Printmaking) **Class 1, Lab 4, Credit 3 (F, S)**

**FNAS-503** **Fine Arts Studio Painting**  
Fine Arts Studio Painting students engage in contemporary visual art practice through a personal exploration of painting techniques. Individual approaches to painting address issues of representation and abstraction to build a portfolio for further career advancement. Students in the fine arts studio program may choose any combination of Fine Arts Studio (Painting, Non-Toxic Printmaking, Sculpture or New Forms) classes to meet the 18 credit course requirements in their major. (FNAS-203 Introduction to Painting) **Class 1, Studio 4, Credit 3 (F, S)**

**FNAS-504** **Fine Arts Studio: Sculpture**  
This course allows students to explore concepts, materials, processes, and techniques to develop a personal, cohesive three-dimensional body of work. Theories and history of sculpture will be discussed as relevant to individual directions. Students in the fine arts studio program may choose any combination of Fine Arts Studio (Painting, Non-Toxic Printmaking, Sculpture or New Forms) to meet the 18 credit course requirements in their major. (FNAS-204 Introduction To Sculpture) **Class 1, Lab 4, Credit 3 (F, S)**

**FNAS-514** **Ideation and Series**  
Creative flow, having an endless stream of ideas, alternatives, and choices for solutions, helps creative work evolve and reach more advanced levels. In this course students develop appropriate skills and strategies to generate ideas and develop them effectively. **Class 1, Lab 4, Credit 3 (F)**

**FNAS-517** **Business Practices for Fine Artists**  
This class is devoted to business issues that artists must address including building and maintaining a portfolio, pricing and marketing strategies and public relations. Financial organization and communication skills are highlighted as are networking skills for the advancement of an artist's work. **Class 3, Lab 0, Credit 3 (F)**

**FNAS-533** **Painting for Non-Majors**  
Students will be encouraged to experience and explore the properties of Oil Painting and establish strategies toward solving problems of composition related to successful form content. **Class 0, Studio 6, Credit 3 (S)**

**FNAS-535** **Art Gallery Management**  
The complex social and cultural role of a fine arts gallery will be explored through supportive gallery operations: the installation of experimental and traditional exhibits, promotion, and marketing for competitions, student initiatives and special events tailored to the RIT and community arts audiences, Metro site visitations and gallery research will be combined with arranged studio hours in a gallery laboratory setting. **Class 3, Studio 0, Credit 3 (F, S)**

**FNAS-543** **Foundry Practices**  
This course is designed to introduce or develop students' skills in casting metals with an emphasis on cast iron and the use of a cupola. Advanced pattern-making, mold-making, spruing, patination, and casting techniques will be introduced. Students will develop their concepts through cast metal sculpture. (FDTN-132 3D Design II) **Class 1, Studio 5, Credit 3 (S)**

**FNAS-560** **Watercolor**  
An intermediate to advanced exploration of watercolor concepts and techniques to enhance skill development and personal expression of the individual student. (FDTN-112 Drawing II) **Class 0, Studio 6, Credit 3 (F, S, Su)**

**FNAS-561** **Digital Art Printmaking**  
Students may elect to take this course for greater practice and experience with popular software and digital tools to create fine art prints. Students will become more knowledgeable about printmaking processes, and using concepts employing digital design and production of unique prints on paper. (FNAS-202 Introduction to Non-Toxic Printmaking) **Class 0, Lab 2, Studio 3, Credit 3 (F)**

**FNAS-563** **Contemporary Drawing**  
Students experiment and explore drawing as an expressive end, in and of itself. Individual approaches to content range from abstraction through representational art, as students address contemporary visual art issues through drawing. Participation in classroom exercises along with the development of individual work is expected. (FDTN-112 Drawing II) **Class 0, Studio 6, Credit 3 (S)**

**FNAS-568** **Monoprint Figure**  
Introduction and continuation of life drawing exercises focusing on dynamic and expressive line quality. Half of the class time schedule will be dedicated to life drawing and the other half to mono-printing. The focus will be on applying figure drawing skills to mono-printmaking and how to creatively apply techniques that will result in works of art. (FDTN-112 Drawing II and FDTN-122 2D Design II) **Class 0, Studio 6, Credit 3 (S)**

**FNAS-571** **Painting the Figure**  
This class is structured to explore materials and techniques in order to paint the human form. Theory and practice of color and drawing, as well as other resources, will be used to develop an understanding of how to portray the figure. Traditional and contemporary approaches to figurative painting are utilized in producing figure paintings. (FDTN-112 Drawing II and FDTN-122 2D Design II) **Class 0, Studio 6, Credit 3 (F)**

**FNAS-583** **Welding and Fabrication**  
This course is designed to introduce or develop students' skills in metal fabrication. Several different types of equipment will be introduced and explained along with the welding and cutting processes. Emphasis will be placed on students completing a body of work consisting of finished fabricated steel sculptures. There is a lab fee to cover some safety equipment and supplies. The course will be taught off-campus at Rochester Arc and Flame Center. (FDTN-132 3D Design II) **Class 0, Studio 5, Credit 3 (S)**

**FNAS-599** **Fine Arts Studio Independent Study**  
Independent Study Fine Arts Studio Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Fine arts studio independent study students must obtain permission of an instructor and complete the independent study permission form to enroll. **Class 0, Studio 0, Credit 1-6 (F, S)**

## Illustration

**ILLS-213** **Illustration I**  
Illustration I is the primary core course for illustration majors in their sophomore year. The students approach major elements of technique, application, and theory in relation to becoming illustrators. Studio sessions involve basic problem solving, anatomy, pictorial composition, media applications, figurative expression, use of reference tools, and illustrative techniques. Class structure allows demonstrations of processes and experimentation for assignment development. Group and individual critiques will be used to evaluate work. (FDTN-112 Drawing II; FDTN-122 2D Design II) **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-214** **Anatomical Illustration**  
This course will provide and in depth anatomical approach to drawing the figure. Students will obtain instruction and practice at drawing human anatomy including body and head postures, facial expressions, and hand gestures. Students will be taught anatomical proportioning while drawing from observation from models to convey emotions such as anger, sadness, fear, disgust, etc. Students will also learn to use photo support references. Works will be created in black and white and in color media using light and dark, and warm and cool effects. (FDTN-112 Drawing II; FDTN-221 2D Design II) **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-218** **Dimensional Illustration I**  
This course will introduce students to an alternative style of illustration that will expand their thinking into the third dimension. Emphasis will be placed on planning and preparation of compositional elements in three-dimensional sculptural form and creative problem solving. Students will be encouraged to explore a variety of materials and techniques to complete projects. (FDTN-112 Drawing II; FDTN-122 2D Design II) **Class 2, Studio 3, Credit 3 (F, S)**



**ILLS-219****Digital Illustration I**

Digital Illustration I will provide students with methods of conceptualizing, organizing and executing illustrations using the computer. Projects will expose students to various types of digital techniques using vector and raster-based software applications, and a variety of input and output devices for the creation of professional level assignments. The course will emphasize conceptual problem solving methodology and the language of visualization while providing a consistent foundation for digital illustration as it relates to professional illustration production. Color systems, digital terminology and pre-press file formats will be also be covered. (FDTN-112 Drawing II, FDTN-122 2D Design II) **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-313****Illustration II**

This course focuses on preparing students to create work for a variety of illustration markets including the advertising, editorial, corporate and book publishing markets. Emphasis will be placed on the development and creation of a variety of finished illustrations that will demonstrate understanding of current industry trends and standards. Students will gain insight into the differences and nuances of these illustration specializations. Creative problem solving, stylistic self-expression, and technical proficiency will be emphasized. Students will participate in individual and group reviews and critiques. (ILLS-213 Illustration I) **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-319****Digital Illustration II**

Digital Illustration II will provide students with advanced methods of conceptualizing, organizing and executing illustrations using the computer. Projects will expose students to various types of digital techniques using vector and raster-based software applications, and a variety of input and output devices for the creation of professional level assignments. The course will emphasize conceptual problem solving methodology and the language of visualization while providing a consistent foundation for digital illustration as it relates to professional illustration production. Color systems, digital terminology and pre-press file formats will be covered. (ILLS-219 Digital Illustration I) **Class 2, Lab 3, Credit 3 (S)**

**ILLS-358****Dimensional Illustration II**

This course will offer students the option to continue an exploration of three-dimensional illustration. Emphasis is placed on creative problem solving, drawing skills, planning, preparation, compositional elements of three-dimensional low relief and sculptural form. Students are encouraged to explore a singular medium to complete projects in series presented in a consistent style. (ILLS-218 Dimensional Illustration I) **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-359****Illustrative Design**

Illustrative Design is an introduction to the principles and methods used to incorporate illustration with typography and layout. Students will conceptualize, organize and execute illustrations within a design context. Illustrative Design I will emphasize the use of graphic elements such as symbols, charts, and type to be incorporated into illustrations. Layout terminology and illustration production methods will be included. Projects will expose students to various examples of real-world assignments that will demand the use of traditional illustration methods as well as computer-based production media. Assignments will stress solutions that are typically managed by art directors and designers. The course will emphasize the language of visualization and the relationship and coordination of concept, illustration and word. (ILLS-219 Digital Illustration I) **Class 2, Studio 3, Credit 3 (F)**

**ILLS-363****Zoological and Botanical Illustration**

This course utilizes subjects found in the natural world as resources for applied and fine art applications. Working from live and preserved subjects, students will accurately depict animal and plant images, which may be used descriptively in print and electronic media. **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-364****Editorial Illustration**

Editorial Illustration takes an in-depth look at creating images for the newspaper and magazine publishing industry. Emphasis will be placed on creating a wide variety of finished illustrations. The course focuses on the visual interpretation of editorial subject matter. Critical thinking, visual criticism, and rhetoric will also be a required component of work generation and conceptualizing. Presenting thumbnails that explore a variety of concepts is emphasized. **Class 2, Studio 3, Credit 3 (S)**

**ILLS-368****Pop-Up Books**

This course will deal with constructing and illustrating pop-up and mechanical books. Students will study planning, preparation, engineering and illustration for production of pop-ups. The course will be divided into a preliminary section of learning basic mechanisms of pop-up books and a second section, which allows students to apply knowledge learned in the first section to the illustration and production of their own book. (ILLS-218 Dimensional Illustration I) **Class 2, Studio 3, Credit 3 (F)**

**ILLS-369****Digital Mixed Media**

This course provides students with the opportunity to explore the creative potential presented through the imaginative combination of both traditional and digital media. Students will be expected to utilize and combine skills learned in traditional and digital illustration courses to provide exciting and fresh illustrations unrestricted by a singular medium. (ILLS-219 Digital Illustration I and ILLS-213 Illustration I) **Class 2, Studio 3, Credit 3 (S)**

**ILLS-379****Digital Editorial**

Digital Editorial will introduce students to editorial illustration. Importance will be placed on interpretation of editorial subject matter and preparation of digital imagery for print reproduction. Students will apply approaches to creative illustration while creatively interpreting editorial text and visual narratives. Students may use vector and raster-based software applications and a variety of input and output devices. Stylistic issues, conceptual strategies, production restrictions, and color systems will also be covered. (ILLS-219 Digital Illustration I and ILLS-213 Illustration I) **Class 2, Studio 3, Credit 3 (S)**

**ILLS-413****Illustration III**

This course focuses on preparing students to function as professional working illustrators. Students will prepare and supply professional business materials such as job cost estimates, work and job delivery schedules, etc. along with assignment work. Emphasis will be placed on the development and creation of a variety of finished illustrations that will demonstrate understanding of current industry standards. Students will gain insight into pricing, time management, and effective communication relative to the illustration profession. Creative problem solving, stylistic self-expression, and technical proficiency will also be emphasized. Students will participate in individual and group reviews and critiques. (ILLS-313 Illustration II) **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-461****Illustration History**

Illustration History will provide students with a historical overview and discussion of the field of illustration. Students will be presented with illustration in a developmental context. Visual examples, illustrator's biographies, descriptive information, and terminology will define and distinguish illustration and provide topics for discussion. The course will cover revolutionary illustrators, evolutionary trends, and styles from 1880 to the present. Special emphasis will be placed on particular illustrators whose artistic contributions to the field have defined and influenced changes and new movements. Work in traditional mediums and more recent digital mediums will be covered. (FDTN-112 Drawing II; FDTN-122 2D Design II; FDTN-141 4D Design) **Class 2, Studio 3, Credit 3 (F)**

**ILLS-462****Journalistic Illustration**

This course will familiarize students with the requirements of visually reporting a specific happening or event. Assignments will be longer in duration and will consist of several major works, many drawings, sketches, notes and photo references. This journalistic approach to illustration demands that students attend an event and selectively record important aspects that will best communicate the atmosphere and action of the scene. Extensive research, both informational and visual is expected. A personal, editorial viewpoint is desired. This course will familiarize students with methods and issues involving creating a series of images for the single purpose of representing a story or illustrated sequence. Emphasis will be placed on choosing important content and planning effective image sequences. Students will learn to share their observations to clarify and embellish what might be commonplace for the non-visual observer. **Class 2, Studio 3, Credit 3 (S)**

**ILLS-465****Book Illustration**

This course focuses on preparing students to create work for the book publishing industry. Emphasis will be placed on creating a wide variety of finished illustrations that will appeal to picture book markets as well as a range of other publishing categories. To create a basis for their illustrations, students will visualize existing narratives and/or author their own story concepts. This will involve story development and storyboard conceptualization. Creative expression and technical experimentation will be encouraged. The course will culminate with the student creating a completed 'dummy' suitable for presentation to book publishers. (ILLS-219 Digital Illustration I) **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-466****Personal Focus**

This course requires students to create several illustrations on a topic, genre, or market relating to personal interests, experiences, directions, portfolio requirement, and career goals. Emphasis will be placed on the display of the student's individual aesthetic choices including realism or stylization, personal color palette, characterization, compositional sense, and other considerations. Works may be thematic or individualistic in content. Although this is not an independent study course, students will be expected to create a plan of work for the course in consultation with the instructor. **Class 2, Studio 3, Credit 3 (F)**

**ILLS-467****Animating Digital Illustration**

Animating Digital Illustration will provide an introduction to illustrating for multimedia projects by creating computer generated animations and presentations. Adobe Flash in combination with other imaging and motion software will be used. Assignments will investigate not only illustrated animation, but also sound, music, color and special effects. The course will emphasize conceptual problem solving methodology, color systems, digital terminology and motion file formats. (ILLS-219 Digital Illustration I) **Class 2, Lab 3, Credit 3 (S)**

**ILLS-468****Fantastic Illustration**

Fantastic Illustration takes an in-depth look at creating images for the fantasy and science-fiction publishing industry. Emphasis will be placed on creating a wide variety of finished illustrations. The course focuses on the visual interpretation of subject matter specific to these specialized genres of illustration. Critical thinking, visual criticism, and rhetoric will also be a required component of work generation and imaginative conceptualizing. Stylistic options and technical approaches to the subject matter will be emphasized. (Sophomore illustration core) **Class 2, Studio 3, Credit 3 (F)**

**ILLS-469****Advertising Illustration**

This course will deal with creating illustrations used to advertise products, services and events. Assigned projects will give students a better understanding of the wide range of assignments advertising illustrators are asked to produce by advertising agencies and corporate accounts. Students will experience the fast paced working conditions inherent in the advertising industry. **Class 2, Studio 3, Credit 3 (F, S)**

**ILLS-472****Sketchbook Illustration**

This course will facilitate the use of sketchbooks as a creative, developmental tool for illustrators and artists. Students will complete assignments by draw on location and in class to explore subjects and environments to create a visual reference material in the form of a sketchbook journal. Material documented in the sketchbook will then provide visual reference for more complete illustrations. **Class 2, Studio 3, Credit 3 (S)**

**ILLS-477****Caricature Illustration**

This course will provide and in depth look and practice at creating humorous, symbolic or acerbic images of people for this specialized area within the field of Illustration. Assignments will challenge students to create characters for a variety of purposes and media. Emphasis will be placed on interpreting facial expressions, body postures, and clothing. Students will work in black and white and in color media producing a wide variety of finished illustrations. Students will be instructed in production methodologies, character diagramming, and color systems. **Class 2, Studio 3, Credit 3 (S)**

**ILLS-482****Political Cartooning**

Political Cartooning is an introduction to this very popular, humorous approach of illustration that is widely used by newspaper and magazine publishers. Students will apply humorous, satirical, ironic, etc. content to their illustrations. Research, brainstorming, and exploration of techniques and media are emphasized. The history of visual joke telling is reviewed. **Class 2, Studio 3, Credit 3 (S)**

**ILLS-498****Illustration Internship**

The Illustration Internship will provide students with the option to work in the illustration or visual communication field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the internship permission form to enroll. **Class 0, Studio 0, Credit 1-6 (F, S)**

**ILLS-499****Illustration Co-op**

The Illustration Co-op will provide students with the option to work in the illustration or visual communication field. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. Illustration co-ops must be approved and sponsored by a faculty adviser. (Department approval) **Class 0, Lab 0, Credit 0 (F, S)**

**ILLS-501****Illustration Portfolio**

Illustration Portfolio is the final preparatory course for the Illustration major. Its purpose is to provide students with information, strategies and guided instruction to market themselves and organize and create their final portfolio. Writing will be a substantial component of this course. The course will include marketing and business practices for the professional illustrator. Students will receive individual critique and analysis of work created in prior studio classes and progress to the definition of a career agenda. Projects will be customized for each students body of work and their career intentions. Presentation methods and business protocol will also be addressed. The final culminating project will be a finished portfolio. In addition to the portfolio document, students will be instructed in job seeking strategies including creating mailers and promotional materials, interviewing dynamics, resume writing, and correspondence. **Class 2, Studio 3, Credit 3 (S)**

**ILLS-599****Illustration Independent Study**

Illustration Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Illustration independent study students must obtain permission of an instructor and complete the independent study permission form to enroll. **Class 0, Studio 0, Credit 1-6 (F, S)**

**Medical Illustration****ILLM-498****Medical Illustration Internship**

The medical illustration internship will provide students with the option to work with practicing professionals in a business or educational environment. Students may apply for internships to businesses and educational institutions based on the availability of positions and company needs. Students must obtain permission of an instructor and complete the internship permission form to enroll. **Credit 0, Studio 0, Credit 1-6 (F, S)**

**ILLM-499****Medical Illustration Co-op**

The medical illustration co-op will provide students with the opportunity to work alongside of practicing medical illustrators in various branches of the profession. Students may apply for co-ops with businesses and educational institutions based on the availability of positions and company job needs. Students must obtain permission of an instructor and complete the co-op form to enroll. (Department permission to enroll) **Class 0, Lab 0, Credit 0 (F, S)**

**ILLM-501****Human Gross Anatomy**

An in-depth study of the structure of the human body. Emphasis is on understanding the relationships between anatomical structures as well as their form, texture, and color. Dissection of a human cadaver is supplemented with lectures on the structure and function of the major organ systems. (MEDS-251 Human Anatomy and Physiology II) **Class 3, Lab 9, Credit 6 (F)**

**ILLM-502****Illustrating Human Anatomy**

Drawings of lab dissections and the skeleton will be translated into illustrations designed to support instruction in Human Gross Anatomy. Course teaches what choices need to be made when translating literal drawings into illustrations that support instruction. The target learner for these illustrations is a student attending Human Gross Anatomy at a graduate level. **Class 0, Studio 5, Credit 3 (F)**

**ILLM-503****3D Modeling of Organic Forms**

This course introduces strategies used to create NURBS and polygonal models of organic subjects in a three-dimensional environment. Assignments stress accurate portrayal of proportions, form, and texture. Instruction will also focus on creating lighting and shader networks that emphasize form and are consistent with surface characteristics. (FDTN-131 3D Design I) **Class 2, Lab 4, Credit 3 (F)**

**ILLM-506****3D Animation of Organic Forms**

This course explores animating biomedical subjects and processes in their native environment. Students will be ask to research contemporary theory defining their subjects' anatomy and create animations consistent with their findings. Frame by frame animation, blend shapes, non-linear deformers and rigging systems will be introduced to permit students to choose the most effective method for creating motion and transformation. (ILLM-503 3D Modeling of Biomedical Forms) **Class 2, Lab 4, Credit 3 (S)**

**ILLM-507 Computer Applications in Medical Illustration**  
Students will learn to use industry-standard raster and vector illustration software to create images of assigned medical subjects. Students will also use page layout applications to combine digital images with text and other graphic elements. Course work emphasizes creation of illustrations to support medical education and publishing. (FDTN-112 Drawing II, FDTN-122 2D Design II, MEDG-102 or equivalent) **Class 2, Lab 3, Credit 3 (S)**

**ILLM-508 Scientific Visualization**  
Emerging technologies enable scientists to visualize structures that are otherwise invisible to the naked eye. For example, molecular visualization software allows us to construct highly accurate molecular models from x-ray crystallography and other structural data. Cryo-EM and confocal microscopy are revealing the previously unknown structure of cellular organelles. Medical imaging systems allow us to reconstruct the human body in three dimensions from actual patient data (CT scans, MRI, etc.). This course explores the use of these technologies to provide references for traditional artwork and to export models for digital rendering and animation. (ILLM-501 Human Gross Anatomy, ILLM-507 Computer Applications in Medical Illustration) **Class 2, Lab 3, Credit 3 (S)**

**ILLM-512 Surgical Illustration**  
Students observe live surgical procedures and translate their sketches into finished illustrations that are used in medical training, patient education, and litigation. Demonstrations of sketching and rendering techniques are supplemented with lectures on general surgical principles and common procedures. (ILLM-501 Human Gross Anatomy, ILLM-507 Computer Applications in Medical Illustration) **Class 3, Lab 3, Credit 3 (F)**

**ILLM-515 Contemporary Media I**  
This course is an introduction to two-dimensional computer illustration, animation, and interactive media as they apply to contemporary methods of instruction in medicine and allied health. Students will be assigned topics in health care and develop an interactive lesson to support instruction of their topic. Students will organize these lessons as a website. (ILLM-507 Computer Applications in Medical Illustration) **Class 2, Lab 3, Credit 3 (F)**

**ILLM-516 Contemporary Media II**  
This course continues the development of a student-created website designed to assist teaching topics in medicine and allied health. Advanced topics in two-dimensional computer illustration, animation, and interactive media as they apply to contemporary methods of instruction in medicine and allied health, will be presented. (ILLM-515 Contemporary Media I) **Class 2, Lab 3, Credit 3 (S)**

**ILLM-517 Portfolio and Business Practices**  
This course helps prepare students to enter the workforce in full-time positions or as freelance illustrators. Students create a traditional portfolio, personal identity package, and marketing materials. The course also introduces important business concepts such as copyright, licensing, pricing, contracts, taxation, and formation of a proper business. (ILLM-512 Surgical Illustration) **Class 2, Lab 3, Credit 3 (S)**

**ILLM-599 Medical Illustration Independent Study**  
Medical Illustration Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Medical Illustration Independent Study students must obtain permission of an instructor and complete the Independent Study Permission Form to enroll. (Instructor permission) **Class 0, Studio 0, Credit 1–6 (F, S)**

## School of Design

### 3D Digital Design

**DDDD-101 Introduction to Modeling and Motion**  
This course is an introduction to the representation of form and motion in three-dimensional software. The course focuses on the development of visual and verbal vocabulary as a means of exploring, developing, and understanding composition and motion with digital geometry and in virtual spaces. Topics include the basics of lines, planes, contour, transforming lines into form, composing images with a software camera, interaction of light and surface, perspective, resolution of geometry, and rendering. Perception and visual thinking are emphasized in the development of projects. Projects will include modeling organic and inorganic forms, composition, level of detail, creation of spaces and motion. Structured assignments develop skills in concept generation, basic form making, techniques for creating motion, and craftsmanship. Emphasis is placed on workflow, teamwork, and the technical and aesthetic aspects of each project. **Class 2, Studio 2, Credit 3 (F)**

**DDDD-102 Introduction to Visual Design**  
This course is an introduction to the development of surface materials in three-dimensional software, using the basic concepts covered in Introduction to 3DDG Modeling and Motion. Principles of additive and subtractive color are developed as they relate to the interpretation of physical phenomena within a virtual world. The vocabulary expands to include the interaction of light and surface attributes including: color, relief, specular, transparency, and more. Projects focus on using color, value and texture to enhance the representation of form and space. The basic of node based materials design is introduced. Additional techniques for UV layout are introduced. Concepts are introduced through lectures, discussions, demonstrations, research, assigned projects, and critiques. Assignments develop skills in surface design, lighting and rendering. (DDDD-101 Introduction to Modeling and Motion) **Class 2, Studio 2, Credit 3 (S)**

**DDDD-103 Imaging for 3D**  
This course provides experience in generating images, both still and moving, for use with the 3D software environment. Students learn techniques for drawing perspective and orthographic views as well as cabinet drawings, oblique drawings, and other techniques. Students learn to create curves to import for model creation, to capture images photographically to use as textures, to create wrapping textures, to compile multiple frames into a movie, to merge segments together into a single movie, to record and incorporate audio elements, and to export results to the Web and other media. Students learn to use a green screen to add live elements to their work. **Class 2, Studio 2, Credit 3**

**DDDD-201 Modeling Strategies**  
This course provides extensive coverage of methods for modeling where evaluation of the appropriate modeling method to use in various situations is key. The emphasis in the course is on problem solving. Modeling challenges of various types are incorporated into the projects. With these techniques students create complex models of organic and inorganic forms using many techniques. (DDDD-101 Introduction to Modeling and Motion) **Class 2, Studio 2, Credit 3 (F)**

**DDDD-202 Layers and Effects**  
Students learn to utilize render layers and to create effects using software that makes it possible to incorporate multiple layers of image and audio into a single project. Issues related to integrating images created using different renders is covered. Emphasis is placed on incorporating various elements into a cohesive whole matching lighting and perspective. (DDDD-101 Intro Visual Design; DDDD-103 Imaging for 3D) **Class 2, Studio 2, Credit 3 (S)**

**DDDD-203 Scripting**  
This course covers the use of scripts to control various aspects of three-dimensional environments, models, textures, motion, production workflow and more. Students develop scripts to control particles, models, textures, motion, and interaction with the environment. Additionally students gain experience downloading scripts to micro controllers. (DDDD-101 Intro to Modeling and Motion) **Class 2, Studio 2, Credit 3 (F)**

**DDDD-206 Service Project**  
The course focuses on playing a supportive role in the development of a three-dimensional digital design project from the planning stage, through completion and presentation. Emphasis is placed on working effectively on a team and providing leadership in a supportive team role. Methods for clearly communicating with a client are addressed including sketches, reference images, flowcharts and storyboards. **Class 2, Studio 2, Credit 3 (S)**

**DDDD-207 Lighting, Materials, and Rendering**  
The course focuses on advanced techniques in lighting, materials, and rendering. Students light objects and spaces. They use shading networks to incorporate groups of two-dimensional and three-dimensional textures into realistic and non-photorealistic materials. Students learn to use texture maps instead of detail in models to increase interaction speeds. Textures are to prototype simple models into complex scenes before completion of final geometry. Displacement textures are used to create detail in models. Use of the node-based system to control many aspects of the 3D environment is covered. Use of textures to simulate non-dynamic lights and shadows is introduced. Planning for the economical use of textures and for the replacement of models with texture maps in level of detail (LOD) situations will be addressed as well. Students learn to design effective render layers. They learn the strengths and weaknesses of various renderers and are able to make effective judgments about which renderer to use in a given situation. (DDDD-202 Layers and Effects) **Class 2, Studio 2, Credit 3 (S)**

**DDDD-208** **Anatomical Figure Drawing**  
Lessons introduced in lecture will be applied during figure drawing sessions. These lessons describe a proportion system developed by Robert Beverly Hale to define the human skeleton. After studying the skeleton, the course focuses on all major muscle groups and their influence on the human form. **Class 3, Lab 3, Credit 3 (S)**

**DDDD-301** **Professional Practice**  
The course focuses on preparing students to enter the professional world. Projects include the development of a resume, cover letter, artist's statement, bio, and portfolio. Focus is placed on submitting work to competitions, both visual and written, related to their work. **Class 3, Studio 0, Credit 3 (F)**

**DDDD-302** **History of Digital Graphics**  
As a historical overview of computer graphics design, this course covers the development of digitally based graphics and imagery from its pre history to the present. It touches on related technology and the growth of the computer industry. Major pioneers and their contributions are reviewed. The course traces the use of digital technology in the creation of graphics for design, interactive media, fine art, animation, visualization, and performance. **Class 3, Lab 0, Credit 3 (F)**

**DDDD-306** **Project Planning and Production**  
In this course students learn to develop design documents, time lines, budgets, marketing plans, and supporting material for potential projects. A project of their own design is then fully implemented and presented at the end of the term. **Class 2, Studio 2, Credit 3 (S)**

**DDDD-323** **Hard Surface Modeling**  
The course focuses on designing and constructing hard surface models including machinery, furniture, vehicles, electronics, and robots. Students explore the use of different modeling techniques in the process and are particularly interested in the flow of the topology within the geometry. Some attention is given to creating controls for moving the hard surface models. (DDDD-201 Modeling Strategies) **Class 2, Studio 2, Credit 3 (F)**

**DDDD-401** **Senior Thesis Testing and Documentation**  
The course focuses on implementing a three-dimensional digital design project from the planning stage, through completion and presentation. By the end of the term the student will have completed most of the project and have made all of the aesthetic decisions relative to the project in preparation for an intense critique at the end of the semester. (Corequisite DDDD-402 Senior Thesis I) **Class 3, Studio 0, Credit 3 (F)**

**DDDD-402** **Senior Thesis I**  
The course focuses on implementing a three-dimensional digital design project from the planning stage, through completion and presentation. By the end of the term the student will have completed most of the project and have made all of the aesthetic decisions relative to the project in preparation for an intense critique at the end of the semester. (Corequisite DDDD-401 Senior Thesis Testing and Documentation) **Class 6, Studio 0, Credit 3 (F)**

**DDDD-403** **Senior Thesis II**  
The course focuses on the completion of a major three-dimensional digital design project from the planning stage, through completion and presentation. Based on the feedback received in the critique at the end of the previous term, students refine and complete their project and prepare to submit their work to competitions and integrate it into their portfolio. (DDDD-402 Senior Thesis I) **Class 3, Studio 0, Credit 3 (S)**

**DDDD-498** **3D Digital Design Internship**  
This course exposes students to the professional environment through outside job opportunities in at places of employment that utilize 3D software for various applications and other acceptable organizations. Students will work under the guidance of art directors, technical directors, or other professionals in the field and perform creative work that is educational and meaningful for their short-term academic goals as well as their long-range career preparation. Documentation of the experience is required and final review from employer is required documenting the kind and quality of work performed. Students must obtain pre-approval of their department and complete the Internship Approval Form. Credit earned is used toward elective or major elective credits. (Department permission) **Class 0, Studio 0, Credit 1-6 (F, S)**

**DDDD-499** **3D Digital Design Co-op**  
The 3D Digital Design Co-op will provide students with the option to work in the 3D digital design field. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. 3D Digital design co-ops must be approved and sponsored by a faculty adviser. (Permission of department) **Class 0, Lab 0, Credit 0 (F, S)**

**DDDD-516** **Advanced Studio**  
This course focuses on students working more independently to explore an area of three-dimensional digital design not covered in other course work. Students will work closely with the instructor to research and complete tutorials in a new area. They will develop skills in that area and then create a tutorial explaining what they have learned. They will present what they have learned to the rest of the class as a means of extending their knowledge into specialized areas that are not covered in other course. Students must have an area of exploration defined in writing in advance of enrolling in the course, which must be approved by the instructor. This course is repeatable. **Class 2, Studio 2, Credit 3 (F, S)**

**DDDD-517** **Experimental Workshop**  
The course focuses on implementing, advanced, newly developing ideas in three-dimensional computer graphics. The specific topic varies and is determined by the instructor. A specific course outline is provided each time the course is taught. Potential topics include the creation of interactive installations, game asset design, digital performances, cyber fashion, network art, locative media, scientific visualization, information visualization, event design, projection design, or any new area in digital design. This course has a subtopic and may be repeated with different subtopics. (DDDD-202 Modeling Strategies) **Class 2, Studio 2, Credit 3 (F, S)**

**DDDD-521** **Character Design and Rigging**  
This course covers first the design of characters and then the creation of them using three-dimensional software, inverse kinematics, parent and rigid binding, bones, and deformers. Students design characters using techniques like interpretant matrices, model sheets, sketches, and maquettes followed by development of the actual character in software. Characters are designed for incorporation into motion graphics, games, real time applications, performance, or visualization. (DDDD-201 Modeling Strategies) **Class 2, Studio 2, Credit 3 (F)**

**DDDD-522** **Environment Design**  
This course covers modeling techniques useful in developing environments, both interior and exterior. The content of the course covers proportions appropriate to a variety of environments, lighting for spaces, surface design to replicate real world materials, and building to an appropriate level of detail for the circumstance. (DDDD-201 Modeling Strategies) **Class 2, Studio 2, Credit 3 (F)**

**DDDD-526** **Physical Interface Design**  
This course covers the use of basic electronics so that students can develop embedded systems or controllers for games, design environments with ambient intelligence, design interactive museum exhibits and point of purchase installations, or embed electronics in clothing. Students use micro controllers, sensors, switches, lights, and motors to implement their designs. **Class 2, Studio 2, Credit 3 (S)**

**DDDD-527** **Real Time Design**  
In this course students design levels for games or virtual worlds for a variety of applications. Once the design is complete, the design is implemented using high-end three-dimensional software. In many cases the projects will be large and will be executed by teams of students. Versioning systems will be used to keep track of the most recently developed assets. Models are imported into real time software engines for manipulation. (DDDD-322 Environment Design) **Class 2, Studio 2, Credit 3 (S)**

**DDDD-528** **Simulating Natural Phenomena**  
In this course students use learn to simulate gasses, liquids and forces as well as develop complex organic systems in natural environments. Students employ particle systems, physics engines, l-systems, and software designed especially for developing richly detailed natural environments. The content of the course encompasses both modeling natural environments and also phenomena in motion; such has windstorms, fire, cloth, hair, fur, and water. (DDDD-207 Lighting, Materials, and Rendering) **Class 2, Studio 2, Credit 3 (S)**

**DDDD-599****3D Digital Design Independent Study**

3D Digital Design Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. 3D Digital Design Independent Study students must obtain permission of an instructor and complete the independent study permission form to enroll. (Instructor permission) **Class 0, Studio 0, Credit 1-6 (F, S)**

**Graphic Design****GRDE-106****2D Graphic Design**

Introduction to basic visual communications in the field of graphic design. Lectures will cover graphic design topics and information ranging from typographic terminology and design principles to methods of visual organization. Assignments will be undertaken in the studio where hands-on introduction to graphic design studio skills and practices will occur. Through formal studies and perceptual understanding, including aesthetics, graphic form and structure, concept development problems and visual organization, students will design solutions to visual communication problems. Assignments will explore aspects of graphic imagery, typography, hierarchy, and layout. Students will refine their computer skills through applications requiring digital formats. (FDTN-121 2D Design I; FDTN-111 Drawing I; corequisite GRDE-107 Time-Based Design) **Class 2, Lab 3, Credit 3 (S, Su)**

**GRDE-107****Time-Based Design**

This course is an introduction to the concepts, principles and techniques of time-based design. Planning and organization methods, kinetics, animation principles, sequencing, composition, visual variables, and forms of narrative will be studied and applied to specific design projects. This course will incorporate both traditional and digital design based projects. Projects will introduce imagery and/or typography components, storyboard planning, and computer-based applications as they apply to design problem solving. (FDTN-121 2D Design I, FDTN-111 Drawing I; corequisite GRDE-106 2D Graphic Design) **Class 2, Lab 4, Credit 3 (S, Su)**

**GRDE-201****Typography**

This course is an introduction to the fundamental principles of typography (the visual representation of language) to effectively convey information and ideas to specific audiences. This course also builds on the brief basic introduction of typography that is integrated into the 2D Graphic Design course. Focus is on the communicative function and aesthetic nature of typographic problem-solving. Exercises help students understand typographic hierarchy, grid structure, form and communication. Lectures cover typographic terminology and anatomy, history of typography as well as type classification, type measurement, and issues of legibility and readability. Once students have been introduced to the fundamentals of typography, they will include imagery as appropriate. Students will also refine their skills in using relevant software. (GRDE-106 2D Graphic Design; corequisite GRDE-202 Design Imagery) **Class 2, Lab 3, Credit 3 (F, Su)**

**GRDE-202****Design Imagery**

This course focuses on the understanding, creation and selection of imagery within visual communication contexts. Students' design process skills will be enhanced through the exploration of symbolism, concept development, composition, scale, cropping and manipulation of various modes of imagery, and the integration of imagery and typography for message-making purposes. The course will also cover introductory principles, theory and terminology related to symbolic graphic representations such as graphic marks (logos, trademarks, etc.) employed within branding and corporate identity systems, and pictograms and icons used within environmental way-finding and on-screen digital contexts. Students will also refine their skills in using relevant software. (GRDE-106 2D Graphic Design; corequisite GRDE-201 Typography) **Class 2, Lab 3, Credit 3 (F, Su)**

**GRDE-205****History of Graphic Design**

This course is a thematic approach to the history of graphic design and provides a necessary historical basis for students in the graphic design program. The course involves lectures on design history, pioneering Modernist designers, design from other countries, exemplars from the field, all set in a wider historical context. Lectures are complemented by guest speakers, videos, participatory exercises, discussion, and critical essay writing. (ARTH-136 Survey Western Art and Architecture II) **Class 3, Studio 0, Credit 3 (F)**

**GRDE-206****Typography and Imagery**

Students expand upon the principles of grid theory, text and display typography, sequence, page layout, and type and image integration as they relate to a range of design applications: posters, instructional materials, brochures, magazines, books, etc. Visual organization and message communication are stressed. This course builds upon the content taught in Typography and Design Imagery courses. Appropriate layout and imaging software skills are integrated. (GRDE-201 Typography and GRDE-202 Design Imagery) **Class 2, Lab 3, Credit 3 (S)**

**GRDE-207****Interactive Media Design**

This course is an introduction to the concepts, uses, and general principles of interactive media on the computer. The course will explore several planning and organizing methods and how they can be used in this design process. Concepts and principles in site design, page design, interface design, and usability will be studied and applied to interactive projects. Students will be encouraged to explore highly structured as well as highly experimental approaches to merging content with interactive design. Aspects of social-cultural issues in new media will be incorporated. (GRDE-201 Typography and GRDE-202 Design Imagery) **Class 2, Lab 4, Credit 3 (S)**

**GRDE-301****Information Design**

This course explores the importance of reader and user responses to written and visually presented information. Problem-solving, functional requirements, information transmission, accessibility and design structure are integrated while investigating a variety of formats (i.e. charts, diagrams, business forms, tables, maps, instructional materials, wayfinding systems, and technical data.) Applied problems are solved through principles of language, structure, diagrammatic interpretation and the visual display of information. Solutions will be developed for both print media and digital use (i.e., mobile devices, computer screens, kiosks, etc.). (GRDE-206 Typography and Imagery) **Class 2, Lab 3, Credit 3 (F)**

**GRDE-302****Web and User Interface Design**

This course is an introduction to the planning, design, and production of interactive projects that are Web-based. Students will be introduced to Web design concepts and principles in site design, page design, graphical user interface design, and usability. The course will include instruction in building pages and creating interactive functions with HTML, CSS, and Web production software. Students will be encouraged to explore highly structured as well as highly experimental approaches to merging content with interactive design. The course will also incorporate social-cultural issues in new media. (GRDE-206 Typography and Imagery) **Class 2, Lab 4, Credit 3 (F)**

**GRDE-306****Professional Practices**

Students will learn about strategies to obtain internships and permanent employment in the graphic design profession. Emphasis will be placed on learning about the various types of positions available to designers, the designer/client relationship, business aspects of design, and professional ethics and expectations. Information about promotional materials, including resume and portfolio design, and implementation will be covered in order to prepare students to present themselves and their work effectively and professionally. (GRDE-301 Information Design and GRDE-302 Web and User Interface Design) **Class 2, Studio 3, Credit 3 (S)**

**GRDE-307****Design Systems and Methodology**

This course provides students with conceptual, organizational and systematic problem-solving methods to create unified and effective design systems using multiple components. Research, concept generation, visual symbolism and other methods will be used to establish a common framework to create applied systems. The value and roles of constants and variables in design development and implementation are explored. Effectiveness of solutions is determined through the use of selected evaluation methods within key phases of each project. Visual and verbal articulation is emphasized in relation to systems explanations and integration. Design writing, professionalism and technical proficiency are also stressed. (GRDE-301 Information Design and GRDE-302 Web and User Interface Design) **Class 2, Lab 3, Credit 3 (S)**

**GRDE-308****Environmental Graphic Design**

This course focuses on design problem-solving for three-dimensional spaces and environments with the purpose of directing and/or informing identified audiences. Conceptual development and final design solutions are developed to assist users in negotiating through various interior and exterior environments. Topics include: communication theory, ergonomics and human factors, visual aesthetics, and design methodology. Areas of application may include: architectural graphics, signage systems, mapping, exhibit design, themed museum experiences, and dynamic environments. Two-dimensional, three-dimensional, and digital design attributes are incorporated using appropriate materials and software for both physical and interactive solutions. (GRDE-301 Information Design; and GRDE-302 Web and User Interface Design) **Class 2, Lab 3, Credit 3 (S)**

**GRDE-322****Women Pioneers in Design**

This course will center on the contributions made by Modernist women designers. Emphasis will be placed on their design works, their design process and the nature of their unheralded pioneering efforts. Exemplars from the field will be presented, set in a historical context. Lectures are complemented by guest speakers, videos, participatory exercises, discussion, and critical essay writing. **Class 3, Studio 0, Credit 3 (S)**

**GRDE-326****20th Century Editorial Design History**

This course is a thematic approach to the history of magazine design and provides a necessary historical basis for students in the visual arts and design. The course involves lectures on editorial designers, other pioneering Modernist designers, and design from other countries. Exemplars from the field are presented, set in a wide historical context. Lectures are complemented by guest speakers, videos, participatory exercises, discussion, and critical essay writing. **Class 3, Studio 0, Credit 3 (S)**

**GRDE-367****Graphic Design in Film**

An interdisciplinary design history course that will afford students the opportunity to critically study the history of graphic design through viewing seminal motion pictures. Students will be required to view films, write essays on film themes and participate in discussions about the films. Lectures will complement the film showings. **Class 3, Studio 0, Credit 3 (F or S)**

**GRDE-401****Collaborative Design**

This course offers students the opportunity and challenge of working on interdisciplinary and multidisciplinary teams to create professional level projects, which are collaborative, competitive and cooperative in structure and implementation. The content of the course will vary depending upon faculty expertise and coordination between departments, schools and colleges, as well as possible outside non-profit clients. (GRDE-308 Environmental Graphic Design; GRDE-307 Design Systems and Methodology and GRDE-306 Professional Practices) **Class 2, Studio 3, Credit 3 (F or S)**

**GRDE-402****Senior Capstone Project**

This course offers students the opportunity and challenge of working either individually or on interdisciplinary/multidisciplinary teams to create professional a quality project, which is collaborative, competitive and cooperative in structure and implementation. The content of the course work will vary depending upon the students' focus/direction and approval from faculty member. This course allows for a culmination of the students' knowledge in graphic design by applying it to a complete comprehensive capstone project. A final formal presentation is required. (GRDE-401 Collaborative Design and GRDE-421 Branding and Identity Design) **Class 2, Studio 3, Credit 3 (S)**

**GRDE-418****Editorial Design**

This course will explore the role of a graphic designer/art director in developing effective and innovative communication for editorial design. Students will work on interdisciplinary teams (with photographers and/or illustrators) to create visual solutions for in-class projects and/or a magazine produced by the class. Design development processes and aspects of production methods will be implemented. (GRDE-306 Professional Practices and GRDE-308 Environmental Graphic Design) **Class 2, Studio 3, Credit 3 (F or S)**

**GRDE-421****Branding and Identity Design**

This course provides an overview of branding and identity design as an integrated study within the field of graphic design. Past and present corporate design and branding models will give students historical background as well as explore current and future trends. Corporate identity and graphic standards will be studied in depth as the cornerstone of branding. Students will produce a comprehensive branding/identity systems project using design development processes and implementation. (GRDE-306 Professional Practices and GRDE-308 Environmental Graphic Design) **Class 2, Studio 3, Credit 3 (F)**

**GRDE-422****Advanced Interactive Media and Web Design**

This course covers advanced Web and interactive media design concepts, principles and processes. Students develop and refine skills in project planning, site design, page design, graphical user interface design, and usability through applied projects. Students will be encouraged to explore highly structured as well as highly experimental approaches to merging content with interactive design. The course will also incorporate social-cultural issues in new media. (GRDE-302 Web and User Interface Design) **Class 2, Lab 4, Credit 3 (F or S)**

**GRDE-423****Advanced Information Design**

This course is an advanced exploration of the importance of reader and user responses to written and visually presented information. The aims are to instill a broader awareness and a deeper appreciation for information design and to help develop a more critical eye for affecting the transmission and reception of information. It is also to help students develop as much concern for what a design does as for how a design looks. Problem-solving, functional requirements, information transmission, accessibility and design structure are integrated while investigating a variety of formats (i.e. charts, diagrams, business forms, tables, maps, instructional materials, wayfinding systems, and technical data.) Advanced applied problems are solved through principles of language, structure, diagrammatic interpretation and the visual display of information. Solutions will be developed for both print media and digital use (i.e., mobile devices, computer screens, kiosks, etc.). (GRDE-301 Information Design and GRDE-308 Environmental Graphic Design) **Class 2, Studio 3, Credit 3 (F or S)**

**GRDE-428****Advertising Design**

This course will explore the role of the graphic designer in developing communicative design for advertising. Emphasis will be placed on effective communication of the client's message and concept development. Advertising will be addressed in a broad context and the content of the course will include the relationship and use of typography, photographic imagery and layout for advertising impact. Certain sections of this class will work with an upper level advertising photography class or on all projects in order to better understand and experience the working relationship between the photographer and the designer, particularly in regard to advertising design. Some projects will be with outside clients, such as non-profit organizations or the Ad Council. (GRDE-306 Professional Practices and GRDE-308 Environmental Graphic Design) **Class 2, Studio 3, Credit 3 (F or S)**

**GRDE-431****Packaging Design**

This senior level graphic design course focuses on the design of physical packaging for the protection and marketing of goods. Aspects of visual, structural, ergonomic and environmental issues are considered in the design of rigid and flexible containers. Taught as a team/collaborative course, students from graphic design, packaging science, and industrial design will work together to develop effective packaging design solutions. (GRDE-308 Environmental, Graphic Design; GRDE-307 Design Systems and Methodology and GRDE-BFA YR4) **Class 0, Studio 6, Credit 3**

**GRDE-448****Senior Internship**

This course exposes students to the professional environment through outside job opportunities in graphic design studios, advertising agencies, corporate communications departments and other acceptable organizations. Students will work under the guidance of art directors, creative directors, senior graphic designers or marketing communications managers and perform creative work that is educational and meaningful for their short-term academic goals as well as their long-range career preparation. Students will obtain pre-approval from their faculty adviser in advance of serving the internship. Documentation of the experience is required and final review from employer is obtained. Faculty adviser will meet with the student upon completion for final evaluation for a grade. (Instructor permission) **Class 0, Studio 0, Credit 3 (F, S)**

**GRDE-458****Graphic Design Internship**

This course exposes students to the professional environment through outside job opportunities in graphic design studios, advertising agencies, corporate communications departments and other acceptable organizations. Students will work under the guidance of Art Directors, Creative Directors, Senior Graphic Designers or Marketing Communications Managers and perform creative work that is educational and meaningful for their short-term academic goals as well as their long-range career preparation. Documentation of the experience is required and final review from employer is obtained. The appointed faculty adviser will meet with the student upon completion for final evaluation for a grade. Students must obtain pre-approval of their department and complete the internship approval form. Credit earned is used toward elective credits. (Department approval) **Class 0, Studio 0, Credit 1-6 (F, S)**

**GRDE-499****Graphic Design Co-op**

The Graphic Design Co-op will provide students with the option to work in the graphic design/visual communication field. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. Co-ops must be approved and registered with the Career Services/Co-op office. (GRDE-BFA YR 2-4 with department approval) **Class 0, Lab 0, Credit 0 (F, S, Su)**

**GRDE-599** **Graphic Design Independent Study**  
Independent Study will provide students with the ability to focus in a specialized area of graphic design with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. The Independent Study student must obtain permission of an instructor and department by completing the independent study proposal form to enroll. (GRDE-BFA YR 3-4 with permission of instructor) **Class 0, Studio 0, Credit 1-6 (F, S)**

## Industrial Design

**IDDE-102** **Design Drawing**  
This course is an introduction to drawing objects and three-dimensional space. Students will understand and use the basics of perspective sketching, developing grids and mechanical perspective and orthogonal views. (FDTN-111 Drawing I) **Class 0, Studio 6, Credit 3, (S)**

**IDDE-201** **Sophomore ID Studio I**  
This studio course focuses on experimentation and discovery through the exploration of creative problem solving techniques. Students explore the dynamics between objects and the user's senses and emotions. Using drawing, sketch-modeling and basic shop skills, students are exposed to the wide choice of materials industrial designers use to move their projects forward. Concepts of recycling and reuse are introduced, as well as other philosophical design approaches such as historical examples and material culture. Emphasis is placed on the improvement of craft in the execution of projects. Stress is placed on evoking clarity and promoting professionalism in practices. (FDTN-122 2D Design II, FDTN-132 3D Design II and IDDE-102 Design Drawing) **Class 0, Studio 6, Credit 3 (F)**

**IDDE-202** **Sophomore ID Studio II**  
In this course, design projects are conceived as the result of close contact between students and real-world sponsors in the manufacturing sector. Students work with a specific manufacturing entity in order to understand its capabilities. Research is conducted in the field and shared within the classroom to enhance the understanding of the realities associated with production. Students are challenged to improve their ability to define problems, generate and promote concepts, evaluate their work and offer refinements of solutions. In short, they will learn to derive inspiration from the material world and marketplace while simultaneously bringing inspiration to it. (IDDE-201 Sophomore ID Studio I) **Class 0, Studio 6, Credit 3 (S)**

**IDDE-206** **ID Form**  
ID form emphasizes the cognitive and the technical skills necessary to manipulate material for the accurate three-dimensional communication of design intent. Projects focus on understanding the relationship of materials, manufacturing processes, products and the user. (FDTN-132 3D Design II) **Class 0, Studio 6, Credit 3 (F)**

**IDDE-207** **ID Digital Drawing**  
This visualization course develops more advanced analog and digital visualization techniques, while expanding on graphic and three-dimensional components needed to create effective presentations and the workflows to achieve them. Assignments will expose students to various types of digital techniques, using vector and raster-based software applications and a variety of input and output devices for the creation of professional level assignments. (IDDE-102 Design Drawing) **Class 0, Studio 6, Credit 3 (F)**

**IDDE-211** **Human Factors Applications**  
This course emphasizes human characteristics, capabilities and limitations as the primary design criterion in understanding, designing and analyzing systems, displays, controls, tools, and workstations. (IDDE-201 Sophomore ID Studio I) **Class 3, Studio 0, Credit 3 (S)**

**IDDE-212** **Integrated CAD**  
Develop the skills needed to effectively develop and communicate design concepts graphically, digitally and three-dimensionally, consistent with professional industrial design practice standards. Emphasis is placed on the development, integration and application of Computer Aided Design (CAD) skills throughout the assignments, utilizing the relationship of analog and digital mediums as a means of enriching the design process. (IDDE-207 ID Digital Drawing) **Class 0, Studio 6, Credit 3 (S)**

**IDDE-221** **History of Industrial Design**  
This course explores the history of the industrial design profession as it evolved in response to the Industrial Revolution and industry's need for standardized approaches to aesthetics and design for the end user. Significant designers and their work are reviewed in the context of the economics and politics of the times. This course also surveys the history of modern furniture design from the late 19th Century to the present, including important design movements, individual designers and their significant furniture designs. (ARTH-136 Survey of Art and Architecture II) **Class 3, Studio 0, Credit 3 (F)**

**IDDE-223** **History of Modern Furniture**  
A study of Modern furniture and its most significant designers. Factors of style, materials, construction and ergonomics are examined in the context of time, place and purpose. (ARTH-136 Survey of Western Art and Architecture II) **Class 3, Studio 0, Credit 3, (S)**

**IDDE-301** **Junior ID Studio I**  
Students will explore the benefits and challenges of working with a design team to address a complex product, problem, or system. Students will explore group dynamics, creativity in design teams, as well as the nature of complex problems and the various methods required to solve them. (IDDE-202 Sophomore ID Studio II and IDDE-211 Human Factors Applications and IDDE-212 Integrated CAD) **Class 0, Studio 6, Credit 4 (F)**

**IDDE-302** **Junior ID Studio II**  
This course will highlight the application of design methods and processes through projects that focus on deepening the students' problem-solving skills, studio skills (two- and three-dimensional sketching, drawing, CAD), shop skills (modelmaking) and presentation skills. Emphasis will be placed on collaborating with multidisciplinary partners outside the industrial design program, and/or, when circumstances allow, with external resources such as clients or project sponsors. (IDDE-301 Junior ID Studio I) **Class 0, Studio 6, Credit 4 (F)**

**IDDE-306** **Materials and Processes**  
This course is designed to help students develop a theoretical understanding and technical competency in materials and processes applications as commonly applied in industrial design practice. Discussions and assignments focus on the relationship of manufacturing processes and materials selection to design intent. (IDDE-202 Sophomore ID Studio II and IDDE-211 Human Factors Applications and IDDE-212 Integrated CAD) **Class 3, Studio 0, Credit 3 (F)**

**IDDE-307** **Graphic Tactics**  
This course provides industrial design students with an introduction to the design and application of graphic elements to objects and environments. (IDDE-202 Sophomore ID Studio II and IDDE-211 Human Factors Applications and IDDE-212 Integrated CAD) **Class 0, Studio 6, Credit 3 (F)**

**IDDE-311** **ID Career Planning**  
This course is an introduction to the business of design. Field trips, guest lecturers and discussion of current trends help students understand the various employment opportunities for the design professional. Students will explore careers within industrial design and define their professional aspirations. The course will also cover the mechanics of job searching, creating a resume, cover letter, portfolio and interviewing to help prepare for design internships. (IDDE-302 Junior ID Studio I and IDDE-306 Material and Processes) **Class 3, Studio 0, Credit 3 (F)**

**IDDE-359** **Fabrication Techniques**  
This course provides industrial design students with an introduction to the application of various additive and subtractive fabrication methodologies, techniques and technologies. (IDDE-301 Junior ID Studio I and IDDE-306 Materials Processes) **Class 0, Studio 6, Credit 3 (F, S)**

**IDDE-406** **Professional Practice**  
An in-depth look at business of design, and employment as a design professional for students beginning the job search. Students will refine their résumé cover letter, and portfolio developed in Professional Practice I as they identify career options through research and networking with professionals in their chosen area. Students will explore the financial and legal aspects of employment in the design business. (IDDE-302 Junior ID Studio II and IDDE-311 Career Planning) **Class 3, Studio 0, Credit 3 (F)**



**IDDE-407**

This is the first course in a two-course sequence in which an industrial design thesis project is developed. Focus is on establishing content, planning, scheduling and research of a thesis project that explores the social elements of design either in a collaborative design process, or in the broader social impact of design decisions. Early stages of thesis development include ideation, concept refinement and evaluation. The thesis project is approved by a faculty committee. (IDDE-302 Junior ID Studio II and IDDE-311 Career Planning) **Class 0, Studio 6, Credit 3 (F)**

**ID Senior Thesis I****IDDE-408**

This is the second course in a two-course sequence in which an industrial design thesis project is developed. Focus is on finalizing design solution, presenting it in a thesis show, and creating a written document that addresses how the theories and methods used in the project have an impact on the current and future state of design in society. The thesis project is approved by a faculty committee. (IDDE-407 ID Senior Thesis I) **Class 0, Studio 6, Credit 3 (S)**

**ID Senior Thesis II****IDDE-498**

The Industrial Design Internship provides students the option to work in the industrial design field. Students must obtain permission of an instructor and complete the internship permission form to enroll. (Fourth-year standing and the permission of instructor) **Class 0, Studio 0, Credit 1-6 (F, S)**

**Industrial Design Internship****IDDE-499**

The industrial design co-op provides students the option to work full time in the industrial design field. (Minimum third-year standing and permission of instructor) **Class 0, Studio 0, Credit 0 (F, S, Su)**

**Industrial Design Co-op****IDDE-501**

This course will explore the application of design methods and skills to projects addressing large-community and global problems requiring team-based, trans-disciplinary collaborations. (IDDE-302 Junior ID Studio II and IDDE-311 Career Planning) **Class 0, Studio 6, Credit 4 (F)**

**Senior ID Studio I****IDDE-502**

The application of design methods and skills to advanced level projects addressing users with unique, non-traditional needs requiring multi-disciplinary collaborations. Project development will emulate processes used in professional industrial design practice. (IDDE-501 Senior ID Studio I) **Class 0, Studio 6, Credit 4 (S)**

**Senior ID Studio II****IDDE-599**

Industrial Design Independent Study provides students the means to study in a specialized area with an individual faculty member. With the assistance of their faculty advisers, students, will propose a course of study. Students must obtain permission of an instructor and complete the independent study permission form to enroll. (3.0 GPA and permission of instructor) **Class 0, Studio 0, Credit 1-6 (F, S)**

**Industrial Design Independent Study****Interior Design****INDE-102**

Fundamental concepts of graphic communication conventions and skills are taught in this course. Skill development will be both manual and computer based and range from spontaneous free-hand sketching to formal 3-D computer modeling. Principles of orthographic projection, paraline drawings, and perspective will be covered. (FDTN-111 Drawing I) **Class 2, Studio 4, Credit 3 (S)**

**Design Drawing I****INDE-201**

The course will introduce students to theory and methodology, of creating interior space. It will also introduce Americans for Disability Act (ADA) accessibility requirements. The course will provide students opportunities to apply the above to a variety of residential, business, and retail uses. (FDTN-122 2D Design II and FDTN-132 3D Design II and INDE-102 Design Drawing I) **Class 1, Studio 5, Credit 3 (F)**

**Introduction to Interior Design****INDE-202**

Graphic communication skills are further developed in order to represent complex geometric forms and space as well as architectural and interior designs. Common drawing conventions of plan, section, and elevation are emphasized; however advanced conceptualization drawing skills are also covered. (INDE-102 Design Drawing I) **Class 2, Studio 4, Credit 3 (F)**

**Design Drawing II****INDE-203**

This course will introduce students to and provide basic skills in digital graphics and publishing. Layout of print and Web-based documents will be the backbone of the course, however this will be augmented with design and typographic principles, image acquisition, and fundamentals of bitmap and vector graphics. **Class 2, Lab 4, Credit 3 (F, S)**

**Digital Graphics****INDE-207**

The course will introduce students to color and lighting. Students will apply principles of light and color to several projects. (INDE-201 Introduction to Interior Design and INDE-202 Design Drawing II) **Class 3, Studio 0, Credit 3 (S)**

**Color and Lighting****INDE-212**

The course will introduce students to Hospitality Design. Students will apply design methods and skills to the design of a restaurant or other designated hospitality design project. (INDE-201 Introduction to Interior Design and INDE-202 Design Drawing II) **Class 2, Lab 3, Credit 3 (S)**

**Hospitality Design****INDE-222**

The course will introduce students the principles and theories of interior design. Topics will include the elements and principles of design, accessibility, human factors, proxemics, integrative design and evidence-based design. Students will complete a series of short projects related to these topics. (INDE-201 Introduction to Interior Design and INDE-202, Design Drawing II) **Class 3, Studio 0, Credit 3 (S)**

**Design Issues****INDE-301**

The course will introduce students to office design. Students will apply design methods and skills for the design of an office. **Class 2, Lab 3, Credit 3 (F)**

**Office Design****INDE-302**

The course will introduce students to design for retail use; image making, merchandise lighting, and integrated graphics utilizing a scale model for study and presentation. (INDE-301 Office Design) **Class 2, Studio 3, Credit 3 (S)**

**Retail Design****INDE-303**

The course will introduce students to materials and specifications for interior design. Students will learn how to select appropriate materials, finishes, equipment and furnishings based on performance, codes, testing, sustainability, indoor air quality, health and safety. **Class 3, Studio 0, Credit 3 (F)**

**Materials and Specifications****INDE-304**

The course will introduce students to building construction materials and processes as applied to wood, steel, concrete and masonry construction; subsystems including windows, doors, hardware and stairs; the application of appropriate interior finishes including floor, base, wall and ceilings, environmental control systems involving water supply, waste water treatment, plumbing, space-heating, ventilation, air-conditioning, electrical, vertical transportation, noise control and acoustic concerns. (INDE-303 Materials and Specifications) **Class 3, Studio 0, Credit 3 (F)**

**Building Systems****INDE-366**

This course will introduce students to the LEED rating system and provide an overview of LEED credits. It will help students understand the importance of designing and constructing LEED. **Class 3, Lab 0, Credit 3 (F)**

**LEED Preparation****INDE-401**

The course will introduce students to multi-story and multi-purpose design, building, zoning, proprietary and zoning codes, and ADA legislation. **Class 1, Studio 5, Credit 4 (F)**

**Multi-Story/Multi-Purpose Design****INDE-402**

The course focuses on projects that may not typically be covered, such as real projects, community service projects or completely theoretical projects. Projects may be as short as one day or as long as six or seven weeks and vary in scope, complexity and intensity. (INDE-401 Multi-Story/Multi-Purpose Design) **Class 2, Lab 3, Credit 3 (S)**

**Special Projects****INDE-403**

The course will introduce students to health care design. Student will work in teams to complete a comprehensive and complex design project, based on a typical medical facility. (Past examples include oncology centers, surgical units, and orthopedic clinics.) (INDE-401 Multi-Story/Multi-Purpose Design) **Class 2, Lab 3, Credit 3 (S)**

**Health Care Design**

**INDE-405 Business Practices and Career Planning**  
This course is an introduction to professional practice with emphasis on business formation; design marketing, legal and ethical responsibilities. It also prepares students for employment by helping them develop career goals, job search skills, a portfolio and resume, and life-long learning awareness. **Class 3, Studio 0, Credit 3 (F)**

**INDE-407 Contract Documents**  
This course will introduce students to and give them a working knowledge in the contract document phase of the design process. While the role of specifications will be presented, the primary focus of the course will be on the production of working drawings. This focus will be from an interior design perspective but with an understanding of how these drawings interface with the entire set of contract documents for a building project. **Class 2, Lab 4, Credit 4 (F)**

**INDE-498 Interior Design Internship**  
The Interior Design Internship will provide students with the option to work in the interior design field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the internship permission form to enroll. **Class 0, Studio 0, Credit 1-6 (F, S, Su)**

**INDE-499 Interior Design Co-op**  
The Interior Design Co-op will provide students with the option to work in the Interior Design field. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. **Class 0, Studio 0, Credit 0 (F, S, Su)**

**INDE-599 Interior Design Independent Study**  
Interior Design Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser, will propose a course of study. Independent Study students must obtain permission of an instructor and complete the independent study permission form to enroll. **Class 0, Studio 0, Credit 3 (F, S)**

## **New Media Design**

**NMDE-099 New Media Design Recitation**  
The new media recitation is a required one-hour lecture meeting required for all new media courses except for evening courses, NM Career Skills and NMD Team Project. Students will meet within groups that represent all four year levels of the New Media Design major to discuss and share knowledge related to the field and learn how to incorporate skills into their current course work. **Class 1, Lab 0, Credit 0 (F, S)**

**NMDE-101 New Media Design Imaging**  
This project-based course is an investigation of the computer as an illustrative and image generation tool. It develops design skills in raster and vector image creation, editing, and compositing for online production. Emphasis will be on the application of visual design organization methods to electronic media. Students will create and edit images, montages and raster-based design solutions for online delivery. Development and reinforcement of drawing skills in the digital environment will be explored and expanded, as well as pictorial composition and visual aesthetics. **Class 0, Lab 4, Credit 3, (F)**

**NMDE-102 New Media Design Elements I**  
This course introduces the student to visual communication and the new media design profession. Through formal studies and perceptual understanding, including aesthetics, graphic form and structure, concept development and visual organization methods, students will design solutions to communication problems. Assignments exploring aspects of graphic imagery, typography, and production will be included. (NMDE-101 New Media Design Imaging) **Class 0, Lab 4, Credit 3 (S)**

**NMDE-103 New Media Design Interactive I**  
This course provides an introduction to key Internet, Web and multimedia technologies. Topics covered include computer-based communication and information, basic HTML, Adobe Flash and WYSIWYG editors, basic internet applications such as FTP, basic use of digital images, audio and video techniques, Web page design, Web animation for development and publishing. (NMDE-101 New Media Design Imaging) **Class 0, Lab 4, Credit 3, (S)**

**NMDE-201 New Media Design Elements II**  
Information design for static, dynamic and interactive multimedia integrates content with visual indicators. Legibility and clear communication of information and direction is important to the success of any user interface design. This course integrates imagery, type, icons, actions, color, visual hierarchy, and information architecture as a foundation to design successful interactive experiences. (NMDE-102 NMD Elements I) **Class 0, Lab 4, Credit 3 (F)**

**NMDE-202 New Media Design 3D**  
A comprehensive course in visualization that extends previous experience and skills to include three-dimensional creation and design. The course will provide studies in 3D modeling, rendering and animation for use in virtual spaces, rich internet and mobile applications as well as motion graphic design. Digital 3D tools will be used for solving visual design and communication problems. Students will be expected to show evidence of growth in 3D asset creation and usage in the form of simple product renderings, interactive integration and story based animation. **Class 0, Lab 4, Credit 3 (F)**

**NMDE-203 New Media Design Interactive II**  
This course extends previous interactive design and development experience and skills to emphasize interactive design principles and development. The emphasis in this course will be on the creative process of planning and implementing an interactive project across multiple platforms. Students will concentrate on information architecture, interactive design, conceptual creation, digital assets, visual design and programming for interactions. **Class 0, Lab 4, Credit 3, (S)**

**NMDE-204 New Media Design Animation**  
This project-based course provides training and practical experience in producing 2D and 3D animated sequences using off the shelf multimedia software. Students produce a number of short exercises incorporating original computer and non-digital artwork. Topics include key frame and tweening, cycling, acceleration, squash and stretch, backgrounds, inking, rotoscoping, sound, masking, multi-plane effects and space-to-time. Screenings of professionally made films will illustrate and provide historical perspective. (FDTN-141 4D Design) **Class 0, Lab 4, Credit 3, (S)**

**NMDE-301 New Media Design Elements III**  
This course focuses on advanced visual communication within the current new media design profession. Through formal studies and perceptual understanding, including aesthetics, graphic form and structure, concept development and visual organization methods, students will design sophisticated solutions to communication problems. This course integrates imagery, typography, icons, user interface design, content creation and information architecture in order to design successful static, motion and interactive experiences. (NMDE-201 NMD Elements II) **Class 0, Lab 4, Credit 3, (S)**

**NMDE-302 New Media Design Graphical User Interface**  
This course examines the user-centered and iterative design approaches to application and interactive development with a focus on interface design, testing and development across multiple devices. Students will research and investigate human factors, visual metaphors and prototype development to create effective and cutting edge user interfaces. **Class 0, Lab 4, Credit 3, (F)**

**NMDE-303 New Media Design Interactive III**  
A study of the application of information design theory and practice to the developing area of New Media. Cartography and iconography will be viewed in the context of Web and kiosk use. The delivery of consumer information, using interactive and dynamic media as the vehicle, will be investigated. **Class 0, Lab 4, Credit 3, (S)**

**NMDE-305 New Media Design Motion Graphics**  
This course will deal with design concepts related to moving type. The impact of type as it moves, rotates, explodes, scales and fades will be considered. Legibility of the message will be studied in relation to delivery methods. Additional compositing, 3D, camera tracking and special techniques and effects will be introduced during the class. **Class 0, Lab 4, Credit 3, (F)**

**NMDE-401 New Media Career Skills**  
The first part of the course centers on resume development, job searches, interviewing practices and online portfolio generation. The second segment focuses on the business and practices within the new media industry. This will encompass an overview of the designer/developer/client relationships, contracts, estimating, invoicing as well as rights and ethics. The third segment will focus on project workflows and management, team building and concept generation. **Class 0, Lab 4, Credit 3, (F)**

**NMDE-404** **New Media Design Interactive IV**  
Students will create innovative interactive product promotions and installations. The projects created in the class will embrace new technology and will focus on innovative solutions for real world design problems. An emphasis will be placed on researching new technology and using it in conjunction with solid interactive design skills to create innovative projects. **Class 0, Lab 4, Credit 3, (F)**

**NMDE-406** **New Media Design Experimental**  
This project-based course affords the student the ability to apply an experimental approach to integrating digitally generated content with new media techniques and processes in new, imaginative ways. Students will be encouraged to approach the computer as a medium of creativity to explore issues of narrative, identity, place, and visual reality vs. digital reality. Students will exhibit completed projects in a public forum. (NMDE-404 New Media Design Interactive IV) **Class 0, Lab 4, Credit 3, (S)**

**NMDE-408** **New Media Design Virtual Entertainment**  
This course extends previous interactive design and development experience and skills to emphasize interactive design principles and development. The emphasis in this course will be on the creative use of programming to create experimental interfaces, installations and physical computing projects. (NMDE-404 New Media Design Interactive IV) **Class 0, Lab 4, Credit 3 (S)**

**NMDE-411** **New Media Design Team Project**  
This course is designed to engage the New Media major in a capstone production experience. The instructor will form interdisciplinary student teams that will design, plan, prototype, and implement new media projects. Student groups are required to test their product with users and provide written feedback and analysis. (NMDE-401 New Media Design Career Skills) **Class 0, Lab 4, Credit 3, (S)**

**NMDE-498** **New Media Design Internship**  
The New Media Design Internship will provide students with the option to work in the new media or visual communications field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the internship permission form to enroll. **Class 0, Lab 0, Credit 1-3 (F, S, Su)**

**NMDE-499** **New Media Design Co-op**  
At least one cooperative or internship experience is suggested for all New Media Design students prior to graduation. Co-ops are an opportunity for students to gain experience in their field and are generally completed between their third and fourth academic years. Co-ops are full-time or part-time paid positions that are usually eight to 10 weeks in length for a minimum of 20 hours a week in a program-appropriate setting. The RIT Office of Cooperative Education and Career Services assist students in identifying co-op placements and opportunities. **Class 0, Lab 0, Credit 0 (F, S)**

**NMDE-599** **New Media Design Independent Study**  
New Media Design Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser, will propose a course of study. New Media Design Independent Study students must obtain permission of an instructor and complete the independent study permission form to enroll. **Class 0, Lab 0, Credit 1-3 (F, S, Su)**

## School of American Crafts

### Ceramics

**CCER-201** **Ceramics Sophomore I**  
This course will introduce students to wheel throwing techniques as used in functional ware. Emphasis will be placed on designing, preparation, and execution of compositional elements in three-dimensional forms. Students will be encouraged to explore different methods and techniques to compete projects. Materials fee required. **Class 0, Lab 18, Credit 6 (F)**

**CCER-202** **Ceramics Sophomore II**  
This course will introduce students to hand building and mold making techniques as a foundation to create sculptural ceramic vessels. Emphasis will be placed on designing, preparation, and execution of compositional elements in three-dimensional forms. Students will be encouraged to explore different methods and techniques to compete. Materials fee required. (CCER-201 Ceramic Sophomore I) **Class 0, Lab 18, Credit 6 (S)**

**CCER-301** **Ceramics Junior I**  
During this semester, students will be introduced to industrial forming methods of ceramics. Students will develop drawings/proposals and a strategy for production. The students will then produce molds for slip casting as a means to produce multiples of a consistent quality. Students will develop their own slip castings clay bodies, slips and glazes for cone 6-oxidations/reduction firings. Materials fee required. (CCER-202 Ceramics Sophomore II) **Class 0, Lab 18, Credit 6 (F)**

**CCER-302** **Ceramics Junior II**  
The purpose of this course will investigate the properties of the sculptural ceramic vessel to develop the student's personal aesthetic and visual thinking. Assigned projects will evoke the student's imagination and ceramic vocabulary through the relationship between concept, design, form, surface embellishment, and choice of firing methods and glazes. A systematic investigation of ceramic clays, raw materials, glaze materials, glaze composition, and glaze calculation will be presented in lecture and assignments. Materials fee required. (CCER-301 Ceramic Junior I) **Class 0, Lab 18, Credit 6 (S)**

**CCER-498** **Ceramics Internship**  
The Ceramics Internship will provide students with the option to work in the ceramics field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the Internship Permission Form to enroll. Registration with co-op and placement office also required. **Class 0, Lab 0, Credit 1-6 (F, S)**

**CCER-499** **Ceramics Co-op**  
The Ceramics Co-op will provide students with the option to work in the ceramics field or ceramics industry. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. Ceramics co-ops must be approved and sponsored by a faculty adviser. **Class 0, Lab 0, Credit 0 (F, S)**

**CCER-501** **Ceramics Senior I**  
The final semester of the senior year is a continuation for the work begun in the fall. The student's proposal is to be redefined and the work completed from the discussions of the problems relating to the evolving concept of the student. Discussions relating to career choices, job hunting, portfolio, resume writing, operating a studio, merchandising and business practices will coincide with the final exhibition. Materials fee required. (CCER-302 Ceramics Junior II) **Class 0, Lab 18, Credit 6 (F)**

**CCER-502** **Ceramics Senior II**  
This is the second of a two-semester course in which seniors will produce a BFA project and must be able to offer evidence of qualification as a candidate for the baccalaureate degree to be approved by the faculty. The proposed body of work should develop self-expression and a personal direction in clay. The work should express the goals and ideas as well as the materials and processes that are stated in the proposal. Emphasis is on expression and technical foundation needed to establish the role of the body of work. The goal is to produce a coherent body of work of high standards which must be exhibited at a venue at the end of the school year. Materials fee required. (CCER-501 Ceramics Senior I) **Class 0, Lab 18, Credit 6 (F)**

**CCER-520** **Ceramics 2 Credit Elective**  
This is a class specifically designed for non-majors covering the fundamental techniques and aesthetics of working with clay. Topics covered include the forming techniques, clay mixing, basic properties of clay, glazing and firing techniques and fundamental understanding of historical and contemporary practices and applications. The course includes prescribed projects based on the number of studio hours. **Class 0, Lab 4, Credit 2 (F, S)**

**CCER-530** **Ceramics 3 Credit Elective**  
This is a class specifically designed for non-majors covering the fundamental techniques and aesthetics of working with clay. Topics covered include the forming techniques, clay mixing, basic properties of clay, glazing and firing techniques and fundamental understanding of historical and contemporary practices and applications. The course includes prescribed projects based on the number of studio hours. Materials fee required. **Class 0, Studio 6, Credit 3 (F, S)**

**CCER-599** **Ceramics Independent Study**  
Ceramics Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Ceramics students must obtain permission of an instructor and complete the independent study form to enroll. **Class 0, Studio 0, Credit 1-6 (F, S)**

## Furniture Design

### CWFD-201

#### Furniture Design Sophomore I

This is the first of a two-semester sequential class covering the fundamental techniques and aesthetics of woodworking. Topics covered include the care and use of hand tools, the care and maintenance of woodworking power tools, wood as a material, its basic properties, basic joinery and fundamental techniques of wood fabrication, and finishing. The course includes a machine maintenance program. Materials fee required. **Class 0, Studio 18, Credit 6 (F)**

### CWFD-202

#### Furniture Design Sophomore II

This is the second of a two-semester sequential class covering the fundamental techniques and aesthetics of woodworking. Topics covered include the care and use of hand tools, the care and maintenance of woodworking power tools, wood as a material, its basic properties, basic joinery and fundamental techniques of wood fabrication, and finishing. The course includes a machine maintenance program. Materials fee required. (CWFD-201 Furniture Design Sophomore I) **Class 0, Studio 18, Credit 6 (S)**

### CWFD-301

#### Furniture Design Junior I

This is the first of a two-semester sequential class covering intermediate techniques and aesthetics of woodworking. Topics covered include the design process, advanced hand and power tool joinery, intermediate machine processes, chair design and construction and CAD/CAM/CNC introduction. Materials fee required. (CWFD-202 Furniture Design Sophomore II) **Class 0, Studio 18, Credit 6 (F)**

### CWFD-302

#### Furniture Design Junior II

This is the second of a two-semester sequential class covering intermediate techniques and aesthetics of woodworking. Topics covered include the design process, advanced hand and power tool joinery, intermediate machine processes, veneering, drawer, door and solid wood carcass design and construction and CAD/CAM/CNC technology. Materials fee required. (CWFD-301 Furniture Design Junior I) **Class 0, Studio 18, Credit 6 (S)**

### CWFD-498

#### Furniture Design Internship

The Furniture Design Internship will provide students with the option to work in the furniture design or furniture manufacturing field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the internship permission form to enroll. **Class 0, Studio 0, Credit 1-6 (F, S)**

### CWFD-499

#### Furniture Design Co-op

The Furniture Design Co-op will provide students with the option to work in the furniture design or furniture manufacturing field. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. Furniture Design Co-ops must be approved and sponsored by a faculty adviser. **Class 0, Lab 0, Credit 0 (F, S)**

### CWFD-501

#### Furniture Design Senior I

This is the first of a two-semester sequential class covering advanced techniques and aesthetics of woodworking. Topics covered include the design process, advanced woodworking processes, conceptually driven design and construction, development of a capstone project proposal and CAD/CAM/CNC. Materials fee required. (CWFD-302 Furniture Design Junior II) **Class 0, Studio 18, Credit 6 (F)**

### CWFD-502

#### Furniture Design Senior II

This is the second of a two-semester sequential class covering advanced techniques and aesthetics of woodworking. Topics covered include the design process, advanced woodworking processes, professional presentations, conceptually driven design and construction, and the creation of a capstone body of work. Materials fee required. (CWFD-501 Furniture Design Senior I) **Class 0, Studio 18, Credit 6 (S)**

### CWFD-520

#### Furniture 2 Credit Elective

This is a class designed for non-majors, covering a fundamental introduction to techniques and aesthetics of woodworking. Topics covered include the use of select hand tools and woodworking power tools, wood as a material, its basic properties and fundamental processes of wood fabrication. The course includes a prescribed project based on the in-class contact hours. Materials fee required. **Class 0, Studio 4, Credit 2 (F, S)**

### CWFD-530

#### Furniture Design 3 Credit Elective

This is a class designed for non-majors, covering a fundamental introduction to techniques and aesthetics of woodworking. Topics covered include the use of select hand tools and woodworking power tools, wood as a material, its basic properties and fundamental processes of wood fabrication. The course includes a prescribed project based on in-class contact hours (6). Materials fee required. **Class 0, Studio 6 Credit 3 (F, S)**

### CWFD-599

#### Furniture Design Independent Study

Furniture Design Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Furniture Design students must obtain permission of an instructor and complete the independent study permission form to enroll. **Class 0, Studio 0, Credit 1-6 (F, S)**

## General Craft Studies

### CGEN-201

#### Crafts Drawing Practice

This is the first of a two-semester class covering basic freehand sketching and measured drawing techniques for both design and presentation. Topics covered will include a broad range of drawing types, architectural conventions and presentation strategies. The course includes lectures, group discussions, independent study, homework, drawing and oral presentations. Each semester long course is structured as an independent unit. **Class 3, Studio 0, Credit 3 (F)**

### CGEN-202

#### Crafts CADD Drawing

This is the second of a two-semester class covering basic CADD (computer assisted design and drawing) for both design and presentation. Topics covered will include a broad range of drawing types, 3-dimensional modeling and presentation strategies. The course includes lectures, group discussions, independent study, homework, drawing and oral presentations. Each semester long course is structured as an independent unit. (CGEN-201 Crafts Drawing Practice) **Class 3, Studio 0, Credit 3 (S)**

### CGEN-501

#### Crafts Promotional Materials

This is the first of a two-semester class covering topics commonly associated with the operation of a small business in fields related to the fine and applied arts. This one semester course addresses promotional issues including portfolio, photography, resume writing, business cards and stationery, marketing, client relations, etc. Students will create their own comprehensive promotional package. The course includes lectures, group discussions, independent study, studio and business visits, homework, papers, reports, and oral presentations. Each semester long course is structured as an independent unit. **Class 3, Studio 0, Credit 3 (F)**

### CGEN-502

#### Crafts Business Practice

This is the second of a two-semester class covering topics commonly associated with the operation of a small business in fields related to the fine and applied arts. This one semester course addresses issues related to skills assessment, developing a sophisticated business plan, quantitative and qualitative business analysis, marketing, bookkeeping, legal issues and studio operations, etc. The course includes lectures, group discussions, independent study, studio and business visits, homework, papers, reports, and oral presentations. Each semester long course is structured as an independent unit. **Class 3, Studio 0, Credit 3 (S)**

## Glass

### CGLS-201

#### Glass Sophomore 1

This is the first of a two-semester sequential class covering fundamental glass working techniques and processes. Basic solid and blown techniques will be covered in the manipulation of molten glass as well as an orientation to the processes of finishing or further manipulating annealed glass in the cold shop. The course will also introduce the practice of utilizing traditional glass working techniques and processes in developing sculptural work based on ideas that rely on the visual and behavioral properties of glass. Emphasis will be placed on traditional technique, craftsmanship, and problem solving. Materials fee required. **Class 0, Studio 18, Credit 6 (F)**

### CGLS-202

#### Glass Sophomore II

This is the second of a two-semester sequential class covering fundamental glass working techniques and processes. Course emphasis is to further develop the manipulation of hot and cold glass. Additionally, the student will be presented with other methods of glass working through the processes of lampworking and kiln working. Through demonstration and discussion the student's technical capability will broaden into one of versatility and, therefore, allow the student a variety of options in using glass for personal expression. Emphasis will be on technical development, aesthetic analysis, and teamwork. Materials fee required. (CGLS-201 Glass Sophomore I) **Class 0, Studio 18, Credit 6 (S)**

**CGLS-301****Glass Junior I**

This is the first of a two-semester sequential class covering intermediate glass working techniques and processes. The course will build upon previous glass working knowledge and introduce assignments that investigate new alternatives to complex, traditionally-based processes in the hot, cold, flame, and kiln shops. Projects are designed to build a stronger technical palette. Additionally, projects will encourage students to research and integrate issues of personal interest and source material to inspire innovative pursuits and/or incorporations of conventional techniques and processes. Emphasis will be on the process of ideation, experimentation, and exploration. Material fee required. (CGLS-202 Glass Sophomore II) **Class 0, Studio 18, Credit 6 (F)**

**CGLS-302****Glass Junior II**

This is the second of a two-semester sequential class covering intermediate glass working techniques and processes. Course emphasis is to further build upon previous glass working knowledge within the hot, cold, flame, and kiln shop to solve aesthetic and conceptual problems posed through regularly assigned topical projects. Students will apply new technical skills to self-generated projects and build a body of work that reflects the student's specific interests within a sculptural context. The student's focus will be on developing a personally relevant voice as an artist whilst expanding upon the student's technical arsenal of capabilities. Emphasis will be on a continued pursuit to innovatively approach traditional processes of glass working with the utmost of craftsmanship. Material fee required. (CGLS-301 Glass Junior I) **Class 0, Studio 18, Credit 6 (S)**

**CGLS-498****Glass Internship**

Glass Internship is a course that offers students the chance to take advantage of professional opportunities as they arise during their graduate studies. This course is structured on the basis of the individual student's needs, interests and background preparation as they may be determined through faculty counseling. This course leads to the master's thesis, proposed by the student and approved by the faculty. Registration with co-op and placement office is required. **Class 0, Studio 0, Credit 1-6 (F, S)**

**CGLS-499****Glass Co-op**

This course will examine professional opportunities present outside the major studio at RIT or other studios or educational institutions. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. Glass co-ops must be approved and sponsored by a faculty adviser. **Class 0, Lab 0, Credit 0 (F, S)**

**CGLS-501****Glass Senior I**

This is the first of a two-semester sequential class to aid the student in beginning the development of their thesis body of work. The student will articulate both a written and verbal proposal for a cohesive body of work. Advanced techniques will be demonstrated with an emphasis on acquiring skill and refinement of craftsmanship. Strong emphasis is placed on studio practice, material sensibility, excellent craftsmanship and idea development. Materials fee required. (CGLS-302 Glass Junior II) **Class 0, Studio 18, Credit 6 (F)**

**CGLS-502****Glass Senior II**

This is the second of a two-semester sequential class to aid the student in finalizing the development of their thesis body of work. The student will be guided by their written and verbal proposal for a cohesive body of work. Advanced techniques will be demonstrated with an emphasis on acquiring skill and refinement of craftsmanship within the context of their thesis exhibition. This course will prepare the student for professional exhibition opportunities and to work well on self-directed goals as well as collaborate on shared goals through the group senior exhibition. Materials fee required. (CGLS-501 Glass Senior I) **Class 0, Studio 18, Credit 6 (S)**

**CGLS-520****Glass 2 Credit Elective**

This course will introduce the beginner to the glass studio and to glass as a creative material. This course is offered only in the fall and spring semesters. Materials fee required. **Class 0, Studio 4, Credit 2 (F, S)**

**CGLS-530****Glass 3 Credit Elective**

This course will introduce the beginner to the glass studio and to glass as a creative material. Materials fee required **Class 0, Studio 6 Credit 3 (F, S)**

**CGLS-599****Independent Study-Glass**

Students who wish to register for an independent study must complete an "independent study form" available from office GAN-1200. Independent studies require department approval. **Class 0, Studio 0, Credit 1-6**

**Metals and Jewelry Design****CMTJ-201****Metals and Jewelry Design Sophomore I**

This course will introduce the student to basic jewelry hand tools. Ferrous and nonferrous metals, their compositions and working priorities, will serve as the primary materials. This course will provide an in depth instruction on basic design and fabrication techniques. Students will obtain instruction on the proper use and maintenance of the metals shop, learn basic machine and hand skills and basic tools. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. Materials fee required. **Class 0, Studio 18, Credit 6 (F)**

**CMTJ-202****Metals and Jewelry Design Sophomore II**

This course will introduce the student to silver soldering and gem setting. Additionally, students will be introduced to basic forming skills for hollowware, flatware and jewelry. Ferrous and nonferrous metals, their compositions and working priorities, will serve as the primary materials. This course will provide an in depth instruction on design and fabrication techniques, the proper use and maintenance of the metals shop, as well as machine and hand skills. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. Materials fee required. (CMTJ-201 Metals and Jewelry Design Sophomore I) **Class 0, Studio 18, Credit 6 (S)**

**CMTJ-301****Metals and Jewelry Design Junior I**

This course will introduce the student to advanced jewelry techniques. Students will be introduced to advanced properties of various metals as a material and advanced casting and mold-making techniques. Students will study and learn the proper mathematical calculations for casting and mold making. Learning how to calculate the proper proportional gravity weights for alloys in casting will be taught. This course introduces jewelry and hollowware rendering, chasing and repoussé, and tool making, as well as provide in depth instruction on advanced design and fabrication techniques. Students will obtain instruction on the proper use and maintenance of the metals shop. Students will be taught advanced machine skills, hand skills and tools. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. Materials fee required. (CMTJ-202 Metals and Jewelry Design Sophomore II) **Class 0, Studio 18, Credit 6 (F)**

**CMTJ-302****Metals and Jewelry Design Junior II**

This course will introduce the student to advanced jewelry techniques. This course continues instruction in jewelry and hollowware rendering, chasing and repoussé, and tool making. This course introduces jewelry and hollowware design and production through the use of kumboo (bi-metal) overlay technique and acid etching. This course will provide an in depth instruction on advanced design and fabrication techniques. Students will obtain instruction on the proper use and maintenance of the metals shop. Students will be taught advanced machine skills, hand skills and tools. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. Materials fee required. (CMTJ-301 Metals and Jewelry Design Junior I) **Class 0, Studio 18, Credit 6 (S)**

**CMTJ-498****Metals and Jewelry Design Internship**

The Metals and Jewelry Design undergraduate co-op will provide students with the option to work in the metals and jewelry design industry and get paid. There is no academic credit awarded for this course. The opportunity must demand a minimum of 20 hours per week. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. Permission from the undergraduate program coordinator required. **Class 0, Lab 0, Credit 1-6 (F, S)**

**CMTJ-499****Metals and Jewelry Design Co-op**

The Metals and Jewelry Design undergraduate co-op will provide students with the option to work in the metals and jewelry design industry and get paid. There is no academic credit awarded for this course. The opportunity must demand a minimum of 20 hours per week. Students may apply for co-op employment to businesses based on the availability of positions and business job needs. Permission from the undergraduate program coordinator required. **Class 0, Lab 0, Credit 0 (F, S)**

**CMTJ-501****Metals and Jewelry Design Senior I**

This course concentrates on hollowware design and production through the introduction of spinning, advanced hollowware techniques and rendering. The design and compilation of a professional resume is also completed. This course introduces advanced gem setting and identification and gemstone anatomy. Students will obtain instruction on the proper use and maintenance of the metals shop. Students will be taught advanced machine skills, hand skills and tools. Students will be required to conduct research on a historical metals topic, write a paper and give a presentation. Materials fee required. (CMTJ-302 Metals and Jewelry Design Junior II) **Class 0, Studio 18, Credit 6 (F)**

**CMTJ-502** **Metals and Jewelry Design Senior II**  
This course continues instruction in advanced gem setting and identification and gemstone anatomy and introduces jewelry mechanisms. This course provides the student with individual research in technique and design. The senior level students are required to assemble a group show of their four year's work, complete a job search and a professional portfolio including resume, photography, and renderings. Materials fee required. (CMTJ-501 Metals and Jewelry Design Senior I) **Class 0, Studio 18, Credit 6 (S)**

**CMTJ-520** **Metals and Jewelry 2 Credit Elective**  
An elective course providing an opportunity for introductory study in metals: either hollowware or jewelry. Development of metals techniques, design fundamentals and encouragement of personal expression will be encouraged. The student will learn to evaluate new techniques, materials and concepts. Slide lectures, technical demonstrations, field trips, hands-on experience and critiques will be used. Materials fee required. **Class 0, Studio 3, Credit 2 (F, S, Su)**

**CMTJ-530** **Metals and Jewelry Design 3 Credit Elective**  
This is a class designed for non-majors, covering a fundamental introduction to techniques and aesthetics of woodworking. Topics covered include the use of select hand tools and woodworking power tools, wood as a material, its basic properties and fundamental processes of wood fabrication. The course includes a prescribed project based on in-class contact hours (6) Materials fee required. **Class 0, Studio 6, Credit 3**

**CMTJ-599** **Metals and Jewelry Design Independent Study**  
Metals and Jewelry independent study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study to pursue over the course of the semester. Goals and objectives will be outlined by the student in conjunction with their faculty adviser. Metals and jewelry independent study students must obtain permission of an instructor and complete the independent study permission form to enroll. (Permission of instructor) **Class 0, Studio 0, Credit 1-6 (F, S)**

## Textiles

**CWTD-530** **Quilting Elective**  
This course will introduce the beginner to the textile studio and to quilting as a creative process. This can be repeated to allow students to develop additional skills. **Class 0, Lab/Studio 3, Credit 3 (F, S)**

# School of Film and Animation

## Film and Animation/Motion Picture Science

**SOFA-101** **Production I**  
A fundamental course in non-synchronous film production and an introduction to digital video editing. Filmmaking is presented as a means of interpretation and expression. This course combines technical information in motion picture exposure and editing with a theoretical and practical approach to motion picture continuity. Production is in (non-sync) format and post-production is digital software. Students furnish film, tape and processing. **Class 2, Studio 3, Credit 3 (F)**

**SOFA-102** **Production II**  
This is the second sequenced production course for freshmen film/video students pursuing a concentration of live action production. Emphasis is on a variety of approaches to the edited image. In addition to continuing to develop basic concepts of creating articulate film language in short productions, this course introduces the nature and importance of the sound component in creating cinematic works and focuses on digital workflow. This course is essential for students of the film/video curriculum, who must be able to create not only images but also mature and appropriate soundtracks for their film and video works. (SOFA-101 Production I) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-103** **Film/Video Materials and Technology**  
This course provides an introductory overview of the basic engineering and scientific principles associated with motion picture technologies. Topics covered include imaging physics, photographic science, human vision and perception, image capture and display technologies (both analog and digital) and digital image processing. This course is taught using both mathematical and phenomenological presentation and prepares students to proceed with more in-depth investigation of these fields in subsequent imaging science and digital cinema courses. Accompanying laboratory exercises provide hands-on experience with the presented concepts. (MATH-171 Calculus A or MATH-181 Project-based Calculus 1 or instructor permission) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-106** **Film Syntax**  
Film Syntax is a motion picture examination and readings course designed to give all media production students the opportunity to trace the development of many of the techniques and forms in what now constitutes the classic cinema. The course is taught from the perspective of a practicing filmmaker involved in the application of film language and logic, as well as its historical and cultural dimensions. Film Syntax is directly related to SOFA-111 Film Viewings, the direct and parallel course of classic film and media viewings which are to run concurrently with Film Syntax and provide data for the course's examination. **Class 2, Studio 0, Credit 2 (F)**

**SOFA-107** **Principles of 2D Animation**  
This course will introduce the concepts and mechanics of movement for animation, focusing on, but not limited to, character based movement. Animation principles will be introduced and applied using hand-drawn methods, which will serve as the foundation for their application in any desired medium. Weekly exercises will be recorded using standard animation software, and will be reviewed, discussed and open to group critique. (SOFA-121 Animation Survey) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-108** **Drawing for Animation**  
This course focuses on the mechanics of motion as applied to animated characters, both human and non-human. Working directly from a live model, costumed and nude, and also employing visualization techniques, students will apply figure-drawing skills along with gesture drawing, focusing on the correct representation of weight, energy and force in sequential poses. Specific attention is paid to improving drawing skills in order to create stronger storytelling poses for animated properties. A variety of drawn animation examples will be screened in class. (SOFA-121 Animation Survey) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-111** **Film Viewings**  
Film Viewings is a film screenings meeting, showing central works from the history of cinema which are shown in support of the lectures for all first year students in the School of Film and Animation. **Class 0, Lab 3, Credit 1 (F, S)**

**SOFA-112** **Fundamentals of Screenwriting**  
This course introduces students to the forms and techniques of writing for visual media, particularly the short film. Throughout the course, students develop resources for finding stories and concepts that can be turned into films. Students are responsible for writing a short script of their own choosing and for completing several brief written exercises in areas such as personal storytelling, character development, dialogue, and plot. Scripts written in this class can be used as the basis for films produced in other classes. **Class 3, Studio 0, Credit 3 (S)**

**SOFA-121** **Animation Survey**  
This class is intended to introduce the student to the gamut of animation thinking and making through classroom instruction and hands-on practical experience. Lecture and readings will emphasize the history, theory and practice of animated filmmaking with extensive film screenings to illustrate each technique and related aesthetics. Hands-on supervised studio sessions will guide students to an intuitive understanding of the principles of animation language. Each student will develop their personal vision through assigned projects utilizing the material discussed in class. **Class 2, Lab 3, Credit 3 (F, S)**

**SOFA-122** **Fundamentals of Computers and Imaging Technology**  
This course provides an introductory overview to computer systems and to principles associated with motion picture technologies. Topics covered include computer history, basics in computer architecture basics, operating systems, HTML and networking. Human vision and perception, image capture and display technologies (both analog and digital), digital image processing and post-production equipment and software are also covered. The course focuses on exposing the students to basic principles necessary to proceed with subsequent courses with production or animation focus. **Class 2, Lab 3, Credit 3 (F, S)**

**SOFA-165** **Audio Introduction for Media**  
Determine successful ways to capture audio and distribute for a variety of media formats. Develop listening and technical skills to manipulate audio for acceptable subjective qualities and meet technical standards. Each student will manipulate different forms of audio and summarize the decisions to accomplish final project. **Class 3, Lab 0, Credit 3 (Su)**

**SOFA-202** **Production Processes**  
This course is an introduction to all aspects of professional film/video narrative production. Students produce short projects while learning basic shooting and crewing procedures, studio protocol, equipment handling and maintenance, and basic sync editing. (SOFA-102 Production II) **Class 4, Studio 6, Credit 4 (F, S)**

**SOFA-203** **2D Animation I: Dynamics**  
This course focuses specifically on the sequential stages of hand-drawn animation. Students explore every stage of production of a short animated scene, including dialogue, from ideation to clean up. The final result will be a complete penciled scene. Each week will build on the previous week's progress. (SOFA-107 Principles of Animation and SOFA-108 Drawing for Animation) **Class 3, Lab 0, Credit 3 (F)**

**SOFA-205** **Basic Sound Recording**  
This course provides specialized knowledge and work in sound to allow the student to be able to distinguish and evaluate proper sound techniques and productions to encourage the beginning of professional work in the sound industry. Each student records audio and prepares a mixed soundtrack to professional quality standards. **Class 3, Studio 0, Credit 3 (F, S)**

**SOFA-206** **Directing the Actor**  
A course in basic directorial techniques with emphasis on the special problems peculiar to film and video production. The class is taught in conjunction with SOFA-207 Acting for Film and Video. Class meetings are organized around the presentation of scenes prepared by student directors. (SOFA-102 Production II) **Class 3, Studio 0, Credit 3 (F, S)**

**SOFA-207** **Acting for Film and Video**  
A course in basic acting technique with emphasis on the special problems peculiar to film and video production. The class is taught in conjunction with SOFA-206 Directing the Actor. Class meetings are organized around the presentation of scenes prepared by student actors and directors. (SOFA-102 Production II) **Class 3, Studio 0, Credit 3 (F, S)**

**SOFA-208** **Dramatic Structure**  
This course explores the theories of dramatic structure from Aristotle to the present and applies these theories to current and classic dramatic works. The class also explores dramatic script structure as it is used in dramatic works on stage and screen. **Class 2, Screen 3, Credit 3 (F)**

**SOFA-209** **Object and Character Creation**  
Students create models for animation in three-dimensional software. Students learn various modeling, texturing, and lighting techniques that apply to animation and digital cinematography. Students model, texture and light three-dimensional environments. (SOFA-121 Animation Survey; corequisites SOFA BS students none, SOFA BFA students: SOFA-107 Principles of Animation) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-211** **Documentary Workshop**  
This course teaches students how to make a short documentary film. Each student will direct a short film on a subject that they choose. Students will learn how to develop and create pre-production for a documentary film including contacting possible subjects, research, and proposal writing. During the production phase of the film, students will learn how to direct a documentary crew, interviewing skills, and how to work with their subjects. During post production students will learn how to organize their material into a short, 10-18 minute film. Students must screen their completed film at the School of Film and Animation's Final Screenings. (SOFA-202 Production Processes) **Workshop 4, Studio 0, Credit 4 (F, S)**

**SOFA-212** **Fiction Workshop**  
In this class students direct short fiction projects using either film or digital media, applying tools learned in earlier craft courses. Students also serve on the production crew for other projects. Students specializing in a cinematic Craft work in important creative capacities on two or more projects. Students are encouraged to explore individual styles and concepts. Intensive pre-production protocol and documentation are followed. Editing and sound design will be completed as well. Students complete projects for presentation at the school screenings at the end of the semester. (SOFA-202 Production Processes) **Workshop 4, Studio 0, Credit 4 (F, S)**

**SOFA-213** **Radical Cinema Workshop**  
In this course, students produce at least one major artistic work that uses the moving image. This course demands the use of alternative expressions in concept, style, or technology, and students are encouraged to take risks, break "rules" and explore their own unique creative potential. Students may work in a variety of media, depending on their proficiencies and the vision of their project. Students from film and animation, fine arts, photography, performance arts, installation, crafts, music, multimedia, gaming, computer sciences, and other relevant disciplines are typically welcomed. Students complete projects for presentation at the SOFA public screenings. (SOFA-202 Production Processes) **Workshop 4, Studio 0, Credit 4 (F, S)**

**SOFA-215** **3D Animation I**  
This course is an introduction to three-dimensional computer animation and character rigging. The basic principles of animation will be addressed in relation to three-dimensional animation. Character rigging techniques will be presented and will include skeletons and animation controls. Students will produce a series of short three-dimensional computer animations and some basic character rigs. Students will become familiar with a variety of three-dimensional computer animation techniques. (SOFA-209 Object and Character Creation) **Class 2, Lab 3, Credit 3 (F)**

**SOFA-216** **3D Animation II**  
This is the second in a sequence of three 3D animation courses. Students will be exposed to the mechanics of motion within a character. Complete character rigging techniques will be discussed and demonstrated. Students will produce a series of short three-dimensional computer animations using a pre-rigged character. Students will also create a complete character model and rig of their own design. Students will gain further knowledge of a variety of three-dimensional computer animation techniques. (SOFA-215 3D Animation I) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-217** **Animation Production Workshop I**  
This course will be the student's first experience in individually producing a complete animated film. The course provides practice in all phases of single-frame film production. Students design and produce a short film with sound. Weekly meetings will discuss and critique the progress and merits of the film. Students will rely only on techniques learned in previous classes. The completed film will be screened to the RIT community. (SOFA-107 Principles of Animation) **Workshop 4, Studio 0, Credit 4 (S)**

**SOFA-218** **Concept and Character Design**  
This course will introduce students to the basics of design as applied to characters and environments for animated productions. Students will create and develop a 'cast' of characters for an imagined property, focusing on group dynamics, visual appeal and personality development. Line, color, texture, shape, form and story will be referenced when developing characters. Students will institute a process of visual development through a variety of exercises, working toward a final, finished group of characters. Strong attention and development will be paid to color, composition, and atmosphere. Projects require a high level of drawing skill and knowledge of perspective, as well as story and character development. Projects will utilize hand drawn, digital painting, live action and subjective techniques. A variety of exercises will cover tone, mood, deep and shallow space, multi-plane movement, and natural and imagined spaces. (SOFA-107 Principles of Animation) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-222** **Stop Motion Puppet Fundamentals**  
This is an introductory course that will give students a basic and solid understanding of stop-motion animation. The class covers all aspects of stop-motion in its various forms but will mainly concentrate on stop-motion puppet/character animation. There will be demonstrations on model fabrication, animation techniques and camera/grip techniques. More in-depth topics, like latex and silicon mold making and intensive post production techniques will be introduced. There will be opportunities for students to practice animation with specific goals and assignments. (SOFA-107 Principles of Animation) **Class 2, Lab 3, Credit 3 (F)**



**SOFA-223****Advanced Stop Motion Techniques**

This course will introduce stop motion students to more advanced techniques of single frame production. The class will be divided into teams that will execute a finished short film complete with post and sound work. Although these finished films will be short and simple they will expose the students to stop motion set and puppet building, lighting, grip work, camera movement and post work. This class builds on the fundamentals that were taught in the Fundamentals class and advances the student in their understanding of stop motion production. The team members will specialize in certain areas of building, camera work, animation and post work and will contribute to the team film until the completion of that project. (SOFA-222 Stop Motion Puppet Fundamentals) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-224****Tradigital Animation**

The computer has become an integral part of modern animation production. This course will introduce the student to this technology and aid them in incorporating it into their personal skill set. The focus will be on adapting traditional techniques learned in Animation Survey to the digital production environment. The student will work with professional level animation software using both raster and vector graphics to produce several short exercises adapted from traditional techniques that will develop the skills needed to efficiently and effectively use 2D digital tools in their own work. (SOFA-107 Principles of Animation) **Class 2, Lab 3, Credit 3 (F)**

**SOFA-225****Performance Resources for Animation**

This course will give animators and other students an opportunity to explore a visual language of acting and posing that will help their storytelling abilities. Acting, timing and pacing are critical elements to any successful character animated film. Identifying and building a library of expressions, poses, and movement for emotional and visual expression is the goal for each student. Students will study reference material from successful silent and animated films. They will also create their own reference material through acting and filming themselves and other students. The visual references will be scrutinized on a frame-by-frame basis for a deeper understanding of this visual language. The class will include demonstrations and exercises for the students. (SOFA-107 Principles of Animation) **Class 3, Studio 0, Credit 3 (F)**

**SOFA-227****Animation Pre-Production**

Students collect and produce short film ideas and learn to express them in a variety of methods. Short film scripts will be written in a workshop setting and shared with class in critiques. Students will learn how to create digital soundtracks and read digital sound. Students will make animation bar sheets for sound/image relationships and timings and exposure sheet design. Students will also work with storyboards scanned into the computer and manipulated in time with sound to create an animatic as another tool for initializing animation production. (SOFA-107 Principles of Animation) **Class 2, Lab 3, Credit 3 (F)**

**SOFA-228****Animation Scriptwriting and Storyboard**

This course concentrates on the structures of temporal organization for the screen in all animated productions. Particular attention is paid to the structures of scriptwriting and the layout of movements and visual composition via editing into storyboards. Various individual written script projects will be required of the student, leading to a final production script for an animated film that will be fully storyboarded and formatted. Particular attention will be paid to the visual storytelling aspects of converting a written script. Layouts from the production will also be developed. (SOFA-112 Fundamentals of Scriptwriting) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-301****Business and Careers in Film**

An introduction to all aspects of the business side of professional film/video narrative and commercial production. Students develop a business plan to create their own production company while learning alternative careers in film, basic financial and legal protocol, and mental preparation needed to enter the film business market. **Class 3, Studio 0, Credit 3 (F)**

**SOFA-302****Business and Careers in Animation**

This class will be geared toward the small animation business owner and individual freelance animator. We will discuss the setting up of a small business and all of its operations. There will be reference to bigger business entities and many of the same principles will apply to both types of businesses. The elements of discussion will teach students how to go about approaching animation work in the industry from a small business point of view and from an individual approach. There will be many references and sources pointed out in the classes including State, Federal and private websites full of information on the workplace. The class will discuss the creation of sample reels, websites, self-promotion, research and interview techniques all related to the individual animation. Discussions of ethics and individual responsibilities will be covered. **Class 3, Studio 0, Credit 3 (S)**

**SOFA-306****Senior Thesis Seminar**

A required course for third-year SOFA students and the prerequisite for SOFA-401 Senior Thesis I. Students discuss and generate a written plan for their senior film or animation thesis projects, select an adviser from among the SOFA faculty, and present a proposal for approval to a faculty committee. (Two different production workshops chosen from SOFA-211 Documentary Workshop, SOFA-212 Fiction Workshop, SOFA-213 Radical Cinema Workshop) **Seminar 2, Studio 0, Credit 1 (S)**

**SOFA-311****Image Capture and Production Technology**

This course offers a full investigation of image capture technologies used in contemporary motion picture production. Historical image generation techniques will be provided as an introduction to modern media and equipment. Fundamental characteristics of silver halide photochemical imaging systems will be explored with emphasis on typical metrology and imaging properties. Electronic image capture will also be presented in the context of fundamental imaging properties. Standard film and video workspaces and workflows will be examined as a direct introduction to post-production technologies to be presented in subsequent digital cinema courses. (SOFA-103 Film/Video Materials and Technology, IMGS-221 Vision and Psychophysics, IMGS-251 Radiometry; corequisite IMGS-351 Color Science) **Class 2, Lab 4, Credit 3 (F)**

**SOFA-312****Digital Post-Production Technology**

This class focuses on the specific technologies of motion picture post-production and imaging science. Motion content generated via film or electronic technologies on set are ingested into the post-production chain utilizing various optical, opto-mechanical, and electronic systems. Topics will include video standards, telecine transfer, digital colorspaces, digital intermediate, special effects, color correction, and image processing. Motion content mastering will be explored as an introduction to exhibition technologies to be presented in the final digital cinema course. Particular emphasis will be placed on production testing, data acquisition and image analyses. (SOFA-311 Image Capture and Production Technology) **Class 2, Lab 4, Credit 3 (S)**

**SOFA-313****Film Projection and Digital Cinema**

As the final course in the digital cinema core technology sequence, this class completes the study of motion picture technologies, focusing on exhibition and display engineering. Topics covered include traditional mechanical film projection, electronic projection and the color science associated with image appearance. Special focus will be given to evolving exhibition standards, image quality evaluations and emerging techniques. The course will conclude with an investigation of 3D technologies and varied distribution models for motion content. (SOFA-312 Digital Post-Production Technology or instructor permission) **Class 2, Lab 4, Credit 3 (F)**

**SOFA-316****3D Animation III**

This course is a continuation of SOFA-216 3D Animation II. Students examine facial expressions and learn how to create emotion in the face. Advanced rigging techniques, especially pertaining to the faces, will be presented. Students will be presented with techniques to dissect sentences and reconstruct them in to usable connected speech for animated characters. Students will produce a series of short three-dimensional computer animations using a pre-rigged character. (SOFA-216 3D Animation II) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-317****Animation Production Workshop II**

This course is the animation student's second experience in producing an animated film individually or in collaboration with a classmate. This course provides practice in all phases of single-frame film production. Students design and produce a short film with sound. Weekly meetings will discuss and critique the progress and merits of the project. Students will rely only on techniques learned in previous classes. Final film must be screened for the RIT community. (SOFA-217 Animation Production Workshop I) **Workshop 4, Studio 0, Credit 4 (F)**

**SOFA-323****2D Animation II: Performance**

This course focuses on the treatment of different styles of movement using drawn animation. Students explore the use of acceleration and deceleration, squash and stretch, maintaining volume, anticipation, secondary action, as they relate to a variety of different performances. Students will use and utilize a moving camera, pans, character interaction and the connectivity of 3 shots that show a cohesive idea as well as advanced animation skills. Weekly assignments consist of rough pencil tests. A variety of examples of drawn animation will be screened in class. (SOFA-203 2D Animation I: Dynamics and SOFA-218 Concept and Character Design) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-401****Senior Project I**

In this course students in their final year begin work on a major student project. Students may work on projects including motion picture engineering, image science research or relevant craft. Students are in charge of their own work, but they work directly with an adviser to track their progress on the project. The class meets one hour each week to provide discussion on project progress and learning. **Class 1, Studio 0, Credit 3 (F)**

**SOFA-402****Senior Project II**

In this course students in their final year continue work on a major student project. Students may work on projects including motion picture engineering, image science research or relevant craft. Students are in charge of their own work, but they work directly with an adviser to track their progress on the project. The class meets one hour each week to provide discussion on project progress and learning. This course is a continuation of Senior Project I. (SOFA-401 Senior Project I) **Class 1, Credit 3 (S)**

**SOFA-406****Senior Thesis I**

Students work independently with their adviser toward completion of their capstone experience for their BFA degree. Students have a predetermined timeline and must complete all deadlines to pass this course. (SOFA-306 Senior Thesis Seminar) **Class varies, Credit varies (F)**

**SOFA-407****Senior Thesis II**

Students work independently with their adviser towards completion of their capstone experience for their BFA degree. Students have a predetermined timeline and must complete all deadlines of that timeline to pass this thesis course including completion and public screening of finished work or final presentation of craft experience. (SOFA-406 Senior Thesis I) **Class varies, Credit variable 2-6 (S)**

**SOFA-408****Senior Forum**

This course is intended to best accompany and complement the student's Senior Thesis experience. All students in this course meet as a group to screen edited works in progress, discuss post-production problems, and plan jointly for the use of departmental production resources. (SOFA-406 Senior Thesis I; corequisite SOFA-407 Senior Thesis II) **Class 2, Credit 2 (S)**

**SOFA-498****Film and Animation Internship**

SOFA Internship is open to all SOFA students with a minimum of a 3.0 GPA. SOFA students should first procure an internship opportunity within our industry. Students must submit a completed permission form identifying the firm and what they have been told will be their duties and responsibilities. All film and animation internships must be approved by the student's program director or administrative chair. Students are required to submit a minimum 10-page paper about their experience and obtain a letter of review from their job site supervisor. Ninety hours of work earns one semester credit. (Permission of program or administrative chair) **Class 0, Studio 0, Credit 1-6 (F, S, Su)**

**SOFA-509****Advanced Object and Character Creation**

This course will continue the exciting journey into modeling. Students will learn economy of geometry for animation. Instruction will go further into organic modeling by studying anatomy and relating it to edge loops. Students will be introduced to sculpting digital models. (SOFA-209 Object and Character Creation) **Class 2, Lab 3, Credit 3 (F)**

**SOFA-511****Film Sound Theory: Music**

This course is one of three in the study of film sound theory. Through readings, focused group discussion, and the viewing of/listening to select films, the course promotes critical analysis of the varied and profound uses of music in sound design. Addressed is the history of music from the silent era to the modern score. The concepts studied include the modal changes in point-of-audition, and positioning across digeses. Newer topics including audio-visualization and ventriloquism theory are also addressed. **Class 2, Screenings 3, Credit 3 (F, Su)**

**SOFA-512****Film Sound Theory: Effects**

This course is one of three in the study of film sound theory. Through readings, focused group discussion, and the viewing of/listening to select films, the course promotes critical analysis of the varied and profound uses of effects in sound design. Addressed is the history of effects from the early sound era to the modern design. The concepts studied include the modal changes in point-of-audition, and positioning across digeses. Other topics like complementarity and the acousmetre are also addressed. Each student gives a presentation on a chosen concept. **Class 2, Studio 3, Credit 3 (F, Su)**

**SOFA-521****Advanced Sound Recording**

This course continues the work from SOFA-205 Basic Sound Recording to include audio synchronized or locked to picture and the use of Foley and ADR production techniques. Students develop workflow approaches for complex multi-track mixing and signal manipulation. Each student prepares a mixed track to professional quality standards and manages sound and video files between various hardware and software platforms. (SOFA-205 Basic Sound Recording) **Class 3, Studio 0, Credit 3 (F, S)**

**SOFA-523****Advanced Editing**

This course is designed to teach students the professional workflow of editing digital film and video files. Students learn the technical craft as well as the aesthetic choices that editors make. Students practice the editing of all genres by editing short fiction, documentary, and experimental projects. Students will explore and learn advanced tools in Final Cut Pro editing software while editing short projects and tutorials. Areas of study include learning a cinema file database, media management, color correction, visual and time based effects, sound processing and track building, multi-camera editing, and titling and graphics. In the second half of the semester, students will learn the basic operation system of AVID editing software and complete 3 short projects using AVID software. (SOFA-102 Production II) **Class 2, Lab 4, Credit 3 (S)**

**SOFA-524****Advanced Directing the Actor**

This class offers in-depth study of techniques introduced in the basic directing class, with an additional focus on using external observation to determine appropriate behavior. This course emphasizes the special problems peculiar to Film and Video production. Class meetings are organized around the presentation of scenes prepared by student directors using the acting students in the class. Meets in conjunction with Advanced Acting for Film and Video. (SOFA-206 Directing The Actor) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-525****Advanced Acting for Film and Video**

An intermediate level acting class working in depth with techniques and approaches introduced in the basic acting class with the additional focus of using external observation to determine appropriate behavior. Class meetings are organized around the presentation of scenes prepared by student actors and directors. The class is taught in conjunction with Advanced Directing the Actor. (SOFA-206 Directing the Actor or SOFA-207 Acting for Film and Video) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-526****Writing the Short Film**

This is a course in writing for short films. The course includes an exploration of the short film genre and how that differs from other narrative forms. In the course, students complete exercises to improve their ability to write scenes and develop characters. To conclude the course, students write a short script appropriate for filming in one of the production courses. (SOFA-112 Fundamentals of Screenwriting) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-531****Digital Effects and Compositing**

This course offers hands-on experience in manipulating live action video and applying digital effects. There is an emphasis on digital compositing using rotoscoping, image tracking, alpha channels and transparency. Composites may be accomplished through green screen shooting, transfer modes, masks, and/or traveling mattes. Node based compositing will also be addressed as well. (SOFA-122 Fundamentals of Computers and Imaging Technology) **Class 2, Lab 3, Credit 3 (F)**

**SOFA-532****Underwater Cinematography**

This course is designed to prepare students to professionally complete cinematography assignments in an underwater environment. To accomplish this, the student will complete basic scuba diving training and achieve scuba diving certification. The student will become familiar with underwater video camera housings and accessories and basic underwater shooting techniques. A facility fee covers all equipment, off campus facility use, texts and insurance. (SOFA-202 Production Processes) **Class 2, Lab 3, Credits 3 (F)**

**SOFA-536****30-Second Commercial Production**

An introduction into the world of producing television commercials. Students learn the workflow between advertising agencies, their clients and production companies. They also execute the production of a television commercial from conception to editorial. (SOFA-102 Production II) **Class 4, Studio 0, Credit 3 (S)**

**SOFA-541 History and Aesthetics of Animation**  
This course will provide a general survey of the development of animated film making around the world from the late 19th century to today. It will be an exploration of the history and aesthetics of animation with an emphasis on the unique characteristics of the animated art form and how those characteristics are used as a means of interpretation and expression. (SOFA-121 Animation Survey) **Class 2, Lab 2, Credit 3 (F, S)**

**SOFA-542 History and Aesthetics: Animation Stories**  
This course provides an in-depth study of a specific movement or individual that has made a major contribution to the animated film art form. Films will be viewed and discussed in the context of the specific time and places in which they were made. Emphasis is on determining the unique characteristics of the medium and how those characteristics are used as a means of interpretation and expression. (SOFA-121 Animation Survey) **Class 2, Screening 3, Credit 3 (F, S)**

**SOFA-561 New Documentary Issues**  
This course examines current trends in documentary film during the last decade. We will view 1-2 documentary films each week. We will examine each film critically; analyzing the film's theme, structure, style, relationship to reality, and effectiveness. In addition, we will look at how current filmmakers interpret and build upon the basic ideas and discourse that have defined documentary film making since its beginnings. (SOFA-106 Film Syntax) **Class 3, Studio 0, Credit 3 (F)**

**SOFA-562 International Film History**  
This course examines selected, varying film topics in a wider socio-historical context. Seminar themes change each year and may include topics such as post-war German film, films of the Holocaust, Japanese film, surrealist and magic realist film, Soviet film, Native Americans on film, etc. Students are expected to participate actively in the course discussions. (SOFA-106 Film Syntax) **Class 2, Screening 2, Credit 3 (F, S)**

**SOFA-563 Writing the Feature I**  
This is the first course in a two-semester course in writing for feature films. The course includes an exploration of the feature film structure. Students propose ideas for a feature length film and in consultation with the instructor and other students move forward to complete a feature length film script. The script begun in this class will be completed in SOFA-364 Writing the Feature II. (SOFA-112 Fundamentals of Screenwriting) **Class 3, Studio 0, Credit 3 (F)**

**SOFA-564 Writing the Feature II**  
This is the second part of a two-semester course in writing for feature films. In this course, students complete the script begun in SOFA-563 Writing the Feature I. (SOFA-563 Writing the Feature I) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-566 Documentary Film History**  
This course will examine the development of documentary film from 1920 to present. It will explore central themes in documentary filmmaking, including the Grierson social documentary, the Flaherty romantic tradition, cinema verité, propaganda films, first person narratives, and experimental documentary. Through film viewings, class discussions, and assigned readings, the student will critically examine how documentary film is constructed and the critical relationship between the construction of the film and the film's content and meaning. (SOFA-106 Film Syntax) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-571 Advanced Production Immersion**  
This workshop provides students with the opportunity to learn more about a particular area of production, editing, cinematography, lighting, sound, etc. with an industry professional. (SOFA-102 Production II) **Class 3, Studio 0, Credit 3 (F, S)**

**SOFA-572 Mixing and Sound Design**  
Continue the work from Advanced Sound Recording by mixing multi-track sessions with video to post-produce several different projects to professional standards. Learn how to listen and develop a trained ear while understanding proper equalization and use of effects and digital signal routing. Sessions can include documentaries, dialog and musical productions. Create templates and develop editing/mixing techniques to balance creativity and time constraints of a typical project. (SOFA-521 Advanced Sound Recording) **Class 3, Studio 0, Credit 3 (F, S)**

**SOFA-573 Fusion Production**  
In this course, students learn to combine various media including live action, two-dimensional animation, and/or three-dimensional animation. Projects include camera matching and compositing. Students match the lighting, blur, color, contrast and perspective across composited media. Students will have characters and objects interacting across different media. Students from a variety of disciplines may contribute their expertise to the group projects from disciplines like music composition, theater and acting, and other arts and related studies. (Animators: SOFA-204 2D Animation II: Movement or SOFA-216 3D Animation II or SOFA-223 Advanced Stop Motion Animation Live action students: SOFA-202 Production Processes; other RIT students: permission of instructor) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-574 Documentary Field Production**  
There are many jobs in the field shooting reality subjects. Students must develop strong camera and sound recording skills to capture events as they unfold. Students in this class will work in small documentary crews of 3-4, shooting weekly assignments in the field. We will shoot digital HD format in these group projects. Emphasis will be on developing a shooting intuition, gathering clean sound, shooting to edit, and interviewing skills. We will also shoot one project using multiple cameras. We will examine different creative approaches to reality subjects and test possible techniques such as incorporating fiction techniques. Students will be expected to edit the projects they direct into short 3-4 minute films for class critiques. (SOFA-102 Production II and FILMAN-BFA YR 2-4) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-575 3D Lighting and Rendering**  
In this course, students learn to use lighting in three-dimensional software. Projects include modeling, texturing, and lighting of objects, characters and spaces. Students match photographic images and three-dimensional objects in lighting, blur, color, contrast and perspective. Students imitate photorealism by combining shadows, textures, direct lighting, indirect lighting, reflections, and refractions. Students use a variety of rendering programs to create composites. (SOFA-216 3D Animation II) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-576 After Effects for Animators**  
Adobe After Effects is an indispensable tool for anyone working in animation or motion media. This course provides the instruction needed to go beyond the basics to make full use of this powerful tool. Students will be instructed in the program's theory of operation and given practical experience performing operations commonly used in animation production. (SOFA-224 Tradigital Animation) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-578 Advanced Cinematography**  
An exploration in the world of cinematography and lighting and how they relate to each other. Students will participate in weekly hands-on exercises to develop and improve cinematic storytelling through composition, framing and lighting techniques. (SOFA-202 Production Processes) **Class 3, Studio 0, Credit 3 (S)**

**SOFA-581 Particles and Dynamics**  
This course gives students the skills to insert three-dimensional computer special effects into animation and live action footage. Students explore three-dimensional computer particle animation and dynamics simulation. Students will create short animations to simulate fire, rain, smoke, lighting, water and other dynamics-based collisions. (SOFA-215 3D Animation I) **Class 2, Lab 3, Credit 3 (F)**

**SOFA-582 Alternative Frame by Frame**  
This course will give all students a chance to explore three different approaches to stop-motion animation. The class will study and experiment with pixilation, time-lapse and relief animation with a down-shooter. These techniques will expand the student's knowledge of traditional or character animation and present an alternative means of expression. Students can explore character or experimental approaches to animation with these non-traditional alternative approaches to single frame animation. The class will study existing work with these techniques, analyze and discuss them with the instructor and then produce several examples of their own after instruction for each approach. There will be a final project in the technique of the student's choice. (SOFA-107 Principles of Animation) **Class 3, Studio 0, Credit 3 (F)**

**SOFA-583****Building 3D Character**

This course covers a broad range of 3D animation related topics in a detail-oriented manner. The various topics will be anchored in the design and development of an original 3D character. Topics covered will include, but are not limited to, modeling, rigging, texturing, and lighting. Students will design and build a 3D character of their own design. Using a variety of 3D techniques, students will create a fully articulated character rig, and produce a short animation demonstrating its functionality, as well as their proficiency in techniques such as lighting, texturing, and rendering. (SOFA-209 Object and Character Creation) **Class 0, Lab 3, Credit 4 (F)**

**SOFA-586****Programming for 3D Animators**

This programming course is designed specifically for artists and animators with little or no programming experience. It is designed to give students the ability to solve software problems by making their own tools or finding existing tools. All of the assignments and examples in class are graphics related and will include tools for animation, rigging, particles, texturing and modeling. (SOFA-215 3D Animation I) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-587****Digital Sculpting**

This course is designed to provide students with an in-depth instruction on organic and hard surface modeling using digital sculpting. Students will discover surface texturing to give a realistic clay look. Techniques for cutting and building surfaces to create both rigid and soft surfaces will be provided. Students will texture surfaces using photographic references and hand painting in software. (SOFA-209 Object and Character Creation) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-588****DVD Authoring**

This course is designed to introduce the design and practices of DVD development with emphasis on creating cut variations (e.g., director's cut, screen cut) of an existing film project. The student develops a specific DVD that is based on a film they have completed. Class discussion and presentation are oriented toward new directions for the film story with interactivity and sequencing considerations. The student will acquire development tools to include: menu development, subtitles, audio streams, encoding principles, hybrid DVD creation, Web linking, and basic scripting. (SOFA-101 Production I) **Class 2, Lab 3, Credit 3 (S)**

**SOFA-599****SOFA Independent Study**

SOFA Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser, should propose a course of study or project with clearly defined deliverables. Students must obtain permission of an instructor and complete the independent study permission form to enroll. Student must have a minimum of a 3.0 GPA to apply. **Class 0, Studio 0, Credit 1-6**

## School of Photographic Arts and Sciences

### Photographic and Imaging Arts

**PHAR-101****Photographic Arts 1**

This course will provide an immersive introduction to the field of the Photographic Arts. It will emphasize both craft and visual problem solving. The course will explore: seeing and appreciating the quality of light, image capture, photographic vision, historical and contemporary genres of photography, best practices and workflow as well as an introduction to the critique forum and its practices. (Corequisite PHPS-106 Photographic Technology I) **Class 3, Lab 3, Credit 4 (F, Su)**

**PHAR-102****Photographic Arts II**

This course will reinforce and build upon the skills learned in the first semester of Photographic Arts I. It will emphasize aesthetics, craft, visual problem solving and critical thinking skills - the foundations of the Photographic Arts curriculum. In this semester, the studio will be introduced as a space that can be used to create and control light. This course's curriculum will continue to emphasize both craft and visual problem solving required in high-level photographic imaging. (PHAR-101 Photographic Arts I; corequisite PHPS-107 Photographic Technology II) **Class 3, Lab 3, Credit 4 (S, Su)**

**PHAR-201****Elements of Fine Art Photography**

This course will offer students an introduction to the discipline of fine art photography. Conceptually driven projects will be investigated through a variety of photographic techniques; reading, writing and discussion about the intent and meaning of photographic imagery will be emphasized. Aspects of still photography and moving imagery as artistic choices and practices will be presented. The goal of the course is to establish theoretical, aesthetic and technical strategies for the production of photographic artwork. (PHAR-102 Photographic Arts II) **Class 2, Lab 3, Credit 3 (F, S, Su)**

**PHAR-202****Elements of Advertising Photography**

This course will provide an introduction to the field of commercial photography, as well as encourage students to develop their own artistic vision. Students will create images from assignments that relate to projects they will encounter after graduation. They will be instructed in the basic photographic skills needed in the commercial field. Practical use of exposure metering and digital workflow will be discussed. Training will be provided in the use of professional cameras and lighting equipment, as well as developing a Web presence. Portraiture and still life photography will be covered both in the studio and on location. Students will learn about career choices available in the commercial photography business. (PHAR-102 Photographic Arts II) **Class 3, Studio 0, Credit 3 (F, S, Su)**

**PHAR-203****Elements of Photojournalism**

This course will serve an introduction to visual story telling as it relates to professional photojournalism. It will provide relevant practice in basic technical, compositional and interpersonal skills necessary in all aspects of modern photography. Students will be exposed to photojournalism—documentary, editorial, narrative and editing—as well as explorations of current career possibilities. Lectures, critiques, demonstrations and assignments will provide participants the opportunity to explore the still, audio, and multimedia strategies used for story telling in this era. Students will be expected to meet tight project deadlines and participate in both class discussions, critiques and practices required to be successful in this field. (PHAR-102 Photographic Arts II) **Class 2, Lab 3, Credit 3 (F, S, Su)**

**PHAR-204****Elements of Visual Media**

This course will provide an introduction to the professional opportunities where the fields of photography, graphic design and print media overlap. Students will develop an understanding of the working relationships between professionals involved in each of the three career areas. Successful visual media experts require a contemporary understanding of the business practices necessary to manage the workflow, financial operations and personnel necessary for success. Students in this class will experience the breadth of interactions between these three career paths, and appreciate the management necessary in their dynamic relationships. (PHAR-101 Photographic Arts I and PHAR-102 Photographic Arts II) **Class 3, Lab 0, Credit 3 (F, S, Su)**

**PHAR-211****Histories and Aesthetics of Photography I**

The objective of this course, part one of a two semester sequence, is to present an overview of the multiple, intersecting histories and aesthetic practices of photography as utilized for fine art, snapshot, documentary, scientific, commercial and propaganda purposes in a global perspective. Course lectures include the medium's pre-history and a detailed development of the camera obscura. Students will learn about many technical processes, as well as, the multiple interpretations of notable images during the period 1800-1915. (PHAR-101 Photographic Arts I and PHAR-102 Photographic Arts II) **Class 3, Studio 0, Credit 3 (F, Su)**

**PHAR-212****Histories and Aesthetics of Photography II**

The objective of this course, the second course of a two-semester sequence, is to present an overview of the multiple, intersecting histories and aesthetic practices of photography from the development of Modernism to the present, including the medium's transformation by digital imaging in the 21st century. Photography's applications within fine art, documentary, scientific, journalistic, commercial and vernacular practices will be investigated within a global perspective, but primary emphasis is placed upon developments and movements within the United States and Europe. (PHAR-211 Histories and Aesthetics of Photography I) **Class 3, Studio 0, Credit 3 (S, Su)**

**PHAR-498****Photography Internship**

The Photography Internship will provide students with the option to work in the photographic or visual communications field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the internship permission form to enroll. **Class 0, Studio 0, Credit 1-3 (F, S, Su)**

**PHAR-499****Cooperative Education Experience**

At least one cooperative or internship experience is suggested for all Photographic and Imaging Arts students prior to graduation. Co-ops are an opportunity for students to gain experience in their field and are generally completed between their second and third academic years. Co-ops are full-time or part-time paid positions that are usually eight to 10 weeks in length for a minimum of 20 hours a week in a program-appropriate setting. The RIT Office of Cooperative Education and Career Services assists students in identifying co-op placements and opportunities. (Department Permission) **Class 0, Credit 0 (F, S, Su)**

**PHAR-599****Photography Independent Study**

Photography Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser, will propose a course of study. Photography Independent Study students must obtain permission of an instructor and complete the independent study permission form to enroll. **Class 0, Studio 0, Credit 1-3 (F, S, Su)**

## Advertising Photography

**PHAP-301****Advertising Photography I**

This is the first of a sequence of required advertising photography courses that investigates visual problem solving when applied to commercial photography. Studio and other controlled environments will be encountered through assignments. Advertising and editorial solutions and applications will be covered. The skills necessary to photograph people, places, and things will be learned through various assignments. (PHAR-201 Elements of Fine Art Photography; PHAR-202 Elements of Advertising Photography; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Studio 3, Credit 3 (F)**

**PHAP-302****Advertising Photography II**

Building on the content delivered in Advertising Photography I, Advertising Photography II will introduce business aspects involved in commercial photography. Students will create self-promotion materials as well as a resume/cover letter. A cohesive portfolio is required at the end of the course. Students will also work on a group project, introducing them to the collaborative nature of the advertising business. Assignments will emphasize conceptual over technical solutions. (PHAP-301 Advertising Photography I) **Class 3, Studio 0, Credit 3 (S)**

**PHAP-306****The Collaborative Composite Image**

Computer generated imaging (CGI) combined with photography is being widely used in commercial advertising. This course will offer an opportunity for photography students to work in collaboration with computer graphics students by developing projects that seamlessly unite photography with CGI. Students will study work being generated professionally and develop their own projects as a team. A team approach will be employed to design, execute and integrate images for use in a commercial photography context. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Studio 0, Credit 3 (F)**

**PHAP-307****Technology and Image Making**

Changing technology continues to influence how photographers capture, modify, distribute, and consume images. This course will emphasize the development of artistic voice in the context of this evolving climate. By further mastering craft, students will gain experience in using technology to expand what is possible in the photographic image, both technically and creatively. Course topics will include photographic creativity, image capture, optimization, construction, manipulation, and distribution. Proficiency in new technologies will push boundaries of image making, augment a visual vocabulary, and expand creative expression. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Lab 3, Credit 3 (F)**

**PHAP-308****On Location Lighting Photography**

The course will cover the technical and aesthetic decisions necessary to produce successful photographs on location for both advertising and editorial usage. Students will be encouraged to develop a consistent personal style and maintain rigorous technical photographic standards. A variety of subject matter will be explored while photographing on location. A final portfolio will be required for the course. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Studio 0, Credit 3 (F)**

**PHAP-311****Photographing People**

An advanced study of people photography, this course will focus on the development of the photographic and social skills of the commercial photographer. This course will examine the effects of light, camera choice, and subject pose on reproducing the human form as a photograph. The student will learn to develop strategies for photographing people, build upon lighting skills, and improve photographic styling techniques. Casting and directing models, as well as the role of a professional photographic team will be included in the lectures, demonstrations, and assignments. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Studio 0, Credit 3 (S)**

**PHAP-312****Projects in Still Life Photography**

This course will explore the genre of the still life as a subject in advertising and editorial photography. A variety of forms of photographic expression will be examined as well as solving visual problems related to the still life image. Both structured and open-ended assignments will be given. The construction of the still life photograph and the effective use of props and backgrounds is an important aspect of the course. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Lab 3, Credit 3 (S)**

**PHAP-313****Editorial Photography**

This course explores the role of photography and design in contemporary magazines as well as online content. Students will have the option of working with still life, people, location, documentary, architecture or fashion photography. Current events will be discussed for picture possibilities. Emphasis will be placed on producing multiple or sequential images that relate to social and political issues. Historical and contemporary studies of layout and style will be examined. A professional quality magazine featuring work done by all students will be produced. All projects will be done in collaboration with students in the School of Design (Graphic Design). (PHAP-301 Advertising Photography I) **Class 2, Lab 3, Credit 3 (S)**

**PHAP-314****Light Control and Manipulation**

The course will provide an opportunity for the experimentation with photographic light and its manipulation in a variety of situations both in and out of the studio. Assignments will range from simple portraits in the studio to complex locations, from simple still life set ups to intricate sets with groups of people. Methods of controlling a variety of lighting devices, both strobe and continuous-source, will be demonstrated and discussed. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Lab 3, Credit 3 (F)**

**PHAP-320****XL: Summer Ad Core**

This course will provide students with the flexibility of using one studio for the entire course, allowing students to work as a professional photographer would. Students will work on self-assigned long-term projects with the goal of expanding their portfolio. A cohesive body of work is required at the end of the course. (PHAR-201 Elements of Fine Art Photography; PHAR-202 Elements of Advertising Photography; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 1, Lab 6, Credit 3 (Su)**

**PHAP-326****Architectural Photography**

An image-making course for advanced photography students with a specific interest in architectural exterior and interior photography. Assignments are designed to emphasize the development and exploration of professional techniques and styles. Class hours will include lecture-demonstration, discussion, critique, and both individual and group location work. All work required will utilize digital capture methods. This is a non-laboratory, shooting course. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Studio 0, Credit 3 (S)**

**PHAP-327****Fashion Photography**

This course will provide students with an introduction to fashion photography and look at fashion from a broad imaging perspective. There will be instruction on lighting, styling, and directing a fashion image, as well as developing concepts for photo shoots. Casting, studio and location practices, and ethics will be discussed. The history of fashion and photography will be addressed. Retouching for fashion photographs will be demonstrated. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Studio 0, Credit 3 (S)**

**PHAP-328****Food Photography**

The class will examine the current trends in food photography used in advertising and editorial uses. There will be demonstrations of the techniques of food preparation, staging, styling, and specialized lighting techniques, with the goal of rendering various foods as appealing and appetizing. (PHAP-301 Advertising Photography I) **Class 2, Studio 3, Credit 3 (S)**

**PHAP-336 People Illustration Photography**  
An advanced class in portrait photography, this course will focus on the nature of the photographic “fiction” or “illustration.” Students will work on specific assignments, many of which will be generated from aspects of the history of portrait photography. Lighting techniques will be examined to create more effective photographs. Digital post-production will also be discussed as a means to enhance the images as required by the assignments. (PHAP-301 Advertising Photography I) **Class 3, Studio 0, Credit 3 (S)**

**PHAP-337 Production Photography**  
This class will introduce the storytelling side of professional photographic illustration. Assignments for this course will include recreating historical events, inventing futuristic scenes, and creating believable period pieces with an emphasis on visual narrative. Students will be introduced to project planning, concept development, scheduling, budgeting, casting, auditions, advanced lighting techniques, comprehensive preparation for large production, project management and post-production treatments. Students work on production teams to address large-scale photographic projects. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Lab 3, Credit 3 (S)**

**PHAP-338 Typography for Photographers**  
This course will introduce the fundamentals of typography used in visual communications. Lectures will cover a variety of topics, ranging from the history of typography to the use of type in electronic and photographic media. Special attention will be paid to the combination of type and image. Assignments will combine photography and typography through a variety of forms: posters, brochures, websites, and book design. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Lab 0, Credit 3 (S)**

**PHAP-403 Portfolio Development**  
This course is required for 4th year advertising photography students who are near to graduation and will be ready to present themselves to potential employers. Weekly assignments will be designed to move students closer to their stated goals. Existing work will be edited, sequenced and prepared to form a professional quality portfolio. Additional assignments will be given leading to the creation of new work. Students will be required to produce promotional materials, a resume/cover letter, a market research paper and a business plan. (PHAP-302 Advertising Photography II) **Class 3, Studio 0, Credit 3 (S)**

**PHAP-411 Advertising and Design Photography**  
This course will pair students in advertising photography with students in graphic design to produce advertising-related projects. Teams will produce advertising campaigns that merge graphic design, photography, and copy. Contemporary and historical examples of advertising imagery will be studied. The ethics and business of advertising photography will be studied through lectures, discussions, and field trips. (PHAP-301 Advertising Photography I and PHAP-302 Advertising Photography II) **Class 2, Lab 3, Credit 3 (F)**

**PHAP-416 New York City Advertising Photography Field Trip**  
This course will provide advertising photography students the unique opportunity to participate in a one-week intensive workshop that travels to New York City, the center of the advertising photography industry. Through this field trip and accompanying lectures and studio visits, students will experience an introduction to the field of professional photography and related industries in New York City. The purpose of the trip is to provide a broad view of advertising and editorial photography within the city. Students meet with a variety of photographers, art directors, designers, filmmakers, photo editors, photographer agents, assistants, and RIT alumni. Photography studios, advertising agencies, design-studios, magazines, galleries, and museums will be visited during the one-week field trip. (PHAP-301 Advertising Photography I) **Class 1, Credit 1 (S)**

## Fine Art Photography

**PHFA-101 Introduction to Film Photography**  
An introduction to black-and-white still photography (technical, aesthetic, conceptual) for non-photography majors. Through weekly assignments, students will become familiar with the operation of a 35mm camera body/lenses and film processing/printing, while exploring basic principles of lighting, depth of field, principles of design, blur/stop motion, accurate exposure, and tone control. Lectures will address photographic aesthetics, in addition to historical, contemporary and innovative practices. Students will engage in the language of the critique through participation in discussions of photographic shooting assignments. Students are required to provide their own 35mm camera, film and processing, and photo paper. Non-photo majors only. **Class 2, Lab 4, Credit 3 (F)**

**PHFA-105 Introduction to Digital Photography**  
An introduction to digital photography (technical, aesthetic, conceptual) for non-photography majors. Through weekly assignments, students will become familiar with the operation of a DSLR camera body/lens, while exploring the basic principles of lighting, depth of field, design, blur/stop motion, accurate exposure, and image manipulation. Lectures will address photographic aesthetics, contemporary and historical practices, and professional applications. Students will learn to critique work through participation in discussions of photographic assignments. Students are required to have their own DSLR (digital single-lens reflex) camera. Non-photo majors only. **Class 2, Lab 3, Credit 3 (F, S)**

**PHFA-301 Fine Art Core I**  
This course is the first in a sequence of two principle critique and production classes for students in the Fine Art Photography option of the BFA program. Students will undertake conceptually-driven assignments to investigate their ideas through a critical engagement with peers within the context of contemporary photographic practices. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Studio 0, Credit 3 (F)**

**PHFA-302 Fine Art Core II**  
This course is the second in a sequence of two principle production and critique classes for students in the Fine Art Photography option of the BFA program. Each student will analyze, interpret and develop a meaningful practice to create personal artwork. Course emphasis requires students to produce a photography-based independent body of work and demonstrate best practices within the fine arts. (PHFA-301 Fine Art Core I) **Class 3, Studio 0, Credit 3 (S)**

**PHFA-311 Contemporary Issues**  
A study of current issues relevant to imaging-based fine art and related media; how they relate to broader historical/cultural issues, and how they might suggest future directions. Emphasis is placed on the integration of critical theoretical discourse and studio practice. Contemporary Issues courses vary in subject and content. This course is a touchstone to current and future fine art practices through its engagement with a variety of subjects. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Studio 0, Credit 3 (F, S)**

**PHFA-340 Gallery Management**  
This course covers all aspects of gallery administration and exhibition implementation. Skills to be developed and explored include: framing artwork; preparing exhibition text and support materials; writing press releases; developing fundraising strategies and researching funding sources; writing a grant application; gallery maintenance; unpacking and laying out a show; and understanding the aesthetics of showing pictures in a gallery, including sequencing and space arrangement. Course practicum is achieved with actual exhibitions on campus and in the Rochester area. **Class 2, Practicum 8, Credit 3 (F, S)**

**PHFA-355 Color Photography Seminar**  
This course is a creative exploration of the hybrid technology between traditional film-based color photography and digital imaging. Students will use film and progress through analog to digital conversion. Proper scanning techniques, information on proper color management and procedures for digital image editing and manipulation will be outlined. Various methods of printed output will be discussed and explored. Students will conceive and design their own photographic project and produce a portfolio of prints. **Class 2, Lab 3, Credit 3 (F, S)**

**PHFA-359 The Constructed Image**  
This course will introduce students to the concept, theory, and practice of constructed imagery within the context of contemporary photography. Image making will be explored from creating interventions within the landscape to the manipulation of space in and out of studio spaces as a method of creating photographs. Participants will be introduced to the history of constructed imagery and the impact this working methodology has towards the contemporary dialog in photography. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Lab 3, Credit 3 (F, S)**

**PHFA-361****Retouch and Restore**

This course will explore the techniques, tools, practices, and workflows used in image restoration and retouching. We will begin with historical images to practice basic retouching and restoration techniques. We will then apply these skills to contemporary images and discuss the importance of the collaborative role of the image maker and the re-toucher. One of the primary goals is to help students craft a personal or signature imaging style. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 3, Credit 3 (F)**

**PHFA-362****The Fine Print Workflow**

This course will discuss the latest advances in digital workflow, best practices and output technology. The emphasis will be on the creation of an optimal and efficient fine art print workflow with reproducible results. This will be achieved through the integration of the various software tools and technology at our disposal. Using these techniques, we will build optimized files and craft final, exhibition quality prints. We will also discuss the various substrate options along with archival issues and finishing. This course is intended to build on and update skills learned in previous photographic foundation courses. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Lab 3, Credit 3 (F)**

**PHFA-363****Black and White Photography I**

This course, the first part of a two-semester sequence, will introduce students to the exposure and development of black and white film and the procedures for making high quality black and white photographic prints in a traditional darkroom with chemicals, safe lights and enlargers. Included in this course are 35mm, medium and large-format cameras, variables in making fine black and white prints and techniques for archival and museum quality processes and methods of display. Students must have access to a film camera with adjustable exposure controls. Each student will produce a finished portfolio of black and white fine prints. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Lab 4, Credit 3 (F)**

**PHFA-364****Black and White Photography II**

This course, the second course of a two-semester sequence, will introduce students to the use and manipulation of specialty analog cameras (pinhole, Holga, Hasselblad fish-eye, X-Pan, view camera, etc.). In addition to the hardware resources, the course will survey and demonstrate methods of making mono-prints—one of a kind photographs using analog processes such as photogram, chemogram, wet plate ambrotype, and hand-coloring. Students will also interpret selections of work by noted photographic artists and others enrolled in the course in both critiques and written assignments. A creative portfolio of black and white prints and/or monographs will be produced by each student. (PHFA-363 Black and White Photography I) **Class 2, Lab 4, Credit 3 (S)**

**PHFA-365****Art and the Internet**

This course will investigate the use of the internet by artists as a means of distributing their work, creating an audience, engaging in multidisciplinary practices and, most importantly, conceptualizing work for an interactive, web-based interface utilizing current technologies. Students will learn how to design, publish and maintain web sites as an online exhibition of their work. Students will learn to publish still images, video and other digital media. Supported by critical and theoretical writings published since the advent of digital imaging and the internet, we will examine what it means for artists to create work for a potentially unlimited audience that operates outside of the traditional museum/gallery/object-oriented distribution network. **Class 2, Lab 3, Credit 3 (F or S)**

**PHFA-366****Advanced Retouching and Compositing**

In this advanced level course, we will begin where the retouching and restoration class left off. Building on the foundation of those techniques, we will delve deeper into the software tools and more advanced workflows used in image restoration, retouching and compositing. Once the retouching and restoration techniques have been mastered, we will transition into collage and montage building. This will include working with multiple images in single or multiple frames. We will expand the discussion of the collaborative roles of the image maker and the retoucher in relation to creating composite images. (PHFA-361 Retouch and Restore) **Class 2, Lab 3, Credit 3 (S)**

**PHFA-375****Zone System and Fine Print**

This course will introduce the use and methods required in the Zone System and used in making the Fine Print using primarily black and white analog photography. A full review of the basics of exposure and development practices will be covered as well as how the technology supports visual concepts. Purpose, aesthetics and technique of the zone system and fine printing are the content of the course. Numerous field trips, lectures, and demonstrations will be given. The student will complete this course by producing a visually and technically competent portfolio. (PHFA-363 Black and White I,) **Class 2, Lab 3, Credit 3 (F or S)**

**PHFA-376****Preservation and Care of Photographs**

This course will expose students to the field of photographic conservation and professional practices. Even in the digital era, millions of film and paper images are in greater need of preservation and conservation than at any point in history (PHAR-212 Histories of Aesthetics of Photography II) **Class 3, Studio 0, Credit 3 (S)**

**PHFA-381****Large Format Printing**

The course will examine the differences large-format camera use can bring to photographs. Camera controls and movements unique to view cameras will be discussed and demonstrated. The differences between large-format film cameras and current digital cameras will also be discussed. Demonstrations will be given on the following topics: swings and tilts, selective focus, lens selection, and other features of the view camera. Students will expose, process, and print black and white film. Color negative film materials will also be examined. (PHAR-201 Elements of Fine Art Photography, PHAR-202-Elements of Ad, PHAR-203-Elements of PJ, PHAR-204-Elements of Visual Media) **Class 3, Lab 6, Credit 4 (S)**

**PHFA-401****Professional Development for Artists**

This class will prepare the advanced student for a career in the arts. It will cover practical information related to required professional practices such as the creation and maintenance of a professional website, creating a portfolio, resume writing, grant writing, writing an artist's statement, researching exhibition spaces, and self-publishing. Students will undertake research and apply for professional opportunities. The course addresses the role of the artist in society, and includes visits with artists and museum and gallery professionals. (PHFA-302 Fine Art Core II) **Class 3, Studio 0, Credits 3 (F)**

**PHFA-402****Fine Art Photography Portfolio**

This course represents the culmination of the studio/critique experience for students in Fine Art Photography. Having established a working artistic methodology in previous courses, students will consolidate a final body of work through the critical engagement with their peers. The focus of the course will lead to the completion of a printed portfolio or other final expression of their work such as video or an installation. Studio practices and extensive critique experiences will be featured in this course. (PHFA-302 Fine Art Core II, PHFA-401 Professional Development for Artists) **Class 3, Studio 0, Credit 3 (S)**

**PHFA-556****Moving Media I**

This course explores the history and evolution of the moving image in art. Students will record digital video and utilize electronic imagery to create new work that expands the disciplines of photography and video. Projects will involve creating experimental narratives, conceptual constructions, and performance pieces. Students will work with traditional photographic processes, electronic media, web resources, editing software, and projection technologies to create and display their new visual media work. (PHAR-201 Elements of Fine Art; PHAR-202 Elements of Advertising; PHAR-203 Elements of Photojournalism; PHAR-204 Elements of Visual Media) **Class 2, Lab 3, Credit 3 (F)**

**PHFA-557****Moving Media II**

This course uses the skills developed in Moving Media I to work with time-based imagery on projects utilizing advanced visual language and technical skills. Students learn to record sound with off-camera microphones and sound recorders. Historic and contemporary media artists will be studied, analyzing various strategies used to convey ideas. Students will design a series of independent projects and produce a final project for presentation in the Media Café. (PHFA-373 Moving Media I) **Class 2, Lab 3, Credit 3 (S)**



## Photojournalism

### PHPJ-301

#### Foundations of Photojournalism

This course is designed to help students learn the history of photojournalism and write a proposal for an independent senior project. Students will develop the research skills necessary to create a written proposal that describes, in detail, their intention and process. Students will incorporate historical photojournalism topics into their written drafts. (PHAR-203 Elements of Photojournalism; corequisite PHPJ-302 Photojournalism I) **Class 3, Studio 0, Credit 3 (F)**

### PHPJ-302

#### Photojournalism I

This course will explore the use of the photographic image in narrative, documentary and editorial form. There will be an emphasis on publication, public need and independent projects. Lectures, critiques, demonstrations and assignments will provide participants the opportunity to explore the still, audio, video, and multimedia aspects of storytelling. Students will be expected to meet project deadlines and participate in both class discussions and critiques. (PHAR-203 Elements of Photojournalism) **Class 2, Lab 3, Credit 3 (F)**

### PHPJ-303

#### Photojournalism II

This advanced course will explore and expand on the use of the photographic image in narrative, documentary and editorial form. The emphasis of the course will be on professional practices, professional visual storytelling, and publication. Lectures, critiques, demonstrations, and assignments will provide participants the opportunity to explore the still and multimedia aspects of storytelling. Students gain insight into the business of photojournalism and develop an awareness of career options available to them. Students will be expected to meet project deadlines and participate in both class discussions and critiques. (PHPJ-303 Photojournalism I) **Class 2, Lab 3, Credit 3 (S)**

### PHPJ-306

#### Picture Editing I

This course focuses on image selection, usage and design. Using images from a variety of sources, we discuss picture selection relative to context and desired impact in print and online. Effective use of images for a variety of story applications will be discussed. Design techniques that maximize impact and storytelling will be investigated, including scaling, proportion, sequencing, visual variety and sizing. Students will design a number of assignments from single pages to multi-page essays of varying length. (PHAR-203 Elements of PJ) **Class 2, Lab 3, Credit 3 (S)**

### PHPJ-307

#### Ethics and Law

This course introduces students to principles and theories of ethics and their application to editorial photography and photojournalism for mass communications. It establishes a basic understanding of philosophical ethics, social responsibility, and professional practices within the protections and responsibilities of the First Amendment. The course will also review the legal issues relating to photographic practice and access to subjects. The course examines a wide range of case examples for discussion and analysis to build a foundation for professional practice. (PHAR-203 Elements of PJ) **Class 3, Studio 0, Credit 3 (S)**

### PHPJ-311

#### Picture Editing II

Picture Editing II is designed for students to develop and express creative ideas, shape visual texts, and convey stories, concepts, and viewpoints through the understanding of image sequencing, and layout. Using images from a variety of sources, we discuss how to use images effectively in a variety of story applications and media. This course also emphasizes project management and managing assignments, photographers and editors. This is a non-shooting course, and students will work with existing professional images to develop visual narratives and essays in a variety of media. Students will study market segmentation, new audiences, new forms of content delivery, and other consequences associated with rapid changes in technology. Consideration will also be given to ongoing changes in professional photographic practice. Students will develop strategies for working in a professional environment. (PHPJ-306 Picture Editing I) **Class 2, Lab 3, Credit 3 (F, S)**

### PHPJ-315

#### Multimedia for PJ I

This course teaches students how to tell stories in the digital world. Students will learn the skills necessary to gather and edit audio and how to combine audio, images, and text for compelling online storytelling. In addition to basic technical skills, the course will explore contemporary concepts for effective multimedia storytelling. (PHPJ-302 Photojournalism I) **Class 2, Lab 3, Credit 3 (S)**

### PHPJ-319

#### Multimedia Editing for PJ

This course prepares students with multimedia editing skills. Students will use audio and video editing software to create multimedia projects with existing assets and adapt story-telling techniques for a variety of media. (PHAR-203 Elements of PJ) **Class 2, Lab 3, Credit 3 (F, S)**

### PHPJ-355

#### Multimedia for PJ II

This course provides students with advanced multimedia techniques and introduces photographers to storytelling and reporting using still cameras with video and sound capture features. Students will research and produce multimedia work in class. (PHPJ-315 Multimedia for PJ I) **Class 2, Lab 3, Credit 3 (F, S)**

### PHPJ-356

#### Alternate Influences

This course introduces students to a wide range of disciplines that influence image making. Students will develop a new vocabulary for discussing their own work as well as the work of those who came before them. They will develop a respect, through knowledge and experience, for practitioners of other aesthetic disciplines—artistic, cultural, and others—with regards to photography and, specifically, photojournalism. Students will explore various forms of literary, cinematic, poetic, and lyrical storytelling as influences on photojournalism. (PHAR-203 Elements of PJ) **Class 3, Studio 0, Credit 3 (S)**

### PHPJ-361

#### Working On Location

This course is designed to prepare students for on-location assignments, which includes planning and preparation for challenging photographic issues and conditions. Students will learn how to prepare for and address constituency issues, logistical issues, safety issues, and lighting problems. Additionally, students will work with image transmission and wireless remotes to address specific assignment needs and storytelling. (PHPJ-303 Photojournalism II) **Class 1, Lab 6, Credit 3 (F)**

### PHPJ-365

#### Documentary I

This course will address historical, social, political, and ethical issues as they relate to documentary photography. Within its history, documentary photography has been seen as personal artistic expression, a form of anthropological research, a tool for social change and even propaganda. Documentary photography is also frequently newsworthy, and selected images from more extensive projects have become a part of daily editorial and press coverage. While studying forms, structures and the nature of documentary work, students will complete an in-depth project of sufficient substance to require the application and consideration of these issues. (PHPJ-303 Photojournalism II or PHPJ-311 Picture Editing II) **Class 2, Lab 3, Credit 3 (F, S)**

### PHPJ-366

#### NYC Photojournalism Trip

This course provides students the unique opportunity to participate in a one-week intensive workshop that travels to New York City, the center of the photojournalism business in the US. The purpose of the trip is to provide a broad view of documentary and editorial photography in the industry and give students an idea of the wide variety of potential job markets that exist for documentary/editorial work. Students will meet with a variety of photographers, art directors, designers, photo editors, photographer agents, including RIT alumni, while visiting print and online publications (magazines and newspapers), photo agencies, photography studios, galleries, and museums. A special course fee will be assessed. (PHPJ-302 Photojournalism I) **Class 1, Field Trip 1, Credit 2 (S)**

### PHPJ-401

#### Senior Project

This course is an independent study project that demands the student execute the accepted Senior Project Proposal. Students will have the support and guidance of a faculty member. The process will result in the production of a visual media presentation, a book/hardcopy portfolio or a collaborative editing portfolio and a written statement and conclusion. Course will include weekly group presentations on various topics to include time management, research, planning, photographic and photojournalistic subjects. (PHPJ-301 Foundations of Photojournalism) **Class 2, Studio 0, Credit 3 (F)**

### PHPJ-402

#### Photojournalism Portfolio

This course explores career options, assesses individual skills and temperament, and establishes initial and long-term career goals for each student. Students then develop portfolios with an emphasis on their established goals. Issues in new media and forms of presentation are addressed, as well as building a professional life beyond the entry-level job. Job research, resume development, preparation, application and interviewing skills are incorporated into an examination of the changes in media publications and their use of photographers and photographic images. (PHPJ-401 Senior Project) **Class 2, Lab 3, Credit 3 (S)**

**PHPJ-465**

This course explores the dialogue between images and texts in relation to lived experience. This course takes the introductory experiences from the course Documentary I and builds on those experiences to look more deeply at a single subject or issue. The course examines particular problems, challenges, and responsibilities of documentary work and representing the lives of others to an outside audience. This course approaches documentary work through case studies and field work, and requires students to apply theoretical readings and critiques of published documentary work to their own projects. (PHPJ-365 Documentary I) **Class 2, Lab 3, Credit 3 (S)**

**Documentary II****PHPJ-466****DC Photojournalism Trip**

This course provides photography students the unique opportunity to participate in a one-week intensive workshop that travels to Washington, D.C., the center of the photojournalism business outside of New York City. The purpose of the trip is to provide a broad view of documentary and editorial photography in the industry and give students an idea of the wide variety of potential job markets that exist for documentary/editorial work. Students will meet with a variety of photographers, photo editors, and designers, including RIT alumni, while visiting print and online publications (magazines and newspapers), governmental agencies, photo agencies, photography studios, galleries, and museums. A special course fee will be assessed. (PHPJ-302; corequisite PHPJ-303 Photojournalism II or PHPJ-311 Picture Editing II) **Class 1, Field Trip 1, Credit 2 (F)**

**Photo Visual Media****PHVM-301****Visual Media Career Research**

This course will introduce students to the practical methods for researching possible careers and opportunities after graduation. Using Internet and library research, students will identify a career field that might interest them. Further investigations will focus on the realities of working in that environment so that further decisions can be made leading to that career. This course is required for all third-year visual media majors. **Class 3, Studio 0, Credit 3 (F)**

**PHVM-401****Visual Media Capstone**

This course is the second required for all fourth-year visual media majors and is last visual media required courses in the curriculum. As such, students will be finalizing their career preparation in anticipation of entry into the industry of choice. The course will require a major media project, allowing students to create a package/portfolio that represents their photographic, design, printing and management skills. **Class 3, Studio 0, Credit 3 (S)**

**Photographic and Imaging Technologies****IMPT-301****Applied Color Theory**

This course investigates the principles of color science including theory and application. Topics include CIE colorimetry, color transformations, color order systems, metamerism, color inconstancy, color tolerance equations and spaces. (PHPS-211 Advanced Principles of Photographic Technology) **Class 3, Lab 0, Credit 3 (F)**

**IMPT-306****e-Sensitometry**

This course provides students with immersive experiences investigating the design of imaging systems and related technology with an emphasis on device characterization and image quality metrics and standards. Input and output standards including photographic and video systems will be covered in detail. Additionally, the course will explore measurable and subjective evaluations required for image quality. (PHPS-202 Scientific Photography II) **Class 2, Lab 3, Credit 3 (F)**

**IMPT-307****Survey of Non-Conventional Imaging Systems**

This course will provide an overview of imaging methods and imaging systems including principles of photographic surveying, mapping photogrammetry and aerial photography, photofinish photography, panoramic photography, peripheral photography, scanning imaging, infrared/ultraviolet photography, three-dimensional imaging including lenticular photography and alternative imaging such as schlieren, thermography, electrophotography and other specialized applications. Topics may vary from year to year allowing for the introduction of newly developing applications and systems. (PHPS-202 Scientific Photography II) **Class 3, Lab 0, Credit 3 (S)**

**IMPT-311****Color Measurement**

This is the second in a two-course required imaging core sequence, the first being applied color theory. Students develop the background and skills required for successful laboratory practice in color measurement as used in scientific research. This includes data management, data analysis, and technical writing. Topics include the optical and electronic design of spectroradiometric and spectrophotometric instrumentation, the use of standard reference materials for calibration, data analysis techniques, properties of objects and radiation, evaluation of instrumentation and psychophysical experimentation. (PHPS-211 Advanced Principles of Photographic Technology) **Class 2, Lab 3, Credit 3 (S)**

**IMPT-312****High Speed Photography**

This course will investigate the theory and applications of photographic systems designed to record events of very short duration. The images will be analyzed to gain a more complete understanding of short duration events. Included in the course will be comparisons of the characteristics of high-speed motion picture and digital video cameras, sequencing and timing control devices, as well as time magnification relationships. Basic characteristics of intermittent and rotating prism cameras, rotating mirror and drum cameras, synchronization systems and timing controls and high-speed flash and stroboscopic systems will also be covered in some detail. Introduction to high-speed video recording as well as the introduction to shadowgraph and schlieren imaging systems will be included. Students will gain basic experiences not only in the operation of equipment but also in proper planning, setup and basic data reduction techniques. (PHPS-202 Scientific Photography II) **Class 2, Lab 3, Credit 3 (F)**

**IMPT-321****Programming for Imaging and Photographic Technology**

This course will introduce students to the IDL programming environment as a data visualization tool and a programming language. Students will learn the various capabilities of the language and how it can be used to rapidly prototype solutions to various imaging-related problems. As these solutions are developed, fundamental concepts of programming and data structures will be introduced. (PHPS-202 Scientific Photography II) **Class 2, Lab 3, Credit 3 (F)**

**IMPT-322****Digital Image Processing**

This course covers the principles and fundamental techniques in writing digital image processing algorithms and computer programming techniques that are used in implementing said algorithms. Topics covered will include color space transformations, basic image manipulation, and spatial and frequency manipulations. (IMPT-321 Programming for Imaging and Photographic Technology) **Class 2, Lab 3, Credit 3 (S)**

**Imaging Systems****IMSM-301****Imaging Systems**

This course will explore the business and technology fundamentals of imaging systems. There will be an emphasis on the operation of devices/components used in imaging systems. Fundamental concepts prevalent in imaging systems such as resolution, dynamic range, sensor architectures, printer and monitor technologies, color spaces, and image processing workflows will be presented. Emphasis will be on the proper selection and underlying principles of these technologies and how to best apply that knowledge to solve problems in the imaging industry. Students will produce a book as a final project showcasing the concepts learned in the course. Potential careers in the imaging industry will be presented throughout the course. **Class 2, Lab 3, Credit (F)**

**IMSM-302****Color Management Technology**

This course, primarily designed for photographers will provide students with a hands-on experience using software and hardware used in the imaging industry. It has been organized to expose students to managed color from capture to output. The course will review industry standard color instruments and give the essential knowledge and skills required to solve problems prevalent in the photographic field. Critical problem solving of accurate color reproduction across media will be investigated. (IMSM-301 Imaging Systems) **Class 2, Lab 3, Credit 3 (S)**

**IMSM-303****Imaging Workflows**

This course will investigate current principles of digital imaging used to solve specific problems in the contemporary imaging field. Highly problematic issues will be investigated as case studies. Students will propose solutions to various problems that might be investigated in a real-world situation. The course will evaluate applications of concepts learned in previous classes and used in a group project creating a catalog or a book. Different projects are attempted each year. (IMSM-302 Color Management Technology) **Class 2, Lab 3, Credit 3 (F)**

## Biomedical Photo

### PHBM-311

#### Magnified Imaging I

This course will expose students to specialized camera and illumination techniques required to produce photographs of the unseen world. Images will be made in the magnification range of 1:1 - 20:1 (at capture) using various types of cameras. Lighting, applied optics, subject management techniques as well as extended depth of field methods will be evaluated in theory and practice. Students will be challenged by interesting problems in lighting and depth-of-field, which are not required in more traditional photographic work. Many assignments will require the use of software to improve images. The course's final project will require students to publish a comprehensive online article about imaging methods including various specified images. (PHPS-202 Scientific Photography II) **Class 2, Lab 3, Credit 3 (F)**

### PHBM-312

#### Magnified Imaging II

The microscope has proven itself to be an important tool for investigation since its invention in 1595. This course has been designed to go well beyond the basics required for the creation of magnified images of invisible objects. Students will explore objects using a variety of microscopy techniques including differential interference contrast, fluorescence, phase contrast, reflected light and polarized light. The course will investigate both the optical and digital enhancement techniques made possible in contemporary times. Video, motion stopping using electronic flash as well as specimen preparation will be part of the coursework. (PHBM-311 Magnified Imaging I) **Class 2, Lab 3, Credit 3 (S)**

### PHBM-316

#### Digital Media I

This is the first of two required courses for students who have declared the biomedical photographic communications option in the junior year. The course explores the use of motion imagery and digital video technology as it relates to the design and production of instructional media. Students will work in production teams utilizing digital video equipment to complete assignments that involve pre-production planning, field production and post-production editing tasks. The focus of work done in this class will be the production of media used in support of training and marketing activities commonly found in corporate, governmental, industrial and scientific communities. (PHPS-212 Fundamentals of Layout and Design) **Class 2, Lab 3, Credit 3 (F)**

### PHBM-317

#### Digital Media II

This is the second of two required courses that Biomedical Photographic Communications option students take in their junior year. The course explores the use of digital media in the design, production and delivery of instructional and marketing content. Students will plan and produce projects that integrate audio, still images, interactivity, 2D animation and video. The course also explores the technology and production techniques involved in delivering digital media via interactive DVDs as well as publishing multimedia content to the Internet. Additionally, the course will provide an introduction to basic instructional technology concepts that influence design, development and assessment decisions. The focus of work done in this class will be the production of media used in support of training and marketing activities commonly found in corporate, governmental, industrial, and scientific communities. (PHBM-316 Digital Media I) **Class 2, Lab 3, Credit 3 (S)**

### PHBM-321

#### Ophthalmic Photography I

This is the first course of a series that will investigate proper patient management and camera/photographic techniques required in contemporary ophthalmic photography and imaging. Diagnostic evaluation of ocular anatomy and physiology utilizing special cameras/equipment is presented. In addition to retinal fundus photography, students will learn diagnostic medical imaging techniques such as fluorescein angiography, fundus autofluorescence, optical coherence tomography and scanning laser ophthalmoscopy. Retinal disease processes and recognition will also be investigated. (PHPS-202 Scientific Photography II) **Class 2, Lab 3, Credit 3 (F)**

### PHBM-322

#### Ophthalmic Photography II

This second course in the series will investigate proper patient management and camera/photographic techniques required in contemporary ophthalmic photography and imaging. Diagnostic evaluation of ocular anatomy and physiology utilizing special cameras/equipment is presented. Ophthalmological disease processes and recognition will also be emphasized. Advanced ophthalmological imaging modalities will be explored, including slit lamp biomicrography and fundus autofluorescence. A clinical component is required of students enrolled in this course. (PHBM-321 Ophthalmic Photography I) **Class 2, Lab 3, Credit 3 (S)**

### PHBM-326

#### Publications and BPC Bulletin I

This course is the first of a two-semester sequence exposing students to the production of a 16-page grayscale magazine based content and activities relevant to the Photographic and Imaging Technologies curriculum. The award winning BPC Bulletin was first published in 1987. The fall and first issue will be produced as a black-and-white issue and will require the student editors to develop or create content - both written and photographic; design an appropriate schedule including magazine workflow; design and layout the magazine using contemporary tools; work closely with print service providers to optimize quality, control costs; proof and publish the magazine. (PHPS-212 Fundamentals of Layout and Design) **Class 3, Lab 0, Credit 3 (F)**

### PHBM-327

#### Publications and BPC Bulletin II

In the second course and the spring issue, students will be expected to explore new facets of producing a professional 16-page, 4-color magazine based on experiences gained from the fall issue. The second issue should include solving new and challenging problems including optimized color reproduction. Publications and BPC Bulletin will require the students to collect or create content - both written and photographic; design the production schedule and workflow; design and layout the magazine using contemporary tools; work closely with print service providers to optimize quality, control costs; proof; evaluate; and publish the final publication. Traditionally the spring print and web issue has been mailed to alumni and professionals working in the field. The award winning BPC Bulletin was first published in 1987. (PHBM-326 Publications and BPC Bulletin I) **Class 3, Credit 3 (S)**

## Photographic Sciences

### PHPS-101

#### Photography I

This course is the first of a two-semester sequence exploring the fundamentals of photography, with emphasis on the development of strong photographic skills as they relate to the principles of DSLR cameras, lenses, choosing and using perspective, lighting and related aspects of photographic skills. Principles of creativity, craftsmanship, applied photographic theory and presentation will be used to solve visual communication problems. **Class 2, Lab 6, Credit 4 (F)**

### PHPS-102

#### Photography II

This course is the second of a two-semester sequence of study in more advanced photographic practices. Emphasis is on improving photographic skills learned in Photography I, skills include studio light, artificial lighting on location, and macro photography. Principles of creativity, craftsmanship, and applied photographic theory will be used to support technical applications. (PHPS-101 Photography I) **Class 2, Lab 6, Credit 4 (S)**

### PHPS-106

#### Photographic Technology I

This first class of a two-semester course will explore the basic technology required for producing photographs, with an emphasis on applications to real world photographic problems. Among the topics studied in the course will be lenses, image formation and evaluation, perspective, light sources, light-sensitive materials, exposure, digital systems and post-processing, tone reproduction, digital workflows, variability, quality control and photographic effects. **Class 2, Lab 3, Credit 3 (F)**

### PHPS-107

#### Photographic Technology II

This is the second class in a two-semester course based in the study of the technology of photography, with emphasis on applications to real world photographic problems. Among the topics studied will include color vision, Munsell color system, CIELAB system, color theory, color management, digital color balance during post-processing, digital tone reproduction, and digital workflows. (PHPS-101 Photography I or equivalent; PHPS-106 Photographic Technology I) **Class 2, Lab 3, Credit 3 (F)**

### PHPS-201

#### Scientific Photography I

The first course of a two-semester sequence that will develop photographic skills and approaches required in scientific photography. The course will develop scientific methods required for standardized imaging. Appropriate subjects including contact lenses, rice grains and other challenging, nearly invisible objects will be explored. Students will investigate unique illumination techniques in order to reveal a subject's unusual characteristics. Techniques including polarized light and fluorescence reveal what cannot easily be observed without specialized photographic imaging and image processing. In addition, the course will expose students to ethical problems encountered in scientific imaging including managing and processing digital data. (PHPS-102 Photography II) **Class 2, Lab 3, Credit 3 (F)**

**PHPS-202****Scientific Photography II**

This is the second course in a two-semester sequence that explores new and different photographic skills and methods useful in scientific photography not covered in Scientific Photography I. Appropriate subjects will be explored in each of the various assignments designed to develop methods used in various scientific applications. Students will investigate new ways to reveal a subject's characteristics such as imaging with ultraviolet and infrared revealing what cannot be observed without photographic imaging and image processing. The course will expose students to the processes required to produce scientific research as well as scientific posters. (PHPS-201 Scientific Photography I) **Class 2, Lab 3, Credit 3 (S)**

**PHPS-206****Careers and Professional Practices**

This class will introduce students to career options following graduation. Alumni from various industries will visit classes to discuss their careers. Professional practices, including resume writing, interviewing techniques, professional communications, as well as writing proposals, bids, contracts, and technical reports will be taught. Additional topics will include intellectual property, workplace ethics, and presentations. **Class 3, Lab 0, Credits 3 (F)**

**PHPS-207****Vision, Perception and Imaging**

This course will explore the anatomical structure, function, and physiology of the human eye and brain and their relationship to vision, color, visual perception and imaging systems. Both the physiology and psychology of visual perception will be explored. The concepts of depth perception in human vision as they relate to both two-dimensional and three-dimensional contexts will be explored. Relationships of image brightness, contrast and how visual processes lead to seeing will be addressed. (PHPS-102 Photography II) **Class 3, Lab 0, Credit 3 (S)**

**PHPS-211****Advanced Principles of Photographic Technology**

This required course will investigate advanced photographic technology, with an emphasis on the study of the components of photographic imaging systems. Geometrical optics, color management, printing technologies and video standards will also be studied. Working in a lab environment, students will evaluate how technology can be optimized and where its limitations might be found. (PHPS-107 Photographic Technology II) **Class 2, Lab 3, Credit 3 (F)**

**PHPS-212****Fundamentals of Layout and Design**

This course will explore basic principles of effective desktop publishing specific to the needs of corporate, governmental, industrial, and scientific communities. Students will explore fundamental layout and design principles required to produce a variety of visually effective digital and print media pieces, including resumes, posters, brochures, flyers, books, and magazines. Assignments are designed to emphasize the effective use of design and typography specific to print media as well as other digital delivery methods where the delivery of facts is critical. **Class 3, Lab 0, Credit 3 (F)**

**PHPS-302****Forensic Photography**

Proper documentation of crime scenes and evidence is extremely important in the investigation of crimes by police agencies and forensic labs. This course will provide hands-on experience documenting crime scenes and related evidence and preparing those images for presentation in court. Topics covered will include crime scene management, evidence handling, crime scene documentation, general evidence documentation, photographic techniques for the enhancement of evidence, and court display preparation. (PHPS-202 Scientific Photography II) **Class 1, Lab 0, Credit 1 (S)**

**PHPS-303****Nature and Natural Science Photography**

This practical photography course will teach students how to apply scientific, technical and graphic imaging principles to optimize their natural science photography in the field, lab or studio. Students will produce publication-quality images using conventional and close-up lenses, scanners, artificial light sources (flash and flashlights), ambient light modifiers such as diffusers and tenting while documenting specimens in both the field and lab. Students will utilize post-production software and learn the constraints and ethics of image manipulation in natural science communication/publication. Students will photograph as their schedules permit and are encouraged to participate in volunteer field trips. (PHPS-202 Scientific Photography II) **Class 3, Lab 0, Credit 3 (F)**

**PHPS-306****Historical Photographic Processes**

This course examines early photographic processes at the molecular level. The chemical concepts of equilibrium, reactivity and kinetics within photographic systems will be examined. Light-sensitive chemistry and formulations, as well as processing chemicals formulations and mechanisms of chemical action, will be demonstrated. An intensive laboratory and darkroom component will emphasize applications covered in lectures and allow students to explore contact printing using silver halide, cyanotype, Van Dyke, and other early and recently revived historical and alternative processes. (PHPS-107 Photographic Technology II) **Class 2, Lab 3, Credit 3 (S)**

**PHPS-306****Surgical Photography**

The role of photography in the digital era has transformed medical photography. With the new collaboration between RIT and Rochester General Hospital, students have a unique access to a hospital, surgical patients, and related medical procedures. Students who might take this course will be exposed to the issues and methods used in contemporary surgical photography. Students will be exposed to the fundamental photographic equipment and procedures used in operating rooms including proper file management in this era of HIPAA regulations. At the end of the course, students will have visited the surgery theater at least three times with the objective of making photographs. **Class 1, Lab 0, Credit 1 (F)**

**PHPS-311****Panoramic Photography**

The Panorama photography class is wonderful opportunity for students to learn the various aspects of making both VR panorama movies and panoramic prints. Students will be exposed to camera and lens considerations required when using various stitching software. The course will expose students to the advantages and disadvantages of various approaches currently used including imaging in high dynamic range situations such as found in the real estate and hotel markets. Students will create panorama VR movies that can be delivered using HTML methods or produce one large mural print. (PHPS-102 Photography II) **Class 1, Lab 0, Credit 1 (S)**

**PHPS-315****Web Publishing**

Photographers have always communicated visually and the accessibility of the World Wide Web creates a potential audience of millions. This course explores the nature of the World Wide Web, websites and the process of designing, building and maintaining these sites for self-promotion, business, or other applications. Students will be given the opportunity to apply current technologies and production techniques to the delivering of image portfolios and other digital media content to the Internet. Interactivity, design, structure, viability and the successful delivery of ideas will be emphasized. (PHPS-212 Fundamentals of Layout and Design or equivalent experience) **Class 2, Lab 3, Credit 3 (F, S)**

**PHPS-316****Scanning Electron Microscope**

This course is designed to teach students how to operate and create images with a scanning electron microscope. Emphasis is on the understanding and optimization of the instrumental and photographic parameters associated with the SEM. A final poster is produced that examines and documents a single sample. (PHPS-202 Scientific Photography II) **Class 1, Lab 6, Credit 3 (S)**

**PHPS-321****Underwater Digital Photography**

This course is to prepare students for photographic assignments in an underwater environment. To accomplish this, students will complete basic scuba diving training and achieve a Professional Association of Dive Instructors (PADI) scuba diving certification. The student will become familiar with basic shooting techniques, underwater photography camera housings, accessories, and equipment care and maintenance. There is an additional course fee that covers equipment, off-campus facilities and insurance. (PHPS-102 Photography II) **Class 1, Lab 6, Credit 3 (F, Su)**

**PHPS-322****Advanced Diving and Underwater Imaging**

Students will develop underwater research skills, photo-documentation skills, underwater lighting techniques, camera positioning, working with a model, and working as a member of an interdisciplinary team. This course prepares students to complete a marine photographic project in an underwater environment. Students will as part of this course complete the PADI Advanced Diving Course and the Enriched Air Specialty Course. The project will take place in the Caribbean as part of the multidisciplinary experience. The final project will be a research paper and multimedia presentation. There is an additional cost for the study abroad class. (PHPS-321 Underwater Digital Photography or permission of instructor) **Class 1, Lab 6, Credit 3 (Other)**

**PHPS-402**                      **Photographic and Imaging Technologies Capstone**  
Similar to a thesis, students will submit a proposal, which is required before producing an approved project incorporating their skills either in a group or as a stand-alone experience. Faculty will sponsor the research and development of the final project. This activity will be a demonstration of the student's capabilities in their chosen areas of study. The project will be designed, developed and completed during the semester. Completed projects will constitute a substantial portfolio piece. (PHPS-202 Scientific Photography II) **Class 3, Lab 0, Credit 3 (F, S)**

**PHPS-498**                      **Photography Internship**  
The Photography Internship will provide students with the option to work in the photographic or visual communications field. Students may apply for internships to businesses based on the availability of positions and business job needs. Students must obtain permission of an instructor and complete the internship permission form to enroll. No more than 6 credits of internships can be applied towards their degree. **Class 0, Studio 0, Credit 1-3 (F, S, Su)**

**PHPS-499**                      **Cooperative Experience**  
At least one cooperative or internship experience is required of all Photographic and Imaging Technologies students for graduation. Co-ops are an opportunity for students to gain experience in their field and are generally completed between their second and third academic years. Co-ops are full- or part-time paid positions that are usually eight to 10 weeks in length for a minimum of 20 hours a week in a program-appropriate setting. The RIT Office of Cooperative Education and Career Services assists students in identifying and applying to co-op opportunities. (PHPS-202 Scientific Photography II) **Class 0, Lab 0, Credit 1-3 (F, S, Su)**

**PHPS-599**                      **Photography Independent Study**  
Photography Independent Study will provide students with the ability to study in a specialized area with an individual faculty member. Students, with the assistance of a faculty adviser will propose a course of study. Photography Independent Study students must obtain permission of an instructor and complete the independent study permission form to enroll. Students can only earn up to 6 credits of independent study toward completion of their degree. **Class 0, Lab 0, Credit 1-3 (F, S)**

## School of Print Media

### Media Arts and Technology

**MAAT-010**                      **Co-op Orientation**  
This course provides students with a venue for preparing for both the job search and for employment. Students learn how to access the job search database, to prepare cover letters and resumes, to make effective use of career fairs, and to participate in effective interviews through a mock interview process. **Class 0, Lab 0, Credit 0 (F, S)**

**MAAT-101**                      **Foundations**  
This course introduces students to the graphic media industries by studying the history, culture, technology, markets and workers. The course provides an orientation to the production concepts, working environments, hardware and software tools, languages, working standards and cultures of the industry. **Class 3, Lab 0, Credit 3 (F)**

**MAAT-106**                      **Typography and Page Design**  
The course provides an introduction to the theoretical and practical foundations of typography and page design. Students will study the history, aesthetics, and technology of typography. Projects will include design and production methods, using current software tools and fonts for typography in print and screen display. Students will apply their acquired knowledge to make informed decisions in the practice of typography. (MAAT-101 Foundations) **Class 3, Studio 0, Credit 3 (S)**

**MAAT-107**                      **Imaging**  
This course addresses the skills and competencies necessary to create, manage and edit digital images. This course introduces students to digital hardware, software, and terminology and addresses the process from acquisition, to manipulation and output of raster images. **Class 3, Lab 0, Credit 3 (S)**

**MAAT-206**                      **Print and Production Workflow**  
Students will learn industry best practices for print publishing applications. Students will prepare content to be printed across a variety of printing platforms. (MAAT-107 Imaging and MAAT-106 Typography and Page Design) **Class 2, Lab 3, Credit 3 (S)**

**MAAT-246**                      **Magazine Publishing**  
This class is an introduction to the basic concepts and methods of magazine design and production workflow, with the practical experience of producing a cross-media magazine for output to a digital device and print. Special attention is given to the use of images in integration with text, grids, and the role of experimentation and innovation in the modern magazine. **Class 2, Lab 3, Credit 3 (F)**

**MAAT-256**                      **Principles of Printing**  
This course surveys the materials and processes used in print reproduction. Students will learn the basic theory of image reproduction embodied in the analog and digital printing processes, and learn to identify the process origins of print samples. Additionally, students will be introduced to material science as it relates to print. **Class 3, Lab 0, Credit 3 (F)**

**MAAT-266**                      **Advanced Workflow**  
This advanced course focuses on analysis of workflow efficiencies, process automation, and process optimization with a focus on relevant applications for publishing, promotional, and packaging production workflows. Students will gain direct experience with advanced workflow tools through immersive project work. (MAAT-206 Print Production Workflow) **Class 2, Lab 3, Credit 3 (F)**

**MAAT-271**                      **Webpage Production I**  
Students in this course will plan and implement publishing projects with a focus on usability, accessibility, and information design for the World Wide Web. Application of standard Web protocols such as HTML and CSS will be applied in the context of Web publishing as a part of a cross-media production strategy. (MAAT-107 Imaging, MAAT-106 Typography and Page Design) **Class 3, Lab 0, Credit 3 (F)**

**MAAT-272**                      **Webpage Production II**  
In this advanced course, students will apply concepts and skills from previous study to determine optimal strategies for the development, deployment and evaluation of websites. Through a blend of research and practical application, students will evaluate and apply a range of methodologies for Web publishing. (MAAT-271 Webpage Production I) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-301**                      **Database Publishing**  
The course introduces the fundamental design elements of databases constructed for the activities that support the publishing process. Topics include the process of building databases comprised of information and digital assets needed to compose publications and to create and distribute personalized documents through the Web and in print. (MAAT-107 Imaging, MAAT-106 Typography and Page Design) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-302**                      **Professional and Technical Writing**  
This course prepares a student to engage in a variety of written and oral communications necessary in academic and business environments. Students are expected to produce appropriate audience-centered written materials that achieve a desired purpose based on techniques, organization, format, and style. A formal technical report and presentation are required. Students must pass this course with a grade of B or higher prior to graduation or pass the Writing Competency Test. **Class 3, Lab 0, Credit 3 (F)**

**MAAT-306**                      **Cross Media Publishing**  
In the course the students will research current and emerging publishing information technology trends and apply them in creating publishing solutions across a variety of platforms. Students will learn and apply digital asset management methods and practices. (ISTE-105 Web Foundations) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-307**                      **Media Business Basics**  
This course introduces principles in core business areas, such as management, finance, accounting, operations, and marketing, which are key factors in developing, growing, and operating a media venture. Students bring these strategic areas together in developing a 12-part business plan for a venture of their own creation. **Class 3, Lab 0, Credit 3 (S)**

**MAAT-336**                      **Digital Asset Management**  
This advanced course focuses on the development and application of digital asset management strategies for cross media production workflows. Project work will include the development of asset management strategies and the utilization of a blend of desktop and enterprise-level DAM tools and systems. (MAAT-306 Cross Media Publishing) **Class 3, Lab 0, Credit 3 (F)**

**MAAT-355** **Media Law**  
Multimedia Law offers an opportunity to investigate the philosophical and constitutional foundations of free expression as it relates to speech, writing, image making and publishing. First Amendment principles will be studied with respect to personal protection boundaries. The course will provide a survey covering defamation issues. Students should be able to form educated opinions about libel and slander boundaries. Since the publication discipline involves the creation of original work, a study of copyright, patent and trademark law will be provided. **Class 3, Lab 0, Credit 3 (F, S)**

**MAAT-356** **Multimedia Strategies**  
This course is designed to explore all of the available mass media and customized communications technology options for effectively reaching consumers. It will explore marketing across multiple channels, focusing primarily on interactive marketing channels. The emphasis will be on development of the right mix of marketing communications techniques. (MAAT-101 Foundations or MAAT-256 Principles of Printing) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-357** **Color Management Systems**  
This course addresses the science and technology of color management systems in achieving quality color reproduction and scanner-monitor and proof-print agreement. Students will study the role of color measurement for device calibration, device characterization, and building an ICC-based color management system. Students will perform color image rendering from digital capture to print, investigate digital proofing and soft and remote proofing, and evaluate color management system performance. Process control tools and analysis of control targets will also be covered. (MAAT-107 Imaging) **Class 2, Lab 3, Credit 3 (S)**

**MAAT-359** **Media Distribution and Transmission**  
In this course students gain extensive knowledge of the various methods and techniques used to electronically and physically distribute information. Students will also study planning, scheduling, inventory management and customer fulfillment. **Class 3, Lab 0, Credit 3 (F)**

**MAAT-361** **Digital Print Processes**  
This course provides students with the opportunity to learn the concepts and applications of digital printing. Students will examine the technology of several major digital print engines and compares digital printing to conventional print processes. The economics and application of specific digital printing processes are examined from a workflow perspective. (MAAT-101 Foundations) **Class 2, Lab 3, Credit 3 (F)**

**MAAT-363** **Media Industries Analysis**  
This course examines the major industries closely allied with the printing industry: advertising, publishing, and packaging. The intent is to give students in-depth knowledge of (1) the structure of each of these industries; (2) the channels and methods through which and by which each distributes its products and services; and (3) the major customers/clients of its products and services. Particular attention will be devoted to investigating the business models for the use of print to create value in advertising, publishing, and packaging. **Class 3, Lab 0, Credit 3 (S)**

**MAAT-364** **Digital News Systems Management**  
This course examines the evolving forms and functions of news media publishing. The focus is on the intersections of various systems necessary for contemporary news publishing: information technology, content management, audience assessment, human resource management and product delivery. **Class 3, Lab 0, Credit 3 (S)**

**MAAT-366** **Introduction to Book Design**  
Introduces the history, aesthetics, and technology of book design, with emphasis on typography, digital methods, and digital print media. Projects include page design, typographic investigation, legibility study, and print production. Includes visits to RIT Cary Collection, book store, and SPM Digital Publishing Center. Students will create and print a book as a course project. (MAAT-106 Typography and Page Design or equivalent typography course) **Class 3, Lab 0, Credit 3 (F)**

**MAAT-367** **Image Processing Workflow**  
This course concentrates on the image processing variables and techniques required for producing high-quality color reproductions for a variety of output technologies. Emphasis will be placed on optimizing both image quality and workflow efficiencies from digital capture to final output. Topics include file formats, image processing strategies, color conversion and effective proofing techniques. (MAAT-107 Imaging) **Class 2, Lab 3, Credit 3 (S)**

**MAAT-368** **Gravure and Flexography**  
The course analyzes the infrastructure as well as the print production workflows in the gravure and flexographic printing industries. Students will be introduced to the business of gravure and flexography for publication, packaging and special product applications. In addition to learning these two high-volume printing technologies, students will meet and interact with printing industry professionals on campus and take an extensive industry field trip to visit cylinder engravers and flexographic and gravure printing plants. (MAAT-256 Principles of Printing or MAAT-206 Print Production Workflow) **Class 2, Lab 3, Credit 3 (S)**

**MAAT-369** **Bookbinding**  
The growing interest in digital printing processes has created a desire to bind small editions and single copies of books. This course is an introduction to the many different hand-binding options ranging from single-section pamphlets to hardcover books. The materials and techniques learned are applicable to the finishing of on-demand publications as well as creating one-of-a-kind presentations. **Class 2, Lab 3, Credit 3 (F, S)**

**MAAT-371** **Print Finishing Management**  
This course explains and demonstrates why planning for successful print finishing requires in-depth knowledge of production, from design planning through prepress, print, bindery, and distribution operations. Emphasis is placed on cost-effective planning, management, and control in a contemporary print-finishing environment. (MAAT-101 Foundations) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-376** **Lithographic Process**  
This course provides detailed fundamentals of the equipment and materials used in the lithographic process. Topics include press, inks, substrates, and pressroom management. There is an emphasis on process color printing and problem solving press and process variables that impact quality and productivity. (MAAT-206 Print Production Workflow) **Class 2, Lab 3, Credit 3 (F)**

**MAAT-377** **Advanced Retouching and Restoration**  
This course demystifies the process for digitally enhancing, retouching, and restoring images in industry standard raster software. This class is designed for students who have a solid working knowledge of current industry standard raster software and are interested in advancing their skills in digital image enhancement retouching and restoration. This course includes image acquisition and specialized image manipulation techniques used to retouch, reconstruct, restore, and enhance images. (MAAT-107 Imaging) **Class 2, Lab 3, Credit 3 (F)**

**MAAT-383** **Design Production**  
This introductory course provides students with the fundamental understanding of the key variables, systems and phases of production workflow. Emphasis will be placed on job planning, implementation strategies and decision-making processes for print and e-media production workflow. Projects will allow students to optimize their work for specific production requirements as well as to optimize content and workflow strategies for cross-media applications. **Class 3, Lab 0, Credit 3 (S)**

**MAAT-401** **Team Project**  
This course is designed to engage the students in a capstone production experience. Students will work in teams and interact with selected clients to design, complete and budget a multi-media project. (MAAT-307 Media Business Basics) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-457** **Printing Process Control**  
Test targets and color measurement technology are tools used in calibrating various components in a color reproduction system. This course will integrate many technical disciplines, e.g., metrology, process control, and color management, to make a color imaging system repeatable and predictable. Emphases will be placed on selecting test targets, color measurement, and data analysis tools for evaluation of device-level and system-level performance. (MAAT-357 Color Management Systems) **Class 2, Lab 3, Credit 3 (S)**

**MAAT-499** **Media Arts and Technology Co-op**  
The Media Arts and Technology co-op provides students with the opportunity to work in a position related to their major field of study. The position should be a full-time, paid position. The total time should be 20 weeks which can be spent at one firm or at two different firms. Students may use the summer session, the intercession, or either semester for their co-ops. (MAAT-010 Co-op Orientation) **Class 0, Lab 0, Credit 1-3 (F, S, Su)**

**MAAT-503****Operations Management in the Graphic Arts**

An in-depth study of the factors affecting the efficiencies and effectiveness of print media organizations and ultimately their profitability. Includes consideration of both internal factors, such as quality level goals, training, scheduling, plant layout, and financial management, and external factors, such as environmental and legal issues and safety enforcement. (MAAT-101 Foundations) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-558****Package Printing**

This course introduces students to the package printing industry. Printing processes, materials, production workflows and quality control systems used in package printing will be introduced. Students will take several packages from creation to final printed product. (MAAT-101 Foundations) **Class 2, Lab 3, Credit 3 (S)**

**MAAT-561****Industry Issues and Trends**

This course presents a detailed analysis of the critical trends and issues related to the graphic media publishing industry. It provides an in-depth look at key technologies as well as business, environmental and regulatory issues. This course provides a capstone experience that contributes to the student's fuller understanding of management of the graphic media publishing industry. This course prepares students for successful careers by providing insights into the nature and scope of the major challenges facing industry managers and leaders and how to manage these challenges. **Class 3, Lab 0, Credit 3 (F)**

**MAAT-563****Estimating Practice**

This course examines the use of estimating practices and the development of production standards, and all-inclusive costs for both print and electronic media jobs. It includes consideration of the most cost-effective production sequence. (MAAT-307 Media Business Basics or permission of instructor) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-566****Typography Research**

The course builds on fundamentals and skills taught in introductory and advanced typography courses by developing methods of investigation, research, and analysis, with the goal of enabling students to conduct independent research. Students choose individual typographic topics to research (e.g., technology, psychology, history, aesthetics, imaging, writing systems, culture, and society). Course lectures survey these topics. Students each give presentations on their topics and prepare a written report. The course emphasizes individual initiative and seminar participation. (MAAT-106 Typography and Page Design, plus an additional course in typography, or two other courses in typography, or permission of instructor.) **Class 3, Lab 0, Credit 3 (S)**

**MAAT-599****Independent Study**

The Independent Study course in media arts and technology provides students with the means for obtaining academic credit for work and/or research on topics related to the media arts and technology curriculum but not covered in the desired breadth or depth. The student works with an instructor to establish the objectives, content, and evaluation protocol for the study. **Class 0, Lab 0, Credit 1-6 (F, S, Su)**



# College of Liberal Arts

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Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

## Anthropology

### ANTH-102

#### Cultural Anthropology

This course explores how human beings across the globe live and work according to different values and beliefs. Students will develop the tools for acquiring knowledge, awareness, and appreciation of cultural differences, and in turn enhance their abilities to interact across cultures. The course accomplishes these aims by examining the relationship between individuals and their communities, and the dynamics of ritual, religious, political, and social life in different parts of the world. Counts toward the sociology and anthropology major; sociology and anthropology minor; cultural anthropology immersion. **Class 3, Credit 3 (F, S)**

### ANTH-103

#### Archaeology and the Human Past

Archaeology is the study of the human past, from the origin of our species through to the development of modern, industrial states by means of the physical remains of past human behavior. In studying the past, archaeology seeks to explain how we, as modern humans, came to be. This course investigates how archaeologists study the past, explains how human society has changed over time, and presents an overview of world prehistory. Specific topics include the evolution of modern humans, the peopling of the world, the development of agriculture, the rise of state-level societies and associated social technologies such as writing and urbanism. Case studies will be used throughout to demonstrate how archaeological research is conducted and how archaeologists use their research to formulate explanations of the past that have relevance for the present. Counts toward the sociology and anthropology major; sociology and anthropology minor; archaeological science minor; archaeology immersion. **Class 3, Credit 3 (F, S)**

### ANTH-104

#### Honors Cultural Anthropology

Cultural anthropology is the global study of cultural diversity and change, with the aim of understanding the human condition. Cultural anthropologists develop and refine social theory through use of research techniques such as cultural immersion, open-ended interviews, visual anthropology, and linguistic analysis. Taking a comparative perspective, contemporary anthropologists explore topics such as transnational migration, ethnic nationalism, racism, gender and sexuality, indigenous peoples' rights, religious fundamentalism, violence and genocide, hunger, colonialism, international development, and globalization. This course introduces you to the field of cultural anthropology and explores one topic in greater depth. Counts toward the sociology and anthropology major; sociology and anthropology minor; cultural anthropology immersion. (Honors Program status or permission of instructor) **Class 3, Credit 3 (annually)**

### ANTH-201/SOCI-201

#### Writing about Society and Culture

This course explores the process of research and writing in anthropology and sociology. By way of conducting your own library research project, you will become familiar with how research questions are formulated, the purpose and process of scholarly literature review, and how to conduct library research in the disciplines. We will also consider why anthropologists and sociologists write the way they do and ongoing debates about representation and authorship. Cross-listed with SOCI-201. (Any one of the following: ANTH-102 Cultural Anthropology, ANTH-103 Archaeology and the Human Past, SOCI-102 Foundations of Sociology, SOCI-103 Urban Experience, INGS-101 Global Studies, or permission of instructor) **Class 3, Credit 3 (F)**

### ANTH-210

#### Culture and Globalization

This course explores critical issues of globalizing culture. How are ideas, attitudes, and values exchanged or transmitted across conventional borders? How has the production, articulation, and dissemination of cultural forms (images, languages, practices, beliefs) been shaped by global capitalism, media industries, communication technologies, migration, and tourist travels? How are cultural imaginaries forged, exchanged, and circulated among a global consumer public? How has the internationalizing of news, computer technologies, video-sharing websites, blogging sites, and other permutations of instant messaging served to accelerate cultural globalization? Students will be introduced to anthropological perspectives on cultural globalization, the transmission of culture globally, and the subsequent effects on social worlds, peoples, communities, and nations. (Second-year status) **Class 3, Credit 3 (S)**

### ANTH-215

#### Field Methods in Archaeology

This course introduces students to the methods of archaeological fieldwork. The course begins with the student's development of a research question and design. We then explore the feasibility of this research through the examination of sampling techniques, site survey, and excavation. Field methods of recording, photography and artifact conservation will also be discussed. Students will be able to analyze the usefulness of the field techniques in light of the archaeological scientific methods for dating, and organic and inorganic analyses. Students should emerge from the course understanding the values of the techniques necessary for proper archaeological excavation towards the reconstruction of the past and the development of an understanding of our present. Counts toward the sociology and anthropology major; sociology and anthropology minor; archaeological science minor; archaeology immersion. **Class 3, Credit 3 (S)**

### ANTH-220

#### Language and Culture

This introductory course in linguistic anthropology surveys the great variety of ways humans communicate both verbally and non-verbally with an emphasis on cross-cultural communication. The course explores the complex interplay between language and culture. Topics include: metaphor and narrative; language acquisition and socialization; language, thought and worldview; language and identity; multilingualism; language change; literacy; and the politics of language use and language ideologies. Counts toward the sociology and anthropology major (cultural anthropology track) and sociology and anthropology minor. **Class 3, Credit 3 (F, bi-annual)**

### ANTH-225

#### Globalizing Africa

This course introduces students to processes of interconnection, local, regional, national and global, that have altered and continue to impact life in Africa, taking into account the enormous impact of Africans on one another and on those of us living outside of the continent. In the course, we will focus on how past, present and anticipated future events in African movements of people, ideas and things, across time and space effect the reception of new events. We will pay particularly close attention to how the relationships of time and space are formulated and understood by Africans in the present. While the historical past is never completed, but continuous in the present, its diverse contours lead to differently remembered, embodied, and enacted expressions. We will evaluate these diverse expressions in pre-colonial, colonial and neo-colonial encounters as they have changed ideas of self and other, political philosophies and political economic systems, genders and sexualities, generational relations, religions, expressive arts, violence, and health on the African continent and around the globe. **Class 3, Credit 3 (F)**

**ANTH-230****Great Discoveries in Archaeology**

Archaeology conjures a romantic image in the minds of many people and almost everyone is at least familiar with some of the greatest discoveries made by archaeologists. Finds such as King Tut's tomb, the ancient city of Troy, the jungle cities of the Maya, and Otzi the Ice Man excite almost anyone who hears of them. But what is it, aside from fabulous wealth, romantic locale, or incredible preservation that makes them great? Although great discoveries are always exciting, archaeology is not only about finding things, but also about using these findings to explain the human past. This course explores some of the great discoveries of archaeology, many of which will be familiar to the student, to demonstrate how archaeologists construct an explanation of human prehistory and cultural change. (ANTH-103 Archaeology and the Human Past) **Class 3, Credit 3 (F/S alternating years)**

**ANTH-235****Immigration to the U.S.**

This course examines immigration to the U.S. within the context of globalization. We examine the push- and pull-factors that generate immigration, and changing immigration policies and debates. We consider how changes in the American workplace have stimulated the demand for foreign workers in a wide range of occupations, from software engineer to migrant farmworker and nanny. We review the cultural and emotional challenges of adapting within the American cultural landscape; transnationalism and connections with the homeland; the experiences of refugees; and how immigration has changed since 9/11. Special attention is given to immigration from Latin America, the largest sending region. Counts toward the international and global studies program (globalization concentration elective; Latin America track); sociology and anthropology program (cultural anth track); sociology and anthropology minor; cultural anthropology immersion; globalization theory immersion. **Class 3, Credit 3 (F)**

**ANTH-240****Muslim Youth Cultures**

In recent years, there has been an explosion of interest in youths and Muslim youths, in particular, as a result of increased media attention to security, religious extremism, and human rights. These concerns, while important, obscure other equally vital aspects of being young and Muslim in rapidly globalizing societies. Taken in isolation of other informational sources, media representations of Muslim youths contribute to severe forms of misinformation and to negative stereotypes, sources of social anxiety and potential conflict. Students taking this course, by contrast, will develop critical, anthropological approaches to youths and Muslim youth cultures, taking up Muslim youths' concerns with important aspects of their lives, generation and authority; global capitalism and class distinctions; religious identifications; spaces of memory and the control of public space; global education; new technologies and their affects on sociality, gender and sexuality; war and occupation; and expressive arts. Through in-depth studies of Muslim youth cultures in the Middle East and Africa, the course offers broad perspectives on the diversity and complexity of Muslim youth cultures and their affects on changing societies, cultures, nations and the world. **Class 3, Credit 3 (S)**

**ANTH-245****Ritual and Performance**

The world's cultural diversity is most vividly and dynamically displayed through ritual and festival. Ritual is anything but superfluous; rather, some of the most important "work" of culture is accomplished through the performance of ritual. Through cross-cultural comparison, by way of readings and films, we explore the following dimensions of ritual: symbols, embodiment, emotion, discipline, contestation of tradition and authenticity, and the orchestration of birth, childhood socialization, gender, maturation, marriage, community, hierarchy, world renewal, and death. Written expression is enhanced through drafting, revision, and peer review. Counts toward the sociology and anthropology program (cultural anth track); sociology and anthropology minor; cultural anthropology immersion; religious studies immersion. **Class 3, Credit 3 (Semester varies, biennial)**

**ANTH-250****Themes in Archaeological Research**

One of the most fascinating dimensions of archaeology is the discovery that people have done essentially the same things in different places and different times, independently of developments elsewhere. Agriculture, writing, urbanism, complex economies, and so on, all have been independently invented multiple times in different parts of the world. This fact raises some intriguing questions about what it means to be human. By comparing how these developments occurred in different places and times, archaeologists can, in a sense, perform experiments on the past. Each semester this course is offered we will focus on a separate theme in archaeological research, such as the transition to agriculture; production, trade, and exchange; the origin of writing; imperialism, colonialism, and warfare; pseudoscience/pseudoarchaeology; or human evolution. We will study competing theoretical perspectives and different world regions to gain a broad understanding of the theme and how both theory and data are used to create a comprehensive understanding of the human past. (ANTH-103 Archaeology and the Human Past) **Class 3, Credit 3 (F, S alternating years)**

**ANTH-255****Regional Archaeology**

Since the first humans set out from Africa nearly two million years ago, our ancestors and relatives managed to settle in almost every continent. Wherever they went, they left traces of their lives that are tens of thousands to hundreds of thousands of years deep. We call these traces the archaeological record. Almost everywhere our ancestors settled, they did many of the same things, such as inventing agriculture, cities, writing, and state-level societies. However, they did this in ways unique to each region and time. This course examines the archaeology of a specific region, such as Mesopotamia, Mesoamerica, North Africa, or East Asia, in detail. We examine the geography, culture, archaeological record, and significance of the region to various key themes in archaeological research. (ANTH-103 Archaeology and the Human Past) **Class 3, Credit 3 (F, S alternating years)**

**ANTH-260****Native North Americans**

This course will examine persistence and change in Native American cultures using archaeological, ethnohistorical, ethnographic, linguistic, and autobiographical sources, among others. In addition to broad regional and historical coverage, we will read about and discuss culture change, colonialism, federal law, gender, race, and places in Native American contexts. Our goal is to understand the lived experiences of Indian people and the many forces that shape Native American lives. **Class 3, Credit 3 (S)**

**ANTH-265****Native Americans in Film**

This course will examine the parallels of anthropological works and resulting government policies in the late 19th and 20th centuries as they relate to the genre of Native American film, both popular and ethnographic works. In addition, an extensive regional and historical literature review will complement the possible films. **Class 3, Credit 3 (F)**

**ANTH-270/INGS-270****Cuisine, Culture, and Power**

Physically, culturally, and socially, humans live through food and drink. Spanning the globe, as nearly limitless omnivores, humans have developed myriad ways of collecting and cultivating food and taking advantage of local environments. We also put food to work for us socially by creating cuisine. Through cuisine, we forge and nourish relationships, commune with deities, and through luxury choices, demonstrate our "taste" and lay claim to elite status. Through the cultural practices of production and consumption of food and drink, we wield power. Food and drink consumption patterns have sustained slavery, poverty, malnutrition, and illegal immigration, and have laid waste to the environment. In this class, we explore physical, cultural, social, political, and economic dimensions of food and become more aware of how the private, intimate act of a bite connects us to the rest of humanity. Counts toward the international and global studies program (sustainable futures track); sociology and anthropology program (cultural anth track); sociology and anthropology minor; cultural anthropology immersion. Cross-listed with INGS-270. **Class 3, Credit 3 (F, biennially)**

**ANTH-301/SOCI-301****Social and Cultural Theory**

This course explores influential classical and contemporary theories regarding society and culture. Students will assess the utility of different theories in addressing key enduring questions regarding human behavior, the organization of society, the nature of culture, the relationship between the individual and society, social control and social conflict, social groups and social hierarchy, the operation of power, cultural and social change, and the interplay between the global and the local. Theories will be marshaled to shed light on contemporary social and cultural phenomena and problems such as crime, violence, exploitation, modernity, and globalization. Cross-listed with SOCI-301. (Any one of the following: ANTH-102 Cultural Anthropology, ANTH-103 Archaeology and the Human Past, SOCI-102 Foundations of Sociology, SOCI-103 Urban Experience, INGS-101 Global Studies, or permission of instructor.) **Class 3, Credit 3 (varies)**

**ANTH-302/SOCI-302****Qualitative Research**

Learning about social and cultural groups is a complex and ethically sensitive process. In this course, we explore common qualitative research methods for social and cultural research. We evaluate the utility of such methods for different purposes and contexts, including cross-cultural contexts. We consider common ethical dilemmas in research with human subjects, the ethical responsibilities of researchers, and common techniques for minimizing risks to subjects. Counts toward the international and global studies degree; sociology and anthropology degree; sociology and anthropology minor. Cross-listed with SOCI-302. (Any one of the following: ANTH-102 Cultural Anthropology, ANTH-103 Archaeology and the Human Past, SOCI-102 Foundations of Sociology, SOCI-103 Urban Experience, INGS-101 Global Studies, or permission of instructor.) **Class 3, Credit 3 (F)**

**ANTH-303/SOCI-303****Quantitative Research**

The research conducted by sociologists and anthropologists generates large, complex data sets that are difficult to interpret subjectively. Multivariate quantitative methods are an important tool for understanding these data. This course presents an introduction to quantitative research in sociology and anthropology: how to craft a research question and research design that utilize quantitative data, how to select appropriate quantitative techniques and apply them, how to present results, and how to critically evaluate quantitatively based knowledge claims. Topics include: research design, collecting and coding data, non-metric data, data screening, exploratory data analysis, selection and use of appropriate analysis techniques, comparing groups, exploration of variance, classification, and modeling. The course features laboratory exercises and a final project in which the student selects a research problem and data set, which they analyze and present to the class. Counts toward the sociology and anthropology degree; sociology and anthropology minor. Cross-listed with SOCI-303. (Any one of the following: ANTH-102 Cultural Anthropology, ANTH-103 Archaeology and the Human Past, SOCI-102 Foundations of Sociology, SOCI-103 Urban Experience, INGS-101 Global Studies, or permission of instructor.) **Class 2, Lab 2, Credit 3 (S, biennially)**

**ANTH-310****African Popular Cultures**

For most people in Africa, participating in popular cultures may be the best or only means of political expression. Yet, here in the United States, we rarely, if ever, have access to these forms, nor are they sufficiently linked in our imaginations to political processes in Africa or around the world. Rather, ideas and images about Africa come to us through the lenses of American or European cultures and media—Conrad's *Heart of Darkness*, exotic depictions in *National Geographic*, or CNN images of massacres in the Sudan. These images and the discourses that frame them tend to distance us from African experiences and expressions. By contrast, students, in this course, will assess the links between popular cultures and politics, with special attention to anthropological theory about African colonial and postcolonial literature, music, oral and ritual expressive forms, and visual media, and the particular political contexts through which they emerge and are performed. Through the popular cultures of diverse African communities, we will assess the politicization of identity, and the relations of African communities to ethnic, national, religious and global networks. By the end of the course, students will have an understanding of the enormous impact of popular cultures through which Africans express political sentiments that might otherwise be suppressed. **Class 3, Credit 3 (S)**

**ANTH-315****The Archaeology of Cities**

The long course of the human existence has been marked by a series of revolutions that have profoundly changed society and that ultimately produced the world we live in today. One of the key revolutions that made our world possible was the invention of urbanism. Cities first appeared in Mesopotamia about 6,000 years ago and since then have been independently invented in many different parts of the world. This course focuses on the pre/historical trajectories of urban development in different world regions, the multiple roles of cities, and their impact on the development of complex societies. We attempt to understand and explain how the city has developed and contributed to the constitution of modern society. Throughout the course we will work on developing a working definition of the city that encompasses urbanism in all its many forms. (ANTH-103 Archaeology and the Human Past) **Class 3, Credit 3 (F, biannually)**

**ANTH-325****Bodies and Culture**

This course examines the body in culture, society, and history. The course materials draws on comparative approaches to the cultural construction of bodies, and the impact of ethnic, gender, racial ideologies on body practices (i.e., surgical alteration, mutilation, beautification, surrogacy, erotica). We will critically investigate the global formation of normative discourses of the body (regarding sexuality, AIDS/illness, reproduction, fat/food) in medical science, consumer culture, and the mass media. The course will be discussion, writing, and project oriented, encouraging students to acquire a range of analytic skills through a combination of text interpretation and research. Counts toward the soc/anth, degree (cultural and anthro track), international and global studies degree, the minor in soc/anth, the minor in visual studies, the minor and immersion in women's and gender studies, the immersion in cultural anthropology, and the immersion in health and culture. (ANTH-102 Cultural Anthropology, or INGS-101 Global Studies or permission of instructor.) **Class 3, Credit 3 (S)**

**ANTH-330****Cultural Images of War**

This course critically examines the visual culture of war and terror in a global world from an anthropological perspective. Representations of violence are endlessly transmitted on television, on the internet, in print media, in cinema, and recreational games to become part of our everyday visual culture. Whether disseminated as news, documentary truth, or entertainment, the ubiquitous encounters with images of violence require a new form of visual literacy that not only highlights the intersection of the local and the global, but also recognizes the ways in which visual technologies, cultural politics of memory and history, media practices, and national ideologies intervene in the formation of a visual culture of war and terror. Counts toward the major in international and global studies; the major in anthropology and sociology. (INGS-101 Global Studies or ANTH-102 Cultural Anthropology or permission of instructor) **Class 3, Credit 3 (S)**

**ANTH-335****Culture and Power in Latin America**

This course examines cultures of Latin America and the Spanish-speaking Caribbean in the context of political and economic forces that have shaped them. We consider Spanish and Portuguese colonialism and its modern-day legacies, including ethnic inequalities, economic vulnerability, and social unrest. We look at how art, music, and literature have engaged critically with the forces of fascism, revolution, socialism, dictatorship, and neo-colonialism. We consider indigenous activism, religious diversity, changing experiences and expectations of women and men, rebellion and revolution, impacts of and creative responses to globalization, and Latinos in the U.S. Counts toward international and global studies major (Latin Am, indigenous studies tracks); sociology and anthropology major (cultural anth track); sociology and anthropology minor; cultural anthropology immersion; social inequalities immersion. **Class 3, Credit 3 (Semester varies)**

**ANTH-340****Divided Europe**

As Europe strives for political and economic unity, we see a concurrent push toward inequality, exclusion, and marginalization: minorities, immigrants, refugees, Blacks, Muslims, Jews, Roma or Sinti, and women struggle against discrimination. Not only the legacy of colonialism but the revitalization of nationalism shape contemporary European cultural politics. Based on an anthropological perspective, this course examines ways in which we can understand a divided Europe through the intersections of race, ethnicity, class, gender, and religion. Counts toward the major in international and global studies, the major in anthropology and sociology. (INGS-101 Global Studies or ANTH-102 Cultural Anthropology or permission of instructor) **Class 3, Credit 3 (F or S)**

**ANTH-345****Genocide and Post-conflict Justice**

The destruction and survival of societies often hinges upon the ideas and the social, cultural constructions of identity and belonging. When ideas fail to incorporate people, essentialist categories of identity, historical memory, and accounts of extreme violence become interrelated, potent sources of destruction. Slavery and exclusive ownership of resources leave people starving or living in perilously polluted environments. Globalizing cultural economies threaten local systems and self-representation. Group identities may be “sites” of crises within nation-states and global political, economic and cultural processes. In this course, we will take critical, anthropological approaches to studies of ethnocide, genocide and post-conflict justice. Students will use critical, anthropological approaches to assess ethnocides and genocides from the 19th century forced assimilation and slaughter of Native Americans and Amazonian Indians to more recent genocides in Cambodia, Bosnia, Rwanda, and the Sudan, to understand the impact of globalization on techniques and technologies of genocides, the legal, moral/personal responsibility for genocides, media representations of genocides, and the affects of cultural, historical memory and social, global inequities upon future genocides. Students will use anthropological perspectives on genocide to assess post-conflict concepts of justice, reconstruction and reconciliation and local-global debates about their cultural resonance and effectiveness. Counts toward sociology/anthropology major (cult anth track). (INGS-101 Global Studies or ANTH-102 Cultural Anthropology or permission of instructor) **Class 3, Credit 3 (S)**

**ANTH-350****The Global Economy and the Grassroots**

Economic globalization has given birth to global, grassroots social movements. This course examines how global economic integration is brought about through multilateral institutions, multinational corporations, outsourcing, trade agreements, international lending, and neoliberal reforms. We consider impacts (cultural, economic, and health) of these trends on employees, farmers, small businesses, consumers, and the environment in the developed and developing worlds (with special emphasis on Latin America). We examine beliefs, alternative visions, and strategies of grassroots movements responding to these challenges. Counts towards international and global studies (globalization core and Latin America track); sociology/anthropology major (cultural anthro track); sociology and anthropology minor; cultural anthropology immersion; globalization theory immersion. (Second-year status) **Class 3, Credit 3 (semester varies)**

**ANTH-355****Historic Archaeology**

This course introduces students to historic archaeology as an approach to understanding past cultures. Historic archaeology uses the study of material evidence, in concert with documentary evidence, in a multidisciplinary approach to developing reconstructions of the past. The course, through the study of material culture approaches, addresses a variety of issues including ethnicity and identity, colonialism and culture contact, and gender and sexuality through a variety of readings of ethnohistorical texts and case studies on past societies. Through these readings, and the lectures and discussions, students will develop an understanding of different societies and their material cultures, and also learn processes of seeking multiple lines of evidence that may lead to corroborating or refuting hypotheses about historic societies. While the readings in the course cover a number of world regions, particular emphasis is placed on case studies drawn from the Americas. Counts toward sociology and anthropology major (archaeology track). **Class 3, Credit 3 (S, biannually)**

**ANTH-360****Humans and their Environment**

Humans and their societies have always been shaped by their environment, but as human societies became more complex, their relationship with their environment changed from one of simple adaptation to one in which they had the power to change their environment. Often, the changes they have wrought have had unintended consequences, forcing societies to adapt to the changes that they themselves have brought about. Although we tend to think that this is a relatively recent phenomenon, humans have been altering their environment since the first human societies made the transition to agriculture over ten thousand years ago, if not longer. In this class, we will use the tools of environmental archaeology to explore the history of human interactions with their environments and to draw lessons on how we could manage that interaction today. Counts toward the archaeology track of the sociology and anthropology major. (ANTH-103 Archaeology and the Human Past) **Class 3, Credit 3 (F, biannually)**

**ANTH-365****Islamic Culture and the Middle East**

This interdisciplinary course focuses on introducing the fundamentals of the Middle East (a region which includes North Africa), with an emphasis on Islam, to students with little or no prior background in the region or the culture. The framework of Islam is used to explore the significance of how religion—with its prescriptions for and proscriptions against certain behaviors and societal and cultural norms—constructs and shapes ways of knowing and understanding material and performance culture. The four themes to be addressed include: (1) foundations of Islam, (2) Islamic law and Islamic sects, (3) material and performance culture in Islam, and (4) Islamic culture and the West. The rationale for this course is to help students recognize and interpret fundamental concepts of Islamic cultures, to demonstrate how Islamic culture has shaped technologies used in the Middle East, to encourage students’ independent thinking about topical events concerning Islam and the Middle East within their historical perspective, and to inspire students to examine how their own cultures change and adapt to the various current global situations involving the Middle East. Counts toward the sociology/anthropology major (arch track), international and global studies major (Middle East track). **Class 3, Credit 3 (F, biannually)**

**ANTH-370****Media and Globalization**

This course examines the cultural importance of mass media in the context of globalization. By analyzing the global flows of media images across national borders, emphasis is given to the cultural, social, and political impact of global media culture on communities in different parts of the world. How, for example, do mass media represent or shape cultural values and beliefs in developing societies? What is the role of mass media in forging national and ethnic identities, body images, cultural constructs of sexuality and gender, and the perceptions of war and violence in different societies? Counts toward the major in international and global studies, the major in anthropology and sociology. (INGS-101 Global Studies or ANTH-102 Cultural Anthropology or permission of instructor) **Class 3, Credit 3 (F or S)**

**ANTH-375****Native American Repatriation**

NAR addresses issues surrounding cultural objects, contested ownerships, repatriation, reparations, legal compliance, museum technologies and the ever-changing role of repositories. This course facilitates experiential learning including work with the Rochester Museum and Science Center. Lectures, round-table discussions, and instruction are provided by museum professionals, nationally renowned speakers, and Native American representatives. At the conclusion of this course students will comprehend the breadth of federal legislation regulating human remains and objects of cultural patrimony, the complex legal and social issues facing museums and communities, and the opportunities that exist as NAGPRA enters into its third decade since ratification in 1990. Counts towards the sociology/anthropology major, international and global studies major (indigenous studies track). **Class 3, Credit 3 (F)**

**ANTH-380****Nationalism and Identity**

Nationalism is often described in terms of strong sentiments and acts of self-determination on the part of members of a nation as distinct from the state that is necessarily a territorially and politically defined entity. This course will explore leading theories related to the origins of contemporary nationalism and nationalism’s importance within the context of state societies, especially in Europe. The past as an invented historical or imagined reality will be highlighted, as invented pasts contribute to claims for exclusive national culture and both exclusive and contested identities. The relationships between culture, literacy, and capitalism will be applied to understanding select historical and ethnographic cases of nationalism. **Class 3, Credit 3 (varies)**

**ANTH-410****Global Cities**

This course examines the impact of global dynamics on cities from the early twentieth century to the present. By tracing urban formations from metropolis to global city, emphasis will be placed on the making of identities, communities, and citizens in the architectural spaces, cultural places, ethnic zones, and media traces of urban life in the context of globalization. Counts toward the major in international and global studies; the major in anthropology and sociology. (INGS-101 Global Studies or ANTH-102 or permission of instructor) **Class 3, Credit 3 (F or S)**

**ANTH-415****Archaeological Science**

Archaeology is one of the few social sciences that lends itself well to the application of analytical techniques from the physical sciences. This is due to the fact that archaeology relies primarily on physical evidence; artifacts and features, whose origin, composition, age, manner of production can be elucidated through application of the physical sciences. This course examines the application of physical science techniques to archaeological questions, including the age and origin of materials; how things are made; what people ate; their daily activities; and their state of health throughout their life. The course will include in-class labs in which students have the opportunity to apply some of these techniques and a final research project in which the student picks their own archaeological question to answer. Counts toward the archaeology track of the degree in sociology and anthropology. (ANTH-103 Archaeology and the Human Past) **Class 2, Lab 2, Credit 3 (F, biannually)**

**ANTH-420****Exploring Ancient Technology**

While it is commonplace to describe the present era as one dominated by technology, humans have been critically dependent on technology for as long as we have existed as a species. Some of today's key technologies such as ceramics, woodworking, textiles, glass, and metals, were invented before the dawn of recorded history. In this class, we will explore these ancient technologies; how they came to be invented, how they evolved, and how they were integrated into the social and economic life of ancient and modern peoples. This course features lectures and readings on ancient technology and experimental archaeology. Key concepts and themes will be explored in a series of hands-on labs in which students will seek to replicate, and understand, a variety of ancient technologies. The course concludes with either an individual project, such as replicating a particular artifact or process, or a class project, such as building and using a Mesopotamian glass furnace. Counts toward the archaeology track of the degree in sociology and anthropology. (ANTH-103 Archaeology and the Human Past) **Class 2, Lab 2, Credit 3 (S, biannually)**

**ANTH-425****Global Sexualities**

This course explores issues of gender and sexuality in a global context. Students will be introduced to anthropological perspectives on the experience of men and women, as gendered subjects, in different societies and historical contexts such as colonialism, nationalism, and global capitalism. In turn, we will explore how cultural constructions of masculinity and femininity are configured by race, class, ethnicity, and sexual orientation. Course materials are drawn from an array of sources, reflecting various theoretical perspectives and ethnographic views from different parts of the world. Counts toward the major in international and global studies and the major in anthropology and sociology. (INGS-101 Global Studies or ANTH-102 Cultural Anthropology or permission of instructor) **Class 3, Credit 3 (F or S)**

**ANTH-430****Visual Anthropology**

We see others as we imagine them to be, in terms of our values, not as they see themselves. This course examines ways in which we understand and represent the reality of others through visual media, across the boundaries of culture, gender, and race. It considers how and why visual media can be used to represent or to distort the world around us. Pictorial media, in particular ethnographic film and photography, are analyzed to document the ways in which indigenous and native peoples in different parts of the world have been represented and imagined by anthropologists and western popular culture. Part of the major in international and global studies; the major in anthropology and sociology. (INGS-101 Global Studies or ANTH-102 Cultural Anthropology or permission of instructor) **Class 3, Credit 3 (F or S)**

**ANTH-435****Garbage Archaeology**

This course introduces students to the study of archaeological methods with a focus on garbage (also known in colloquial speak as rubbish, waste, and refuse). By studying garbage, we are studying material culture, and by studying material culture, we can study human behaviors in both the present and past. This course's hands-on component enables students to learn about their immediate environment of Rochester through the collection, sorting, and processing of garbage in their neighborhoods. We also learn and employ the techniques of ethnoarchaeology in order to understand the differences between what people do and what people say they do. Through weekly readings on the role of garbage in other cultures past and present, we will consider how such topics as migration and settlement, disease vectors, ethnicity and identity, and public policy are seen and interpreted through something that every human produces on a daily basis. **Class 3, Credit 3 (S, biannually)**

**ANTH-440****Survey of Metallurgy**

This course introduces students to the study of metallurgy as both culture and science. We begin with a survey of the archaeological evidence of the earliest uses of metals around the globe, and continue with an examination of the role of mining and metal technology as documented in early metallurgical treatises. From there, we explore the symbolism and meanings of metallurgical extraction technologies as presented in ethnographic accounts, and use this information to derive the scientific equations which govern the series of reactions of these technologies. We also examine basic metal refining and working techniques and, through the study of phase equilibrium diagrams, learn to interpret the microstructures of ancient and modern metal samples. Students should emerge from the course understanding the values, traditions, and development of metallurgical techniques employed by both ancient and modern societies around the globe. Counts toward the sociology/anthropology major (archaeology track). **Class 2, Lab 2, Credit 3 (S, biannually)**

**ANTH-455/ECON-452/INGS-455****Economics of Native America**

This course will analyze current and historic economic issues faced by Native Americans. It will also examine government policies enacted by and directed toward Native Americans with a focus on their economic implications. This will be done using standard economic models of the labor market, poverty, trade, development and gaming. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S)**

**ANTH-489****Special Topics**

This course introduces a topic new to the sociology and anthropology curriculum. Topic varies by semester. Counts toward the sociology/anthropology minor. **Class 3, Credit 3 (semester varies)**

**ANTH-498****Practicum**

Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. The practicum may consist of internship, study abroad, or archaeological or ethnographic field school (consisting of at least 160 hours, completed over at least 4 weeks). (Third-year status and permission of instructor) **Class 0, Credit 0 (F, S, Su)**

**ANTH-499****Co-op**

Paid work experience in a field related to anthropology (at least 160 hours of work, completed over at least four weeks). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (Third-year status and permission of instructor) **Class 0, Credit 0 (F, S, Su)**

**ANTH-501****Senior Research Project**

Students will design and conduct a library-based research project with supervision of a faculty member, bringing to bear the knowledge and theoretical perspectives accumulated during the prior years of study. (Any one of the following courses: ANTH-201 Writing about Society and Culture, ANTH-301 Social and Cultural Theory, ANTH-302 Qualitative Research, ANTH-303 Quantitative Research; corequisite fourth-year status) **Class 3, Credit 3 (S)**

**ANTH-502****Scholar's Thesis I**

This is the first course of a two-semester Scholar's Thesis sequence in anthropology or urban studies, in which students will conduct an original research project. In this first course, working with a thesis advisor, students will formulate a research question, conduct a literature review, prepare the research design, and begin data collection, following the conventions of cultural anthropology, archaeology, or urban studies. (Fourth-year status, 3.2 GPA, and permission of thesis adviser) **Class 3, Credit 3 (F)**

**ANTH-503****Scholar's Thesis II**

This is the second course of a two-semester Scholar's Thesis sequence in anthropology or urban studies, in which students will conduct an original research project. In this second course, working with a thesis advisor, students will finalize data collection, analyze the data, write and defend a thesis paper, following the conventions of the discipline. (ANTH-502 Scholar's Thesis I, fourth-year status, 3.2 GPA, and permission of thesis adviser) **Class 3, Credit 3 (S)**

**ANTH-599****Independent Study**

The student explores in depth a topic of choice, under supervision of a faculty member. The student will typically meet weekly with the instructor to discuss the readings and will write paper(s) that synthesize and critique them, or the student may work with the faculty member on original research. (Permission of the instructor) **Class 0, Credit 1-12 (semester varies)**

## Communication

### COMM-101

#### Human Communication

An introduction to the theoretical and conceptual underpinnings of oral, visual and written communication. Introduces basic communication models, the role of language in communication, symbols and symbol making, issues of audience analysis and the development of different modes of discourse. Also explores the history of communication and introduces students to basic principles and research in communication studies. Required for communication majors; part of the communication immersion. **Class 3, Credit 3 (F, S)**

### COMM-142

#### Introduction to Technical Communication

This course covers the history of technical communication—from medieval treatises to the explosion of technical communication following WWII—and its development as a profession and academic discipline. Also, the course introduces students to current best practices in written and visual technical communication, including software applications, as well as principles and practices of ethical technical communication. Required for communication majors in the technical communication track. **Class 3, Credit 3 (F)**

### COMM-201

#### Public Speaking

The public speaking course is designed to equip the student with knowledge of the theories and principles necessary for formal public speaking. Informative and persuasive speeches are the focus with emphasis on organization, evidence, language use, strategy, delivery, and effective use of media aids. Public speaking is generally offered each semester. Required for majors in communication, and advertising and public relations. **Class 3, Credit 3 (F, S)**

### COMM-202

#### Mass Communications

The history and development of U.S. media, theoretical aspects of mass communications, the composition of media audiences, law and regulation of mass communications and how the media affect and are affected by society are presented. Required of all communication department majors. **Class 3, Credit 3 (F, S, Su)**

### COMM-203

#### Effective Technical Communication

This course provides knowledge and practice of written and oral communication skills generally required in technical professions. Focus is on individual and group writing and speaking tasks. Required for various majors in the College of Applied Science and Technology. **Class 3, Credit 3 (F, S)**

### COMM-211

#### Principles of Advertising

An introduction to principles and practices of advertising. Topics include advertising theories, ethics, regulation, consumer research, media planning, message strategy and campaign planning strategy. Required course for advertising and public relations program; an elective for the communication program, and business and design programs. **Class 3, Credit 3 (F, S)**

### COMM-212

#### Public Relations

An introduction to the practice of public relations (PR). Topics include history, research areas, laws, ethics, and social responsibilities as they relate to the theory and practice of PR. Required for advertising and public relations majors. **Class 3, Credit 3 (F, S)**

### COMM-221

#### Public Relations Writing

This course covers a variety of forms of writing for public relations, including news releases, newsletters, backgrounders, public service announcements, magazine queries, interviews, coverage memos, media alerts, features, trade press releases, and public presentations. Students will write for a variety of media including print, broadcast, and the Web. Required for advertising and public relations majors. (COMM-122 Public Relations or equivalent) **Class 3, Credit 3 (F, S)**

### COMM-223

#### Digital Design in Communication

An opportunity for undergraduates to learn principles of message design through the use of digital technology. A wide variety of computer software applications are available to support the research, writing, visualization, and design of messages. Students with a wide range of computer skills will be accommodated. Required for advertising and public relations majors. **Class 3, Credit 3 (F, S)**

### COMM-253

#### Communication

An introduction to communication contexts and processes emphasizing both conceptual and practical dimensions. Participants engage in public speaking, small group problem solving and leadership, and writing exercises while acquiring theoretical background appropriate to understanding these skills. Required for majors in business and in software engineering. **Class 3, Credit 3 (F, S)**

### COMM-261

#### History of Journalism

This course presents the history of American journalism from colonial times to the present, including the advance of press freedom under the First Amendment and how it has affected the development of American media. The influences of Europe, colonial politics in America, national expansion, urbanization, war, and technology are further developed. Journalism's relationship to politics, institutions and culture will be investigated. Newspaper, magazine, and broadcast industries will be examined for ideas that have changed American journalism. Required course for journalism major; part of the journalism and communication minors; and an elective for the communication major. **Class 3, Credit 3, (S)**

### COMM-262

#### News Editing

This course introduces students to the principles and practices of editing hard news and feature articles, including news judgment, story selection, headline writing, copy editing, and picture editing. The course emphasizes reader interest, readability, clarity, verification, and style, as well as legality, ethics, and propriety. Required course for journalism major, an elective for the communication major. **Class 3, Credits 3 (F)**

### COMM-263

#### Computer-Assisted Reporting

How to report on, illustrate, find and analyze records and databases, with emphasis on investigative reporting. Required course for journalism majors; an elective for software engineers and math majors. **Class 3, Credit 3 (S)**

### COMM-271

#### Introduction to Journalism

The course covers the impact/effect of journalism on American society, with an introduction to the history, freedom, technologies, ethics, and functions of the news media. Students will learn how to assess news value, develop news judgment, and analyze news stories. Required course for journalism majors and an elective for other communication majors. **Class 3, Credit 3, (F)**

### COMM-272

#### Reporting and Writing I

This course introduces students to the principles and practices of gathering, evaluating, investigating, and presenting information to general audiences. Rights and responsibilities of the press will be analyzed. Although special emphasis will be given to writing and reporting for print publications, other media will be addressed. Special attention will be given to the qualities of writing, especially organization, accuracy, completeness, brevity, and readability. Assignments must conform to Associated Press style. Required course for journalism major. **Class 3, Credit 3 (F)**

### COMM-273

#### Reporting and Writing II

Practicum in advanced techniques of news gathering, reporting, and writing, with an emphasis on reportorial principles and practices. This class expands upon the processes of gathering, evaluating, investigating, and presenting information to news media audiences previously introduced in newswriting. Required course for the journalism major. (COMM-272 Reporting and Writing I) **Class 3, Credit 3 (S)**

### COMM-301

#### Theories of Communication

An introduction to human communication theory, including a history of the field and major theories from the intrapersonal, language, interpersonal, small group, public, organizational, mass, visual, and computer-mediated communication contexts. Theories based both in the humanities and the social sciences are covered. Required course for all communication department majors. **Class 3, Credits 3 (F, S)**

### COMM-302

#### Interpersonal Communication

Interpersonal communication provides analysis and application of the major theories of interpersonal communication in various situations. The course focuses on perception of self and others, language use, nonverbal communication, and symbolic interaction in the communication of shared meanings in face-to-face and mediated interpersonal relationships. There is a strong focus on both conflict management and intercultural interactions. Optional course for communication majors. **Class 3, Credit 3 (F)**

### COMM-303

#### Small Group Communication

This course provides students with opportunities to engage in small group decision making and problem solving. Students will analyze and evaluate their own experiences and relate them to theories and research from the field of small group communication. Optional course for communication majors; general education elective. **Class 3, Credits 3 (F, S, Su)**

**COMM-304 Intercultural Communication**  
Intercultural communication provides an examination of the role of culture in face-to-face interaction. Students may find a basic background in communication, anthropology, or psychology useful. Intercultural communication serves as a required course for communication, and advertising and public relations majors. The course is also an option for the Arabic and French modern language and culture immersions and for the communication minor. **Class 3, Credit 3 (F, S)**

**COMM-305 Persuasion**  
An in-depth study of the theories, practices, effects, and ethics of persuasion. Persuasion is defined as human communication designed to influence one's beliefs, values, attitudes, and actions. This course examines persuasion from a receiver-oriented perspective with interpersonal, small group, organizational, and mediated perspectives. Part of the communication minor and immersion. **Class 3, Credit 3 (F, S, Su)**

**COMM-306 Rhetoric of Race Relations**  
Rhetoric of Race Relations examines the history of the struggle for freedom and equality for blacks in American society. This course traces the history and rhetoric of key spokespersons from the pre-Civil War period to the 20th century as evidenced in texts of selected public speeches and reactions to them. **Class 3, Credit 3 (every other spring)**

**COMM-321 Copywriting and Visualization**  
An opportunity for undergraduates to learn the verbal and visual skills utilized in the creation of advertising messages. To create an effective strategy for an advertising campaign, the advertising copywriter/art director team needs to combine linguistic and visual metaphors into a persuasive message. Students will develop creative advertising messages by researching and writing a creative brief and then implementing the plan by transforming concepts into actual advertising messages and campaigns. Required course for advertising and public relations major; part of the communication minor. (COMM-211 Principles of Advertising) **Class 3, Credit 3 (F, S)**

**COMM-322 Campaign Management and Planning**  
This course introduces students to the managing and planning of advertising and public relations campaigns. It takes a team project approach thereby helping students learn how to work together in class as well as in a competitive agency. Service-learning will be used to expose students to community causes. Required course for advertising and public relations majors. (COMM-211 Principles of Advertising and COMM-212 Public Relations) **Class 3, Credit 3 (S)**

**COMM-341 Visual Communication**  
This course is an introduction to the study of visual communication. The iconic and symbolic demonstration of visual images used in a variety of media is stressed. The major goal of the course is to examine visual messages as a form of intentional communication that seeks to inform, persuade, and entertain specific target audiences. Required course for communication majors; part of the communication minor and immersion. **Class 3, Credit 3 (S)**

**COMM-342 Communication Law and Ethics**  
This course examines major principles and trends in communication law. The course analyzes a broad range of issues related to the First Amendment, intellectual property, and media regulation. Special attention is paid to discussing the major ethical perspectives and issues surrounding contemporary communication behavior. Required course for communication majors. **Class 3, Credit 3 (S)**

**COMM-343 Technology-Mediated Communication**  
Technology-mediated communication (TMC) was originally defined as a form of electronic written communication. As networking tools advanced, TMC expanded to include new software developments, such as instant messenger and the Web. Today, the term technology-mediated communication is used to refer to a wide range of technologies that facilitate both human communication and the interactive sharing of information through computer networks. Through readings, discussions, and observations of online behavior, students will be introduced to TMC terms and theories to further develop their TMC communication and critical thinking skills. Required course for communication majors. **Class 3, Credit 3 (S)**

**COMM-344 Health Communication**  
An introduction to the subject of communication in health care delivery and in public health campaigns, with an emphasis on interpersonal, organizational, and mass communication approaches. Also covered is the interrelationship of health behavior and communication. Required for communication majors in the health communication track. **Class 3, Credit 3 (S)**

**COMM-345 Ethics in Technical Communication**  
Ethics is the study of morals, of what is right and good, especially regarding specific moral choices. In a given situation, a system of ethics helps us answer the question: What should I do? Ethics in technical communication explores the ways in which ethical conduct is important in the communication of technical information, particularly among professional technical communicators; establishes principles, based on the history of ethical studies, for making ethical choices as technical communicators; and provides opportunities to apply ethical principles to case studies, in order to better understand the often problematic nature of ethical choices in technical—or any—communication. Elective for communication majors in the technical communication track. **Class 3, Credit 3 (F)**

**COMM-361 Reporting in Specialized Fields**  
An in-depth study, analysis, and practicum of a selected advanced and focused subject in professional journalism. Specific subject matter of the course varies according to faculty assigned and is published when the course is offered; students may enroll in this class no more than twice as long as the specific subject matter is different. Examples include education journalism, health journalism, business journalism, reporting public affairs, sports journalism, editorial (or opinion) writing, and reporting for alternative media. Required course for journalism majors; an elective for junior/senior level communication and photojournalism majors. (Junior/senior status) **Class 3, Credit 3 (F)**

**COMM-362 Law and Ethics of the Press**  
This course examines major principles and trends in communication law. The course analyzes a broad range of issues related to the First Amendment, intellectual property, and media regulation. Special attention is paid to discussing the major ethical perspectives and issues surrounding contemporary communication behavior. Required course for journalism majors. **Class 3, Credit 3 (S)**

**COMM-401 Quantitative Research Methods**  
An introduction to the methods and ethics of scientific, scholarly communication research including methods of locating, analyzing, critiquing and conducting communication research. The course focuses on empirical research methods and leads to the development of a research project proposal suitable for implementation in senior thesis in communication. Required course for majors in communication, and advertising and public relations. (COMM-301 Theories of Communication) **Class 3, Credit 3 (F, S)**

**COMM-402 Qualitative Research Methods**  
Introduction to the methods and ethics of qualitative and critical research. Students are introduced to interviewing, participant observation, naturalistic study, and ethnography. They also develop a disciplined ability for the critical appraisal of public discourse, cultural phenomenon and designed objects. Both qualitative and critical research methods rely on the researcher's observational, analytic and critical skills, and seek to understand the behaviors, beliefs, values, attitudes, assumptions, rituals, and symbol systems that characterize relationships between the source, message, media, and audience of specific communication acts. Students will also investigate the processes of rhetorical action. By the end of the course, students will have developed a research proposal suitable for implementation as the senior thesis in communication. A required course for students in communication, and advertising and public relations. (COMM-301 Theories of Communication) **Class 3, Credit 3 (F, S)**

**COMM-421 Media Planning**  
An introduction to developing, executing, and managing media plans for advertising and public relations. This course covers the characteristics and uses of advertising media, media terms and calculations, media strategies and tactics, and media plan development and implementation. Required course for advertising and public relations major; an elective for communication and business majors. (COMM-211 Principles of Advertising or instructor's permission) **Class 3, Credit 3 (S)**

**COMM-440 Visual Communication of Technical Information**  
This course introduces students to the principles, conventions, and ethics of communicating technical information in graphs, tables, and illustrations. A secondary focus is on writing text to complement graphs and illustrations in technical documents. An elective for communication majors in the technical communication track. **Class 3, Credit 3 (F)**

**COMM-441 Writing the Technical Manual**  
Develops in students those skills necessary for designing, writing, and editing long technical manuals. Special emphasis is given to graphics and page layout. Students enrolling should have command of concise English prose. Elective for communication majors in the technical communication track. (ENGL-361 Technical Writing) **Class 3, Credit 3 (F)**



**COMM-442 Professional Writing**  
Students develop writing, research, and interviewing skills necessary to the composition of articles for magazines, newsletters, and other similar publications. In addition students learn how to investigate the market for and sell their writing, and how to write query letters. Much of the course is conducted as a workshop, during which students appraise each other's work, and make suggestions for revision. **Class 3, Credit 3 (S)**

**COMM-461 Multipatform Journalism**  
The Internet is an important source of news information, rivaling print, radio, and television news. This course introduces students to the principles and practices of online news reporting, including writing for mainstream news sites, journalistic blogs, share and discussion sites, and other evolving online news outlets. The course familiarizes students with the tools of the online reporter: for example, vetting sources on the Web, conducting e-mail interviews, and writing for Web pages. Also, students explore the cultural and ethical terrain unique to the wired environment. Required course for journalism majors. **Class 3, Credit 3 (F)**

**COMM-497 Communication Portfolio**  
Communication and advertising and public relations majors create a portfolio comprised of projects, papers, and related professional materials; Journalism majors complete a senior project. Near the end of every semester, the department hosts a portfolio review day when department of communication seniors present their portfolio or project work in a public space for review and comment by faculty, staff, and peers. The presentation constitutes completion of the course. Required of all department of communication majors. (Fourth-year status) **Class 0, Credit 0 (F, S, Su)**

**COMM-499 Communication Co-op**  
One semester of paid work experience in a professional setting related to the communication major. Required of all department of communication majors. (At least third-year and department approval required.) **Class 0, Credit 0 (F, S, Su)**

**COMM-501 Senior Thesis in Communication**  
A guided research seminar culminating in a major project that brings together the professional technical communication students' communication studies and substantive work in his or her professional core. Focuses on designing, conducting and completing an independent research project. The progress of each project is shared with the class for discussion and critiques. Required course for majors in communication and in advertising and public relations. (COMM-401 Quantitative Research Methods, COMM-402 Qualitative Research Methods) **Class 3, Credit 3 (offered regularly)**

**COMM-503 Advanced Public Speaking**  
Further development of knowledge and skills learned in public speaking. This course emphasizes language, delivery, and speech organization, requiring students to develop and deliver speeches for various occasions, using a variety of delivery methods. Students will present out-of-the-classroom speeches as well as practice ghostwriting. Elective for advertising and public relations majors. (COMM-201 Public Speaking) **Class 3, Credit 3 (S)**

**COMM-561 Senior Project**  
Senior capstone course culminating in the production of a long-form piece of journalism, a Web site, and a digital portfolio of select works. The course brings together each participant's work in journalism and the professional core. Required course for journalism majors. (COMM-461 Multipatform Journalism) **Class 3, Credit 3 (S)**

**COMM-599 Independent Study**  
A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Class variable, Credit variable (F, S, Su)**

## **Criminal Justice**

**CRIM-100 Seminar in Criminal Justice**  
This seminar acquaints students with key resources for understanding and conducting criminal justice research. The course involves extensive reading, writing, and discussion. It covers the principles of the criminal justice system including the relationship between system components, their effectiveness, and theories of operation and reform. Consideration is also given to specific problems within the branches of the criminal justice system. Required course for criminal justice majors. Restricted to criminal justice majors. **Class 3, Credit 3 (F, S)**

**CRIM-110 Introduction to Criminal Justice**  
This course provides an introduction to criminal justice. One of the primary goals of this course is to provide a general understanding of how the criminal justice system responds to crime in society. The main component parts of the criminal justice system (i.e., police, courts, and corrections) will be examined with a particular emphasis on developing an understanding of the behavior and interactions among the main actors in the criminal justice system. To accomplish this goal, we will examine how criminal cases are processed in the criminal justice system. We will also consider how external forces, such as political decisions, public opinion, and the media influence criminal justice decision-making. Finally, throughout the course we will emphasize how the societal response to crime has evolved over time. Required course for criminal justice majors. **Class 3, Credit 3 (F, S, Su)**

**CRIM-210 Technology in Criminal Justice**  
Develops understanding of theories, management processes, organizational capabilities and social implications of criminal justice technologies. Many categories of technology are considered, ranging from communications and records management, to special assault and protection tactics. Students consider the role of industry, government, and user groups in the historical development and legal/ethical use of specific technologies. Part of the criminal justice major. Elective for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (S)**

**CRIM-215 Law, Justice and Society**  
This course focuses on the relationships between law and other social institutions, and examines the values and interests that are expressed in law and shaped by legal structures and processes. Consensus and conflict perspectives of the law are compared and contrasted, and applied to understanding the law's impact on everyday life. This course takes an explicit interdisciplinary approach to understanding law. Elective for criminal justice majors. **Class 3, Credit 3 (S)**

**CRIM-220 Corrections**  
Introduction to the basic organizations of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, are discussed with the context of historical and contemporary philosophy. Attention also is focused on decision-making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness are surveyed. May also be taken as an elective for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (S)**

**CRIM-225 Criminal Law**  
Criminal Law deals with the substantive and procedural criminal law. Characteristics of crimes against people, property, and the state will be examined. Emphasis will be placed on the nature of criminal conduct, the requirement of criminal intent, and legal causation. In addition, the principal defenses will be examined. May also be taken as an elective for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (S)**

**CRIM-230 Juvenile Justice**  
This course examines the concepts, theories and environmental influences of juvenile offenders, the impact of the judicial system, control and corrections on juvenile justice. The course also examines the role of forces in the system including police, courts, community resources and treatment. May be taken as an elective for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (F)**

**CRIM-235 Crime, Criminal Justice and Communities**  
This course provides an overview of the role of communities in crime and criminal justice. The course begins by laying a foundation in community theory. Students will gain an understanding of the critical dimensions and attributes which define community. From here the course will emphasize how these critical community dimensions are related to both crime and criminal justice. We will discuss the extent to which structural characteristics (e.g., poverty, residential mobility, etc.) and social processes (e.g., social capital, collective efficacy, etc.) are related to crime and disorder. The course will also examine the potential that exists within criminal justice to intervene in communities to reduce crime and disorder and build community in the process. Central to this will be a discussion of co-production (i.e., the intersection between formal and informal social control). The remainder of the course will examine how the major components of criminal justice (i.e., police, courts, and corrections) have attempted to intersect with communities. These topics will include community policing, comprehensive community initiatives, community problem-solving, community prosecution, restorative justice, and community corrections/offender re-entry. Elective course for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (S)**

**CRIM-240** **Law Enforcement in Society**  
The social and historical origins of the various police systems; police culture, role and career; police in the legal system; social and legal restraints on police practices; police discretion in practice; police and community; police organization and community control mechanisms. May be taken as an elective for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (F)**

**CRIM-245** **Prostitution and Vice**  
This course will examine prostitution and vice in the United States and globally. Through empirical scholarship, various issues will be examined including issues faced by sex workers including crime, victimization, health and safety, and law and policy issues. Quality of life issues for communities will also be examined. Elective course for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (F, biannually)**

**CRIM-250** **Domestic Violence**  
This course focuses on domestic violence in the United States and globally. Various types of domestic violence will be examined, including intimate partner violence, child abuse, and elder abuse. The course will also examine criminal justice responses to domestic violence, including police, court processing of domestic violence cases and punishment of domestic violence offenders. Elective course for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (F, biannually)**

**CRIM-255** **Seminar on Sexual Violence**  
This course focuses on sexual violence in the United States and globally. Various types of sexual violence will be examined, including incest, elder abuse, and male victimization. The course will also examine criminal justice responses to sexual violence, including police, court processing of sexual violence cases and punishment and treatment of sexual offenders. Elective course for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (F, biannually)**

**CRIM-260** **Courts**  
This course provides students with an understanding of the recognized functions of courts in the American criminal justice system. Jurisdiction, policies and procedures of courts in the administration of criminal justice, including trial and appellate courts, will be discussed. Courts will be examined at the local, state and federal levels. Elective for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (S)**

**CRIM-265** **Women and Crime**  
This course deals with women as criminal offenders and as victims of crime, focusing upon theories about women in crime, types of crimes committed, patterns of criminality and the treatment of women offenders. Also examines the role of women as law enforcement officers, judges, lawyers and correctional officers in the criminal justice system. Elective course for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (S, biannually)**

**CRIM-270** **Current Issues in Criminal Justice**  
This course involves yearlong participation in, and written critique of, a designated set of lectures, roundtables and presentations on topics covering current issues in criminal justice. The goal is to engage students in discussion of current issues with their peers and with experts in the field. Elective course for criminal justice majors. Restricted to criminal justice majors. (CRIM-100 Seminar in Criminal Justice) **Class 3, Credit 3 (S)**

**CRIM-275** **Crime and Violence**  
This course focuses on the outbreak and prevalence of violent crime in the United States as one of the most important social realities of the past 100 years. In addition to a historical review, we will also scrutinize contemporary problems associated with violence. These problems include street violence, terrorism, riots, vigilantism, and how the criminal justice system has attempted to control these problems. Elective course for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (F)**

**CRIM-285** **Minority Groups and the Criminal Justice System**  
This course will investigate the roles played by racial minorities—African-Americans, Native Americans, Hispanic Americans, and Asian Americans—at each level of the criminal justice system in the United States of America and globally. The experience of African Americans will be emphasized since this group has been the subject of more extensive research by criminologists and criminal justice practitioners. Elective course for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (S)**

**CRIM-290** **Computer Crime**  
This course provides definitional, theoretical, and operational context for understanding computer-based competition, conflict, and crime in the information age. Students study the history, nature and extent of computer-related crime, as well as differing types of computer criminals, their motivations and the methods they use to threaten, attack, compromise or damage physical and cyber assets. The course considers legal and regulatory environments and the impact these have on policies and practices related to ethics in the management of information security, data encryption, privacy, and numerous other special topics. May be taken as an elective for criminal justice majors. (CRIM-110 Intro to Criminal Justice) **Class 3, Credit 3 (F, S)**

**CRIM-300** **Quantitative Methods for Criminal Justice**  
This course is designed to provide students with a foundation in social science research methods. Through lecture, discussion and activities associated with a research project, emphasis is placed on the creation of null hypotheses, identification of the relationships among variables, establishment models, and analysis of data using both parametric and non-parametric statistics. Required course for criminal justice majors (third-year standing). Restricted to criminal justice majors. (CRIM-100 Seminar in Criminal Justice and CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (F, S)**

**CRIM-310** **Seminar in Law**  
Focuses on the nature, function and limits of the rule of law. This course traces the history and development of the Fourth, Fifth, Sixth and Fourteenth Amendments of the United States Constitution. This will be accomplished by reading and discussing approximately one hundred United States Supreme Court decisions from the early 1900s through the present. Students will also be introduced to the concept of briefing a case. Elective for criminal justice majors. (CRIM-215 Law, Justice and Society) **Class 3, Credit 3 (S, biannually)**

**CRIM-315** **Evidence**  
Provides the student with an awareness of what types of evidence are admissible in a criminal trial. Includes a comprehensive analysis of the most frequently used rules of evidence. There are readings and discussions pertaining to the nature of real, testimonial, hearsay and circumstantial evidence. Examines rules concerning the cross-examination of witnesses, exceptions to the exclusion of hearsay evidence, the burden of proof, the provinces of the judge and of the jury, legal presumptions and the exclusion of illegally obtained evidence. (CRIM-215 Law, Justice and Society) **Class 3, Credit 3 (S, biannually)**

**CRIM-350** **Theories of Crime and Criminality**  
A comprehensive survey of historical and contemporary theories of the causes of crime. Included are theories that derive from biological, psychological, sociological, geographic, economic, and political perspectives. Development of criminological theory reviewed; fundamental distinctions between classical and positivist theories and between theories of crime and criminality discussed. Required course for criminal justice majors (third-year standing). Restricted to criminal justice majors. (CRIM-100 Seminar in Criminal Justice and CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (S, F)**

**CRIM-400** **Research Methods**  
This course is designed to provide students with a foundation in social science research methods. Through lecture, discussion and activities associated with a research proposal, the different methods of conducting research are presented. Stress is on issues of deducting hypotheses from theoretical frameworks, variable construction, experimental design, sampling methodology and the techniques and methods of data collection. Students will formulate a written research proposal that details a research question and the research question and the research design appropriate for addressing that question. Required course for criminal justice majors (third-year standing). Restricted to criminal justice majors. (CRIM-350 Theories Crime and Criminality) **Class 3, Credit 3 (F, S)**

**CRIM-489** **Major Issues in Criminal Justice**  
Focuses on contemporary issues and topics not otherwise distinctly incorporated in established criminal justice courses. Concentrates on student discussion and interaction surrounding required readings on topics such as crime prevention and issues in the prosecution/court system. Recent examples include cyberlaw, prisoner re-entry restorative justice, wrongful convictions crime mapping, crime analysis, non-traditional courts legal controversies in the law, substance abuse; and legal research. Elective course for criminal justice majors. (CRIM-110 Introduction to Criminal Justice) **Class 3, Credit 3 (F, S)**

**CRIM-500****Seminar in Criminal Justice and Public Policy**

This course provides an overview of the public policy process as it relates to issues of crime and criminal justice. Students will gain an understanding of the socio-political context of criminal justice public policy, the public policy process, and the challenges facing successful policy implementation that are unique to criminal justice. The beginning of the course will emphasize public policy designed to control or limit the behavior and discretionary decisions of criminal justice officials. The remainder of the course will emphasize public policy designed to enhance the control, supervision, and processing of criminal offenders. Restricted to criminal justice majors (Fourth-year status). (CRIM-400 Research Methods in CJ) **Class 3, Credit 3 (F, S)**

**CRIM-550****Field Experience**

Internship practicum for all criminal justice students. Gives the student first-hand experience in the field of criminal justice in an appropriate organization that meets the needs of the student's career objectives. Students are closely supervised at selected organizations, developing their pre-professional skills while learning the organization's programs and methods. Required course for criminal justice majors (Fourth-year status). Restricted to criminal justice majors. (CRIM-400 Research Methods in CJ) **Credit 3 (F, S)**

**Economics****ECON-100****Foundational Seminar in Economics**

This course is designed to introduce new students in the Economics program (freshmen and external and internal transfers) to the application of economic analysis in academia, business, government and the not-for-profit sector. Students will be exposed to the research and consulting activities undertaken by academic economists and economic practitioners as well as a discussion of the career outcomes of the alumni of the RIT Economics program. Required course for economics majors **Class 1, Credit 1 (F)**

**ECON-101****Principles of Microeconomics**

Microeconomics studies the workings of individual markets. That is, it examines the interaction of the demanders of goods and services with the suppliers of those goods and services. It explores how the behavior of consumers (demanders), the behavior of producers (suppliers), and the level of market competition influence market outcomes. Required course for economics majors. **Class 3, Credit 3 (F, S)**

**ECON-101 H****Honors Economics**

This course introduces students to some of the important questions addressed in microeconomics and the methodology used to address these questions. We will look at some of the basic models of consumer and firm behavior and study how implications are derived from these. We will also see how some of these simple models give insight into diverse questions such as: Should food stamps be given away freely to those who are poor, or should they be required to purchase them? Why are general practitioners (as opposed to specialists) disproportionately located in smaller towns? Why do firms bundle goods rather than just selling them separately? As far as the final impact is concerned, is there a difference in whether a tax is imposed on the sellers of a product or on buyers of a product? Microeconomics gives the tools to understand and evaluate implications of government as well as business policy decisions. In addition, it provides the foundation for the study of many other sub-disciplines in economics. (Honors Program status or permission of instructor) **Class 3, Credit 3 (F)**

**ECON-201****Principles of Macroeconomics**

Macroeconomics studies aggregate economic behavior. The course begins by presenting the production possibilities model. This is followed a discussion of basic macroeconomic concepts including inflation, unemployment and economic growth and fluctuations. The next topic is national income accounting which is the measurement of macroeconomic variables. The latter part of the course focuses on the development of one or more macroeconomic models, a discussion of the role of money in the macroeconomy, the aggregate supply-aggregate demand framework is presented and other topics the individual instructor may choose. Required course for economics majors. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F, S)**

**ECON-401****Intermediate Microeconomic Theory**

This course develops the tools that are commonly used to study the allocation of resources in a private enterprise economy. Topics covered include the theory of consumer behavior, cost and production, and alternate market structures. Required course for economics majors. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F)**

**ECON-402****Intermediate Macroeconomic Theory**

The central question of macroeconomics is the determination of output, employment and prices. This course develops models which incorporate behavioral assumptions concerning consumption, investment, and the role of money and their relationship to macroeconomic variables. Macroeconomics, unlike microeconomics, has been in a constant of flux during the 20th and into the 21st century. Theories which purport to explain macroeconomic behavior have come into and gone out of fashion depending upon institutional changes and external factors. This course will primarily focus on examining four macroeconomic theories; the Classical, Keynesian, Monetarist, and New Classical models. In addition macroeconomic public policy will be analyzed in the context of recent economic history. This analysis will be extended to consider open economy macroeconomics in a global context. Required course for economics majors. (ECON-101 Principles of Microeconomics or equivalent and ECON-201 Principles of Macroeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-403****Econometrics I**

Econometrics I provides students with the opportunity to develop their skills in applied regression analysis. It covers various regression estimation techniques, data preparation and transformation, and the interpretation of regression results. There is particular emphasis on the dangers of misuse of regression techniques. The course covers regression analysis for both cross-sectional and time series data. Required course for economics majors. (ECON-101 Principles of Microeconomics or equivalent and MATH-171 Calculus A or equivalent and STAT-145 Introduction to Statistics I or equivalent) **Class 3, Credit 3 (F)**

**ECON-404****Mathematical Methods: Economics**

Mathematical Methods of Economics provides students with an introduction to quantitative techniques used in economics such as matrix algebra, one- and multi-variable differential calculus, and unconstrained and constrained optimization. The emphasis of the instruction is on the application of these techniques to fortify and broaden a student's understanding of traditional economic topics like utility maximization, cost minimization, duality in consumer theory, expected utility, and profit maximization. Required course for economics majors. (ECON-101 Principles of Microeconomics or equivalent and MATH-172 Calculus B or equivalent) **Class 3, Credit 3 (F, S)**

**ECON-405****International Trade and Finance**

This course first surveys the sources of comparative advantage. It then analyzes commercial policy and analyzes the welfare economics of trade between countries. Some attention is paid to the institutional aspects of the world trading system. Finally, the course introduces the student to some salient notions in international finance such as national income accounting, the balance of payments, and exchange rates. Required course for economics majors. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F)**

**ECON-406****Global Economic Issues**

This course is focused on understanding economic problems in a global perspective. The students will study the impact of globalization on economic growth and income disparity among countries. Global economic issues such as poverty, hunger, refugees, transnational terrorism will be studied. We will also discuss global efforts to attain progress such as the United Nations Millennium Development Goals. The course work will emphasize on the analysis of international economic data. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-407****Industrial Organization**

The study of the structure, conduct and performance of contemporary American industry. Involves the application of the tools of microeconomic analysis and empirical evidence to aid in understanding the behavior of modern industry. In addition, the course considers the historical determinants of contemporary market structure and the public policy measures designed to preserve a competitive market structure. The course concludes with an examination of alternative intellectual property rights mechanisms and how alternative mechanisms impact firm-level and economy-level innovation rates. Required course for economics majors. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-410** **Game Theory with Economic Applications**  
Game theory uses a mathematical approach to study situations of strategic interdependence, i.e., situations with two or more players in which each player's decision influences payoffs of other players and players are aware of this fact when making their decisions. Game theory has been applied to understand diverse economic, political and biological phenomena. We will study how to formulate situations of strategic interdependence as game theoretic models; how to explain/predict behavior of the parties involved, through the use of various equilibrium concepts; and/or identify guidelines for appropriate behavior. The concepts and methods will be illustrated with many examples. The objective is to introduce you to language of game theory and its methodology, and to develop analytical reasoning skills. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F, S)**

**ECON-420** **Environmental Economics**  
This course examines the relationship and apparent conflict between economic growth and environmental quality, the economics of environmental issues and policy, the environment as a resource and a public good, and the ability and lack of ability of free markets and the government to deal adequately with pollution and other environmental problems. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F)**

**ECON-421** **Natural Resource Economics**  
This course develops an economic perspective on one of the most important and challenging issues facing global society—the allocation, use, and preservation of natural resources. The course presents and discusses the methodology economists use to inform natural resource managers and policy makers. Economic thought and analysis are used to evaluate a variety of issues in this area. The course concludes with a brief discussion of the interdisciplinary aspects of natural resource management. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-422** **Benefit-Cost Analysis**  
Benefit-Cost Analysis fosters better understanding of the efficiency consequences of governmental micro-economic actions, both regulatory and fiscal. The course explores the logic, value and limitations of benefit-cost analysis as a public policy tool commonly used, and misused, in comparing the relative merits of alternative government actions. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F)**

**ECON-430** **Managerial Economics**  
Managerial Economics involves the application of economic theory to business decision-making. Most of the emphasis is microeconomic in nature, the theory of the firm and consumer theory, but there is some macroeconomic influence, particularly in the forecasting area. Since this is an applied economics course, it has a strong quantitative flavor. (ECON-101 Principles of Microeconomics or equivalent; ECON-201 Principles of Macroeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-431** **Monetary Analysis and Policy**  
This course is a study of monetary behavior and the role of monetary institutions in the modern economy. The primary focus of the course is understanding how money plays a role in individual decision making units (i.e., households and businesses) and ultimately affects the macroeconomy (e.g., output, employment and inflation). The first part of the course begins with a discussion of economic methodology including introduction to regression analysis and an overview of money and the financial system, then proceeds to a discussion of interest rates, portfolio analysis and exchange rates. The second part of the course considers how money affects the macroeconomy by discussing the money supply process and considering theories which explain how changes in the money supply affect the economy. (ECON-101 Principles of Microeconomics or equivalent; ECON-201 Principles of Macroeconomics or equivalent) **Class 3, Credit 3 (F, biannually)**

**ECON-440** **Urban Economics**  
Urban economics is the application of economic analysis to spatial relationships in densely populated (urban) areas. The course develops economic models that explain the existence and growth of cities; the location behavior of consumers and businesses in cities; and the economic rationale and effects of zoning and growth controls. The course then applies applying the insights gained from these models to a number of urban issues. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F)**

**ECON-441** **Labor Economics**  
Labor Economics encompasses aspects of human involvement in the production and distribution of goods and services. We will examine models of behavior starting with the supply of and derived demand for labor. Through the course, we will investigate questions such as: What determines the amount an individual earns for their labor? What are the benefits associated with attaining a college degree? Is the minimum wage an effective policy tool? Is there convincing evidence of discrimination in the workplace? (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F)**

**ECON-444** **Public Finance**  
Public Finance is the study of the microeconomics of the public sector. The course fosters better understanding of the scale, scope and results of government spending and taxes. The focus is on economic efficiency in resource allocation and fairness in the distribution of income and wealth. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S, biannually)**

**ECON-445** **History of Economic Thought**  
A survey of the various schools of thought that have developed in economics from Aristotle to the present. Representative economists from each of the major schools (Pre-Classical, Classical, Marxian, Neo-Classical, Keynesian, Monetarist, etc.) are studied. (ECON-101 Principles of Microeconomics or equivalent; ECON-201 Principles of Macroeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-448** **Development Economics**  
This course provides an introduction to development economics, which focuses on the problems and challenges faced typically but not exclusively by the developing countries. In this course we will study the economic transformation of developing countries by focusing on the characteristics of land, labor and credit markets in rural areas of developing countries. We will survey the large literature on modeling economic growth and discuss relevant case studies from developing countries. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-449** **Comparative Economic Systems**  
This course mainly involves a comparative analysis of the structure and performance of different economic systems. The two major economic systems studied are market capitalism and command socialism. In the first part of the course, students are introduced to the economic decision-making processes in the two systems, including the economic structure, operation and relative efficiency in achieving its macroeconomic goals. In the second part, several examples from the world economy which lie on a spectrum between pure market and pure command systems are comparatively discussed and evaluated. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F)**

**ECON-450** **Health Care Economics**  
Examines the economics of health care, the organization of its delivery and financing, and analyzes access to care issues, the role of insurance, the regulation of hospitals, physicians, and the drug industry, the role of technology, and limits on health care spending. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S, annually)**

**ECON-451** **Economics of Women and the Family**  
This course applies economic theory to explain choices faced and selected by women concerning marriage, fertility and labor market participation, alongside government policies targeting those decisions. Empirical research will be presented that describes the changing demographic profile of families, poverty and the labor force. Students in this course will gain experience evaluating how economic theory and practice fits into the larger social sciences goal of describing human behavior by focusing on women and the family. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (F)**

**ECON-452/ANTH-455/INGS-455** **Economics of Native America**  
This course will analyze current and historic economic issues faced by Native Americans. It will also examine government policies enacted by and directed toward Native Americans with a focus on their economic implications. This will be done using standard economic models of the labor market, poverty, trade, development and gaming. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-453 Behavioral and Experimental Economics**  
Over the past few decades, Experimental and Behavioral Economics have become two of the fastest growing and exciting fields of economics. This course will provide students with an introduction to many interesting concepts in both fields. In doing so, students will learn how experimental methodology can be used to provide insights about economic behavior in the areas of market exchange and strategic decision making. Additionally, students will be exposed to interesting topics in behavioral economics including: biases and heuristics, decisions under risk and uncertainty, inter-temporal choice, social preferences, bounded rationality, and learning. The concepts and methods covered in this course will be primarily illustrated by presenting recent experimental and theoretical studies, running in-class experiments, and by participating in group projects. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S)**

**ECON-501 Directed Research in Economics**  
This course is designed to allow economics students to pursue research under the direction of an economics faculty mentor. Prior to enrollment in this course the student must submit a research proposal to the proposed faculty sponsor and the economics department for approval. Once approved, the faculty sponsor in consultation with the student will determine the number of credit hours (1-3) which will be assigned for the course. The completed research project will be presented at the annual COLA Undergraduate Research Conference. (Departmental approval) **Class 1-3, Credit 1-3 (Upon student request and departmental approval)**

**ECON-502 Honors Economic Independent Research**  
This course is designed to allow economics students who are in the Honors Program to conduct independent research under the guidance of a faculty mentor. Prior to enrollment in this course the student must submit a research proposal and the name of the proposed faculty mentor to the economics department for approval. Once approved the faculty mentor in consultation with the student will determine the number of credit hours (1-3) that will be assigned to the course. The completed research project will be presented at the annual Economics/Public Policy Undergraduate Research Conference. (Department approval) **Class 1-3, Credit 1-3**

**ECON-503 Econometrics II**  
Econometrics II builds on skills in applied regression analysis by exploring advanced regression estimation topics including panel data estimation, instrumental variable and two-stage-least-squares estimation, simultaneous equation models, limited dependent variable models, and advanced time series topics. (ECON-403 Econometrics I or equivalent) **Class 3, Credit 3 (occasionally)**

## Fine Arts

**FNRT-100 Introduction to Visual Arts**  
This course will develop students' ability in perceiving worth in objects of art through consideration of fundamental concepts in painting, sculpture and architecture, involving analysis, interpretation and principles of aesthetics. **Class 3, Credit 3 (F, S)**

**FNRT-110 Introduction to Music**  
An introduction to music as a fine art. Students develop skills in listening, evaluation and analysis through an examination of music's forms, constituent elements, and its cultural, stylistic and historical development. **Class 3, Credit 3 (F, S, Su)**

**FNRT-120 Introduction to Film**  
This course provides the student with an introduction to film as an art form. The course presents a vocabulary for film analysis as well as the critical and analytical skills for interpreting films. The course examines the major aesthetic, structural, historical, and technical components of film. It considers how a film works, by looking internally at the multiple aspects that comprise the construction of a film, and externally at how a film affects the viewers. Students will watch a variety of feature films, primarily American, ranging in date from the 1940s through the 2000s. Clips from alternative films and foreign films will also be screened and discussed. Any artistic background in film, music, theatre, painting, sculpture, etc., is helpful, but no specific technical knowledge of film, video, or photography is required or expected. **Class 3, Credit 3 (F, S)**

**FNRT-130 Introduction to Theatre**  
An introduction to theatre as a performing art. Students develop skills in reading, analysis and evaluation through an examination of theatre's forms, constituent elements, and its cultural, stylistic and historical development. **Class 3, Lab 0, Credit 3 (F, S, Su)**

**FNRT-200 Anime**  
This introductory survey course examines the history, aesthetics and style of Japanese animation or "anime." The course provides a vocabulary for the analysis of anime as well as the critical and analytical skills for interpreting anime as an art form. This course will develop students' skills in viewing, analyzing, interpreting and evaluating the art of anime. Students will learn to analyze important series and films, and connect anime with contemporary and historical trends in Japan. Emphasis will be placed on the analysis of works by major directors and studios including: Tezuka, Sugii, Miyazaki, Oshii, Kon, Takahata, Shinkai, Watanabe, Studio Ghibli, Studio 4C and Madhouse. Background knowledge of animation, film or anime is helpful but no specific knowledge is required or expected. **Class 3, Credit 3 (F)**

**FNRT-201 Music in the U.S.**  
This course is a survey of music in the U.S. from the time of European colonization to the present. Particular emphasis is placed upon the question of what makes music distinctively American. Part of the American artistic experience, the music concentration and minors, and may also be taken as an elective. **Class 3, Credit 3 (S)**

**FNRT-202 Studies in World Music**  
A course designed to explore selected music cultures of selected music cultures from North America, South America, Africa, India, Asia, East Asia, and Central and Southeastern Europe. The primary goal of the course will be to expand understanding of and perceptions about music both outside and within Western cultural traditions. In addition to class discussions, students will have opportunities for hands-on activities associated with the cultures studied. **Class 3, Credit 3 (F)**

**FNRT-203 American Popular and Rock Music**  
This course examines the history and elements of Popular and Rock music in the U.S. from the end of the 19th century to current times. Emphasis will be placed on the music that was written and performed after WWII. Students will be introduced to various styles of this genre as well as an introduction to those musical elements necessary to define a rudimentary analysis of the music. Among the composers and performers to be studied are early Minstrel performers, Louis Armstrong, Scott Joplin, George Gershwin, Blues musicians, Benny Goodman, Frank Sinatra, R and B musicians, country and western, Elvis Presley, Motown, Ray Charles, folk, Jimi Hendrix, disco, punk, metal, grunge and pop. This course will be offered only occasionally. **Class 3, Credit 3 (S)**

**FNRT-204 Music and the Stage**  
A historical and cultural survey of collaboration between the arts of music and theatre, focusing on a selection of significant creative products that combine music and drama. Possible works studied include those by Shakespeare, Monteverdi, Molière, Mozart-Daponte, John Gay, Beethoven-Goethe, Wagner, Puccini, Brecht-Weill, and Bernstein, spanning the genres of Renaissance tragedy and comedy, opera seria, opera buffa, ballad opera, incidental music, romantic drama, Italian opera, music-drama, epic theatre, cabaret, vaudeville, and musical comedy. **Class 3, Credit 3 (F, S)**

**FNRT-205 Introduction to Music Theory**  
This course is designed for the student who has basic musical literacy (ability to read music notation). In addition to the writing of melody, two-part counterpoint and four-part harmony, some attention will be given to the analysis of form and style. Because it is important that theoretical understanding be coordinated with musical application, time will be devoted to the development of musicianship. Consideration will be given to individual skills and abilities, hopefully allowing for the maximum development of each student. (Elementary music reading ability) **Class 3, Credit 3 (F)**

**FNRT-206 Queer Looks**  
In this course we examine representations of queer sexuality in art, film and popular culture beginning in the repressive 1950s, followed by the Stonewall Riots of 1969. We situate the birth of gay liberation in the U.S. in the context of the civil rights struggles, feminism and the anti-war movement. We turn to the work of Andy Warhol that looms over the post-war period, challenged subsequently by the onset of AIDS and the work of General Idea and Act-Up, on the one hand, and the more graphically provocative work of Robert Mapplethorpe, on the other. We examine the diversification of the queer community as transgendered identity asserts itself and the opening of popular culture to issues of diverse sexual identities. We explore expressions of queer sensibility outside of North America and Europe. We turn finally to the issue of gay marriage, both in the U.S. and abroad. **Class 3, Credit 3 (F)**

**FNRT-210** **Bach, Handel, and the Baroque**  
European society experienced many changes during the late 16th through the early 18th centuries, and music's role and development within the context of these changes was varied, and profound. This course explores the creation and performance of music within the context of European cultural, religious, political and artistic ideals from 1580 to 1750, culminating in in-depth discussion of the life and works of J. S. Bach and G. F. Handel. (A core music course or FRNT-205 Intro to Music Theory) **Class 3, Credit 3 (F)**

**FNRT-211** **Era of Haydn, Mozart, and Beethoven**  
Many of the characteristics of art music up to the present day have their beginnings in the late eighteenth century. This course explores the creation and performance of music within the context of European cultural, political and artistic ideals from 1740 to 1825, with particular attention given to the works of Haydn, Mozart, and Beethoven. (A core music course or FRNT-205 Intro to Music Theory) **Class 3, Credit 3 (S)**

**FNRT-250** **RIT Singers**  
The RIT Singers is an experiential-learning course in which students learn music theory and historical context by learning pieces from the 16th century to the present and performing them at three major concerts a year. Participation in learning and performing such music gives students an experiential appreciation and understanding of the role of music in modern society. In addition, students from the RIT Singers have opportunities to sing in a variety of small vocal ensembles. (Contact instructor for an audition) **Class 1, Credit 1 (F, S)**

**FNRT-251** **RIT Orchestra**  
The RIT Orchestra performs three major concerts a year of standard orchestral repertoire from the 16th century to the present. In addition, students from the RIT Orchestra have the opportunity to play in a variety of chamber music ensembles. Participation is by audition. (Contact instructor for an audition) **Class 1, Credit 1 (F, S)**

**FNRT-253** **World Music Ensemble**  
The World Music Ensemble is a "hands-on" course, in which students learn the fundamentals of music as a sociological phenomenon and a variety of concepts and world views to answer the question, "What is music?" This is accomplished by introducing students to several music cultures, through learning fundamental instrumental and dance techniques, with African music being central to the study. Ensemble is coached four to six times a year by professional musicians and dancers, including Ghanaian Master Drummer Martin Kwaku Obeng, and performs several times each school year, both on campus and in the community. Enrollment is open to all interested students, faculty, and staff, regardless of musical proficiency. Developing cooperation and teamwork is a necessary outcome of participation in this ensemble. Auditions will be held to assess proper placement. (Contact instructor for an audition) **Class 1, Credit 1 (F, S)**

**FNRT-254** **RIT Jazz Ensemble**  
Preparing for and performing concerts of jazz repertoire offers students the opportunity to broaden their knowledge of and appreciation for music, and its role in society, through the careful analysis of musical forms and ideas, and the comparison of exemplary works from a variety of times, places and social/cultural necessities. The RIT Jazz Ensemble performs three major concerts a year of standard repertoire from the early 20th century to the present. Students from the RIT Jazz Ensemble also have the opportunity to play in a variety of informal performances both on and off campus. (Contact instructor for an audition) **Credit 1 (F, S)**

**FNRT-255** **RIT Chamber Orchestra**  
Preparing for and performing concerts of orchestral repertoire offers students the opportunity to broaden their knowledge of and appreciation for music, and its role in society, through the careful analysis of musical forms and ideas, and the comparison of exemplary works from a variety of times, places and social/cultural necessities. The RIT Chamber Orchestra is a select group of advanced players. It performs concerts and engages in other activities, in particular the exploration of performing practices and stylistic considerations apropos to 17th, 18th and 20th-century music. In particular, the RIT Chamber Orchestra revives works from the 18th and early 19th centuries that have not been performed in modern times. Participation is by invitation of the music director or by audition. **Class 1, Credit 1 (S)**

**FNRT-301** **Theatre in Europe**  
A survey of theatre and drama of selected European nations and periods, emphasizing plays and theatre productions in particular historical, artistic, and theoretical contexts (e.g. "Modernist European Theatre and Drama, 1890-1930,"—"Romanticism and Realism on Continental Stages"—"France and Germany, 1789-1989"—"Theatre of the European Renaissance"—"Major Dramatists of Scandinavia, Russia, and Central Europe"). **Class 3, Credit 3 (F)**

**FNRT-302** **Theatre in the United States**  
A historical survey of American theatre and drama, from the Colonial period to the early 21st century, focusing on a selection of significant plays and stylistic movements in the twentieth century. Plays studied include those by Eugene O'Neill, Arthur Miller, Tennessee Williams, Edward Albee, Sam Shepard, and Tony Kushner, along with alternating selections by less well-known and/or marginalized American dramatists, 1925 to 2000. The varied types of drama, styles and modes of theatre production, and contributions of actors, directors, scenographers, theorists, and critics provide a continuous context for this study of America's developing theatre arts. **Class 3, Credit 3 (S)**

**FNRT-303** **Shakespeare the Dramatist**  
A course in Shakespeare's drama that emphasizes the plays as potential theatre productions. Studying a selection of plays representative of the different acknowledged types of Shakespearean drama (comedy, tragedy, history, problem comedy, romance), students gain a broad understanding of the character and range of Shakespeare's poetic-dramatic art. Experimenting with production activities such as oral interpretation, character presentation, and scene rendering, they acquire a practical appreciation of Shakespearean drama's theatrical potency, of the original staging conventions, and of how each type of play makes particular generic demands on both performer and spectator. Augmenting the reading and expressive activities is a term research project focused on collaborative realization of a staging interpretation of selected scenes from the Shakespeare plays on the syllabus. **Class 3, Credit 3 (F)**

**FNRT-320** **Music of the Romantic Era**  
Survey of the rise of romanticism from Beethoven to Strauss in the context of the development of 19th century musical styles in general. Topics of exploration include national trends in 19th century music, the rise of the general public as arbiters of musical taste, philosophical influences, and performance considerations. (A core music course or FRNT-205 Intro to Music Theory) **Class 3, Credit 3 (F)**

**FNRT-321** **Music Since 1900**  
Survey of the cultivated traditions of music in the 20th and 21st centuries, particularly in the U.S., taking into account its political, social and historical frameworks. (A core music course or FRNT-205 Intro to Music Theory) **Class 3, Credit 3 (S)**

**FNRT-322** **Survey of Jazz**  
This course will survey the development of American jazz music, highlighting representative composers and performers and significant works. Particular attention will be drawn to the multi-racial influences on the creation of jazz music and its relationship to American culture as a whole. **Class 3, Credit 3 (F)**

**FNRT-323** **Survey of African-American Music**  
This course is a survey of African-American music through an examination of the major forms of music-making and dance developed among African-Americans in the United States from the early 17th century to the present. A brief introduction to West African cultural characteristics, especially music and dance, as well as discussions of the African diaspora in the New World, will serve as background for this survey. **Class 3, Credit 3 (S)**

**FNRT-324** **Sounds of Protest**  
This course is designed to explore the variety of ways music has served as commentary on and/or symbolic representation of social circumstances and events in America and throughout the world, historically and in the present. Students will research, listen to, analyze, and discuss music representing a variety of genres, styles, and cultures, ranging from various forms of European and American folk, popular, and concert music to selected non-western music. Topics will include race, gender, sexuality, economics, class, war, and politics, among others. **Class 3, Credit 3 (F)**

**FNRT-325** **American Popular Song**  
This course will survey the development of the American popular song and its composers and performers, taking into account the political, social and historical perspectives reflected in this commercial part of our vernacular music tradition. **Class 3, Credit 3 (F)**

**FNRT-326****History of Musical Instruments**

The development of music in the Western art tradition had a mutually influential relationship with the changes in construction and manufacturing of musical instruments. Recent research into the various and special sounds of instruments from different historical periods has been pivotal in new approaches to performance over the past quarter century (Historically Informed Performance). This course explores the historical development of musical instruments commonly used in performing Western art music, including manufacturing techniques, construction, performing techniques, historical audience expectations of musical sound, and comparative performance practices. **Class 3, Credit 3 (S)**

**FNRT-327****The American Musical Theater**

This course is designed as a survey of the development of the American musical theater, highlighting representative works, composers, librettists and performers of both the cultivated and vernacular traditions. It is further designed as an appreciation course, fostering the development of a greater appreciation for all types of stage music and the ability to better evaluate the quality of a work, the performance and the performers. This course is only offered occasionally. **Class 3, Credit 3 (S)**

**FNRT-350****Introduction to Museums and Collecting**

This course examines the history, theory, ideology, and practice of collecting within the institutional context of the museum. It considers the formation of the modern museum, and focusing on the American context, investigates the function and varieties of museums, ranging from natural history, anthropology, science and technology, history, and art. The course explores the history of the museum and its evolution institutionally, ideologically, and experientially. The course also considers the operations of museums from accessioning through deaccessioning, examining museum management, collections management and collections care. The course also explores museum governance and the professional ethics and legal constraints that affect museum professionals. The course examines how a museum carries out its mission of public education through its collections and exhibitions, as well as through its educational programs and community outreach and visitor studies. Current issues in the museum world are also considered, including: the museum's educational function versus its entertainment function; the problems of staying solvent in an era of diminishing governmental and corporate subsidies; de-accessioning collections to support the museum operations; issues of art theft and repatriation (ranging from colonial era and Nazi era plunder, the disposition of human remains and sacred objects, and illicit trafficking); the evolving responsibilities of the museum to its public and the cultural heritage; and the rise of the virtual museum. Throughout the semester, the course examines museums and their practices through the perspectives of colonialism, nationalism, class, race, age, gender, and ethnicity. The course includes field trips to local museums and collections throughout the semester. **Class 3, Credit 3 (F)**

**FNRT-351****Panel Painting**

This is a studio based class in which student recreate an egg tempera panel. Students will explore the history of pigments and painting technology through use of primary sources and hands on projects. Production methods and technology of artists' materials will be explored by the recreation of a medieval panel painting. Deterioration and alteration of pigments and paintings will be reviewed. **Class 3, Credit 3 (F)**

**FNRT-352****Historic Photographic Processes**

This is a studio-based class in which student recreate a number of different nineteenth century photographic processes. Students will explore the history of photographic technology through use of primary sources and hands on projects. The chemistry and deterioration of the materials will be reviewed through the use of primary texts, projects and discussion. **Class 3, Credit 3 (S)**

**FNRT-353****History and Theory of Exhibitions**

Art exhibitions are organized around a curatorial premise, a statement that articulates an idea allowing for the selection of work included in an exhibition. This course begins with an overview of exhibition history, starting with the transformation of the Louvre into the first public art museum following the French Revolution, where art history, a discipline developed in the 19th century, was enlisted to organize exhibition. The course then examines the proliferation of types of exhibitions that accompanies modernism, up to the present, paying close attention to the curatorial premise animating the exhibitions. **Class 3, Credit 3 (S)**

**FNRT-354****Exhibition Design**

This course examines the history and practice of exhibition design. It reviews the history of exhibitions within the development of museum-like institutions. In this course the following aspects of exhibition design are considered: curatorial premise or theme, exhibition development timeline, exhibition site, contracts and contractual obligations, budgets and fundraising, publicity material, didactic material, and exhibition design. The course includes field trips to local institutions and collections throughout the semester. **Class 3, Credit 3 (F)**

**FNRT-355****Fundraising, Grant Writing, and Marketing for Nonprofit Institutions**

This course examines the growing autonomy of collecting institutions as they are cut off from various forms of governmental sponsorship and public subsidy and their subsequent needs for raising money from outside, non-traditional sources. The course looks at issues of needs assessment, budgeting, and strategic planning. It focuses on the design and implementation of effective fundraising campaigns, as well as on the organization and writing of successful grant proposals. It also considers the importance of marketing to overall institutional success. **Class 3, Credit 3 (F)**

**FNRT-356****Interactive Design for Museums**

This is a project based course which explores the intersection of interactive design and museum education. Interactive museum programs have the potential to engage museum visitors by encouraging creative exploration, independent interpretation, and deeper understanding. Students will learn how to make the study of material culture more interesting and approachable by creating interactive projects for both the museum and the Internet. Students will learn to incorporate educational outcomes into engaging learning experiences for museums. **Class 3, Credit 3 (S)**

**FNRT-357****Collections Management and Museum Administration**

This course presents an overview of the administration and management of museums and their collections. The course examines the governance structure of museums, focusing on personnel responsible for their administration, curation and education, and operations, as well as on the mission statement and policies they determine. The course also details the management of collections, including the development of a collections policy, management of that policy, documentation and record keeping, acquisitions, and the creation/management of exhibitions. Finally, the course considers collections care or preventive conservation, looking at both the facility and collections. Throughout the semester, legal and ethical issues pertaining to museums and their collections will be emphasized. **Class 3, Credit 3 (S)**

**FNRT-370****American Painting**

A survey of the style and meaning in American paintings from the colonial limners, through the nineteenth and twentieth centuries, to contemporary artists. It centers on what distinguishes painting of the colonies and of the United States from the European counterpart. **Class 3, Credit 3 (F)**

**FNRT-371****African-American Art**

This course provides an overview of African-American art, presented in three periods: from slavery through Reconstruction, from the Harlem Renaissance to the end of the 1930s, and modern and postmodern movements following World War II. There will be comparisons with representations of African-Americans in film, music and literature as we move through these periods. We will be sensitive to the development of artists' aesthetic language and the evolution of social and political points of view expressed in artists' work. We will examine the role of institutions in promoting African-American art. **Class 3, Credit 3 (F)**

**FNRT-372****American Film of the Studio Era**

This course examines the history and aesthetics of the motion picture in the United States between the 1890s and the early 1960s; emphasis will be placed on the analysis of both the work of major American filmmakers and the development of major American film genres during the Classical Hollywood Studio period. Among the filmmakers to be studied are Griffith, Chaplin, Hawks, Ford, Capra, Welles, Curtiz, Wilder, Donen, Sirk, Ray, Hitchcock, and Kubrick. Genres to be covered include the melodrama, silent comedy, screwball comedy, western, thriller, film noir, newspaper film, and the gangster film. The films will be studied within the context of contemporary cultural and political events, and will be discussed from several viewpoints, including aesthetic, technical, social, and economic. The ways in which gender and class are constructed through the movies will also be a major focus of study. **Class 3, Credit 3 (F)**



**FNRT-373****American Film Since the Sixties**

This course examines the history and aesthetics of the motion picture in the United States since the late 1960s, when the classical studio era ended. Emphasis will be placed on the analysis of both the work of major American filmmakers and the evolution of major American film genres between 1967 and 2001. Among the filmmakers to be studied are Kazan, Cassavetes, Penn, Coppola, Scorsese, Spielberg, Allen, Seidelman, Lee, Burton, Altman, Tarantino, Coen, and Lynch. The course will consider the evolution of such traditional Hollywood genres as the gangster film, the romantic comedy, and the Hollywood movie, study the development of new, blended genres, investigate the rise of the blockbuster, explore the rise of the Independents, and follow the aesthetic changes that occurred since the 1967. The films will be studied within the context of contemporary cultural and political events, and will be discussed from several viewpoints, including aesthetic, technical, social, and economic. The ways in which gender, race, and class are constructed through the movies will also be a major focus of study. **Class 3, Credit 3 (S)**

**FNRT-374****Art in the Age of the New Deal**

In this course we examine art in the age of the New Deal; that is, the art of the 1920s and the 1930s, with a particular emphasis on the artwork produced through the programs of the Roosevelt Administration's New Deal. These programs sponsored the visual arts, as well as film, theater, literature, music and dance. We study the art produced through this sponsorship in the context of the evolution of twentieth century modernism, mostly European, that had begun to influence American art. We will look at the stylistic and ideological affinities of the figurative style, known as the American scene, with the Mexican muralists of the 1920s and examine other government-sponsored social realist art of the 1930s, notably German and Russian. **Class 3, Credit 3 (S)**

**FNRT-375****Women/Gender/Art**

This course examines the role of women in the visual arts as both images makers and subject matter in order to see how gender plays a role in the conceptualization of creativity and art. Among the topics to be discussed are: the construction of femininity and gender in the patriarchy; art as an ideological practice; women, art, and society; art history, art education, and art evaluation; women artists and their contemporaries. **Class 3, Credit 3 (S)**

**FNRT-376****Visual Culture Theory**

Visual culture studies recognize the predominance of visual forms of media, communication, and information in the contemporary world, investigating both "high" cultural forms such as fine art, design, and architecture and popular "low" cultural forms associated with mass media and communications. Visual culture studies represents a turn in the discourse of the visual, which had focused on content-based, critical readings of images, and has since broadened its approach to additionally question the ways in which our consumption and production of images and image based technologies are structured. Analyzing images from a social-historical perspective, visual culture asks: what are the effects of images? Can the visual be properly investigated with traditional methodologies, which have been based on language, not imagery? How do images visualize social difference? How are images viewed by varied audiences? How are images embedded in a wider culture and how do they circulate? **Class 3, Credit 3 (S)**

**FNRT-377****Imag(in)ing Rochester**

This course examines the ways in which culture, ethnicity, languages, traditions, governance, policies and histories interact in the production of the visual experience. We will approach the campus of RIT and the city of Rochester and their various urban spatial forms as image experiences, subject to interpretative strategies and the influence of other discourses. We will wander the well-traveled and the unbeaten paths, participating in and interrogating a wide range of our campus' and city's treasures and embarrassments, secrets and norms. In addition to these field trips, we will be reading from literature and cultural studies, as well as viewing films, advertisements and websites, and possibly attending theatrical and music performances or sporting events. **Class 3, Credit 3 (S)**

**FNRT-378****Memory, Memorials, Monuments**

In this course we examine the public remembering and memorialization of historic events that leads to memorials and monuments in the fields of architecture, sculpture and film. We begin by examining the nature of memory, and specifically of collective memory, and its relationship to historical events and its subsequent transformation in the process of memorialization. We then look at examples of the sculptural monument, a traditional form of memorial, and the evolution of its vocabulary in the second half of the 20th century. We also examine the memorial work undertaken by those museums whose primary function is to engage in remembering historical events, a recent phenomenon in the field of museum building. We screen films and examine how documentaries and dramatizations engage the spectator by remembering history differently. The course culminates by examining the debates surrounding the remembering of 9/11 and of more recent traumatic events. **Class 3, Credit 3 (S)**

**FNRT-379****Art of India and Southeast Asia**

A survey outlining the development of art in India and Southeast Asia, examining the philosophical circumstances and religious traditions (to include Buddhist, Hindu, Jain, and Islamic) that distinguish eastern artistic traditions. There is opportunity for each student to pursue special interest in depth. **Class 3, Credit 3 (F)**

**FNRT-380****Art of China, Korea and Japan**

A survey outlining the development of art in China, Korea and Japan, examining the philosophical circumstances and religious traditions (to include Daoism, Confucianism, and Buddhism) that distinguish eastern artistic traditions. There is opportunity for each student to pursue special interest in depth. **Class 3, Credit 3 (S)**

**FNRT-381****Art of Islam: The Arabic Tradition**

A survey of artistic traditions (to include architecture, decorative arts [metalware, ceramics, glass, wood], art of the book and painting) from the seventh century until the Mongol conquests in the thirteenth century in countries from Asia, Africa and Europe that were influenced by the religion of Islam. There will be opportunity for each student to pursue special interests in depth. **Class 3, Credit 3 (F)**

**FNRT-382****Art of Islam: Persian/Turkish/Mughal Traditions**

A survey of artistic traditions (to include architecture, decorative arts [metals, ceramics, glass, wood], art of the book and painting) from the Mongol conquests in the thirteenth century until the European imperialistic presence in the later eighteenth century in countries from Asia, Africa and Europe that were influenced by the religion of Islam. There will be opportunity for each student to pursue special interests in depth. **Class 3, Credit 3 (S)**

**FNRT-383****Traumatic Images**

This course investigates visual culture and its imagistic response to life's crises. Problems of identity and identification will be explored and confronted through works of photography, painting, mixed media, new media and film of the 19th, 20th and 21st centuries. Beginning with the late 19th Century vogue for images of "hysterical" women, crippled "black-sheep" family members and dead loved ones (as corpses and as ghosts), we then move on to consider the last century's fascination with pain and suffering, disease and violence, struggle and survival and then the 21st century's emphasis on terrorism. Specifically, we will focus on the gendering of images and imaging as disturbing pictures work to defy the formal and theoretical distinction between private and public, personal and collective experience and manage the often conflicting responsibilities to self, family, religion, race, nation, and society. **Class 3, Credit 3 (S)**

**FNRT-384****Art of Dying**

This course explores the experience of dying as a profoundly human and universal experience as it is represented by artists who are themselves facing immanent death. The unique and deeply personal process of each dying artist is crucially informed by social, cultural and historical as well as artistic contexts. The course will focus primarily on visual artists and writers living with and dying of disease—such as AIDS, cancer and cystic fibrosis as well as mortality and age. Topics such as aesthetics, artistic media, representation, grief, bereavement, illness, care-giving, aging, and the dying process will be considered within the context of issues of race, class, ethnicity, sexuality, gender and community values. Some of the artists covered will be Jo Spence, Hannah Wilke, Elias Canetti, Bob Flanagan, Herve Guibert, Tom Joslin, Laurie Lynd, Audre Lorde, Charlotte Salomon, Keith Haring, Frida Kahlo, Bas Jan Ader, Ted Rosenthal, Felix Gonzalez Torres, Keith Haring, Eric Steel, Derek Jarman, Eric Michaels, and David Wojnarowicz. We will also explore some of the critical theory of Roland Barthes, Michel Foucault, Elaine Scarry, Susan Sontag, and Ross Chambers. **Class 3, Credit 3 (S)**

**FNRT-410****Playmaking**

This is an upper-level course in the practical and critical understanding of how plays are made—dramaturgy—beginning with the conception of a dramatic story, and proceeding through the creative phases of plotting, script writing, acting study, directing, staging, producing, and critical evaluation. All students engage in all the stages of playmaking work. At a designated point in the course, specific responsibilities for realizing the finished product—a performed play—are assigned. The finished product will vary: it might be an original student script (or several); it might be a collection of scenes from one or more existing dramas; or, it might be a published full-length play. (Permission of instructor) **Class 3, Credit 3 (S)**

**FNRT-438** **Conservation and Analysis of Cultural Materials**  
This course examines the philosophies, ethics, and analytical methods of art conservation. An overview of deterioration mechanisms and conservation strategies for a variety of materials including: stone, glass, ceramic, wood, paper, new media, metals, textiles, oil paintings and archaeological materials will be presented. Analytical methods for material analysis and authentication will be reviewed. This course has a laboratory component in which students will learn pigment analysis and the identification of print and photographic processes. **Class 3, Credit 3 (F)**

**FNRT-440** **Deaf Art and Cinema**  
Students will examine the context in which specific cultural groups have chosen to create works about their experiences. They will go on to explore a wide range of artistic works representing the Deaf experience in visual arts and cinema. Students will be expected to analyze works in terms of cultural symbols and themes. Attention will be given to historical context (personal and collective) that has helped to shape many of these works, motifs, and messages. Students will write and present in-depth papers examining specific works and artists/filmmakers. In addition, students will be expected to create an original artwork and a collaborative short film. **Class 3, Credit 3 (F, S)**

**FNRT-485** **Advanced Music Theory**  
This course is designed for the student who has a knowledge of basic music theory and an understanding of four-part diatonic composition. In addition to the continuing study of melodic construction and development, thematic development in two-part counterpoint, four-part harmony, chromatic materials and modulation, and analysis of form and style, emphases will be placed on the development of individual music skills. (FNRT-205 Introduction to Music Theory) **Class 3, Credit 3 (S)**

**FNRT-599** **Independent Study**  
A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Credit 1-12 (F, S, Su)**

## Foreign Languages

**MLAR-201** **Beginning Arabic I**  
Beginning Arabic I introduces students with no prior knowledge of the language to Modern Standard Arabic. Beginning Arabic I builds the foundation skills in speaking, listening, reading, writing, and culture, with emphasis on beginning writing and on conversation. See instructor if this is your first RIT Arabic class and you have prior study of the language. **Class 4, Credit 4 (F, S)**

**MLAR-202** **Beginning Arabic II**  
Beginning Arabic II focuses on the development of functional competence in speaking, listening, reading, writing and culture. (MLAR-201 Beginning Arabic I or equivalent proficiency. See instructor for placement testing if this is your first RIT Arabic class and you have prior study of the language.) **Class 4, Credit 4 (F, S)**

**MLAR-202T** **Beginning Arabic II T**  
Beginning Arabic II T focuses on the development of functional competence in speaking, listening, reading, writing and culture. (0525-401 Beginning Arabic II or equivalent proficiency. See instructor for placement testing if this is your first RIT Arabic class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**MLAR-301** **Intermediate Arabic I**  
Intermediate Arabic I continues with intermediate-level development of functional skills in speaking, listening, reading, writing and culture, including conversation, with increased work in reading and writing. (MLAR-202 Beginning Arabic II or equivalent proficiency; students must take the placement test if this is their first RIT Arabic class.) **Class 3, Credit 3 (F)**

**MLAR-302** **Intermediate Arabic II**  
Intermediate Arabic II, the end of the intermediate year sequence, does advanced-intermediate work in all skills, including conversation, with increased work in reading and writing. (MLAR-301 Intermediate Arabic I or equivalent proficiency; students must take the placement test if this is their first RIT Arabic class.) **Class 3, Credit 3 (S)**

**MLAR-401** **Advanced Arabic I**  
Advanced Arabic I, the beginning of the advanced (third year) sequence, does advanced work in all skills (speaking, listening, reading, writing, culture), including conversation, with increased work in reading, writing, and culture. (MLAR-302 Intermediate Arabic II or equivalent proficiency; students must take the placement test if this is their first RIT Arabic class.) **Class 3, Credit 3 (offered regularly)**

**MLAR-402** **Advanced Arabic II**  
Advanced Arabic II, the final course of the advanced (third year) sequence, continues study of the advanced-year textbook and does advanced work in all skills (speaking, listening, reading, writing, culture), including conversation, with increased work in reading, writing and culture. (MLAR-401 Advanced Arabic I or equivalent proficiency; students must take the placement test if this is their first RIT Arabic class.) **Class 3, Credit 3 (offered regularly)**

**MLAS-201** **Beginning American Sign Language I**  
ASL I includes linguistic features, cultural protocols and core vocabulary for students to function in basic ASL conversations that include ASL grammar for asking and answering questions while introducing oneself, exchanging personal information, talking about family, friends and surroundings, and discussing activities. This course is designed for students who have no knowledge of American Sign Language. **Class 4, Credit 4 (F, S, Su)**

**MLAS-202** **Beginning American Sign Language II**  
This course expands the basic principles presented in ASL I. ASL II teaches students to use linguistics features, cultural protocols and core vocabulary to function in basic ASL conversations that include ASL grammar for giving directions, describing, making request, talking about family, occupations and routines, and attributing qualities to others. (MLAS-201 Beginning American Sign Language I or equivalent) **Class 4, Credit 4 (F, S, Su)**

**MLAS-202T** **Beginning American Sign Language II T**  
This course expands the basic principles presented in ASL I. ASL II T teaches students to use linguistics features, cultural protocols and core vocabulary to function in basic ASL conversations that include ASL grammar for giving directions, describing, making request, talking about family, occupations and routines, and attributing qualities to others. (0525-391 Beginning ASL II or equivalent proficiency. See instructor for placement testing if this is your first RIT ASL class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S, Su)**

**MLAS-301** **Intermediate American Sign Language I**  
This course builds upon information taught in Beginning ASL I and II and introduces expanded grammatical features of ASL and specialized vocabulary, while continuing to increase fingerspelling and numbers receptive and expressive skills. In addition, some basic features of ASL discourse are taught in organizing and explaining contextual information. (MLAS-202 or equivalent). **Class 3, Credit 3 (F, S)**

**MLAS-302** **Intermediate American Sign Language II**  
This course builds upon information taught in Beginning ASL I-Intermediate ASL I. Students continue learning and using ASL vocabulary, grammatical principles and various intermediate-level discourse features in narratives and presentations in ASL. Students analyze multiple meaning English words and English idioms to express concepts in ASL. Issues related to Deaf culture continue to be introduced based on unit topics. (MLAS-301 or equivalent) **Class 3, Credit 3 (F, S)**

**MLAS-351** **Linguistics of American Sign Language**  
Students in this course will be introduced to the study of American Sign Language in terms of its linguistic structure and use. In particular, students will learn to analyze the basic features of ASL phonology, morphology, syntax, semantics and pragmatics/discourse. In addition, research related to variation in ASL and acquisition of ASL will also be reviewed. Instruction is in ASL (an interpreter will not be provided). (MLAS-202 Beginning ASL II or fluency in ASL) **Class 3, Credit 3 (S)**

**MLAS-352** **American Sign Language Literature**  
In this course, students will explore a wide range of literary works representing the various genres of ASL literature. Students will be expected to analyze works in terms of literary conventions/techniques as well as relevant cultural symbols and themes. Attention will be given to historical context, Deaf cultural values, and the style/conventions used by individual literary artists. Each student will be required to complete literary analysis papers. In addition, students will be expected to create original ASL literary works and/or retell well-known ASL literary works as individuals or in collaboration with other students. This course is conducted in ASL, without an interpreter, and will require considerable reading and viewing of videotaped materials. (MLAS-202 Beginning ASL II or fluency in ASL) **Class 3, Credit 3 (F)**

**MLAS-401** **Advanced American Sign Language I**  
This course builds upon information taught in Beginning ASL I-Intermediate ASL II. Students continue learning and using ASL vocabulary, grammatical principles and various advanced-level discourse features in narratives and presentations in ASL. Students continue to analyze multiple meaning English words and English idioms to express concepts in ASL. Issues related to Deaf culture continue to be introduced based on unit topics. (MLAS-302 or equivalent) **Class 3, Credit 3 (F, S)**

**MLAS-402** **Advanced American Sign Language II**  
This course builds upon information taught in Beginning ASL I-Advanced ASL I. Students continue learning and using ASL vocabulary, grammatical principles and various advanced-level discourse features in narratives and presentations in ASL. Students analyze different components in storytelling. ASL Literature will be introduced in this level. Students identify controversial issues in various works of ASL Literature. (MLAS-401 or equivalent). **Class 3, Credit 3 (F, S)**

**MLCH-201** **Beginning Chinese I**  
This course is designed for beginners, with no prior study of Chinese. The course introduces students to the sounds, basic sentence structures, and the writing system of Mandarin Chinese. Pinyin, the Romanization (phonetic transliteration) of Mandarin Chinese, is taught and required throughout the course. Students also learn to read and write Chinese characters. Emphasis is on developing listening and speaking skills, as well as building a vocabulary based on the ideographic Chinese characters. (Students must take the placement test if you have prior study of Mandarin Chinese or already know Hanzi.) **Class 4, Credit 4 (F, S)**

**MLCH-202** **Beginning Chinese II**  
This course follows Beginning Chinese I and completes first-year level Chinese, continuing work in listening and speaking, and increasing work in reading and writing Chinese characters. Pinyin is also used. By the end of the first year of coursework, students will have studied 600 Chinese characters. (MLCH-201 Beginning Chinese I or equivalent proficiency) **Class 4, Credit 4 (F, S)**

**MLCH-202T** **Beginning Chinese II T**  
This course follows Beginning Chinese I and completes first-year level Chinese, continuing work in listening and speaking, and increasing work in reading and writing Chinese characters. Pinyin is also used. By the end of the first year of coursework, students will have studied 600 Chinese characters. (0525-421 Beginning Chinese II or equivalent proficiency. See instructor for placement testing if this is your first RIT Chinese class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**MLCH-301** **Intermediate Chinese I**  
This course begins the second-year level of Chinese study. Knowledge of Pinyin and Chinese characters and sentence structures in Integrated Chinese Level 1 is required. The focus continues to be on developing listening, speaking, reading, and writing skills. Further aspects of Chinese culture are also introduced. (MLCH-202 Beginning Chinese II or equivalent proficiency. See instructor for placement) **Class 3, Credit 3 (F, S)**

**MLCH-302** **Intermediate Chinese II**  
This course continues the second-year level of Chinese study. Knowledge of Pinyin and Chinese characters and sentence structures in Integrated Chinese Level 1 and Level 2 Part 1 is required. The focus continues to be on developing listening, speaking, reading, and writing skills. Further aspects of Chinese culture are also introduced. (MLCH-301 Intermediate Chinese I or equivalent proficiency. See instructor for placement.) **Class 3, Credit 3 (F, S)**

**MLCH-401** **Advanced Chinese I**  
This is the first course of a two-course sequence at the advanced level. This sequence is designed to further develop competence in the four language skills of listening, speaking, reading, and writing. Following Intermediate Chinese II, this course continues the grammar acquisition, expansion of vocabulary with more lengthy reading and writing. Classroom discussion and writing practice are important parts of the course. By the end of the course work, students should be able to express views on serious, topical issues in increased detail. (MLCH-302 Intermediate Chinese II or equivalent proficiency) **Class 3, Credit 3 (F)**

**MLCH-402** **Advanced Chinese II**  
This is the second course of a two-course sequence at the advanced level. Main purpose of this course is to further develop competence in the four language skills as well as cultural literacy by using a diversity of authentic materials and multimedia pertaining to Chinese matters and values. Topics include both traditional and contemporary Chinese socio-cultural issues. By identifying, analyzing, comparing, and discussing in both oral and written forms of Chinese, students will acquire a better understanding of the language, culture, and Chinese society. (MLCH-401 Advanced Chinese I or equivalent proficiency) **Class 3, Credit 3 (S)**

**MLCU-301** **Psycholinguistics**  
This course introduces main subfields of psycholinguistics, a study that deals with all aspects of human language performance: language acquisition, sentence processing/comprehension, and sentence production/speaking. Through readings on theoretical and experimental studies, findings and issues in first language acquisition, sentence processing, and sentence production are introduced. By discussing how speakers of different languages acquire, comprehend, and produce sentences, the course also examines interactions with language-specific, linguistic constraints and human language performances. **Class 3, Credit 3 (S)**

**MLFR-201** **Beginning French I**  
This is the first course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning French as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in French-speaking countries. This course may be taken as part of the French language/culture concentration; the French language/culture and French minors; or as a liberal arts elective. (Students must take the placement test if this is their first RIT French class and they have some prior study of French) **Class 4, Credit 4 (F, S)**

**MLFR-202** **Beginning French II**  
This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning French as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in French-speaking countries. (MLFR-201 Beginning French I or equivalent proficiency; students must take the placement test if this is their first RIT French class, and they have some prior study of French). **Class 4, Credit 4 (F, S)**

**MLFR-202T** **Beginning French II T**  
This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning French as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in French-speaking countries. (0525-441 Beginning French II or equivalent proficiency. See instructor for placement testing if this is your first RIT French class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**MLFR-301** **Intermediate French I**  
This is the first course of a two-course sequence at the intermediate level. The sequence provides students with the tools necessary to increase their ability to function in French. Communicative activities, contemporary texts, vocabulary study, and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary French life and culture as well as the cultures of the Francophone world. (MLFR-202 Beginning French II or equivalent proficiency). **Class 3, Credit 3 (F, S)**

**MLFR-302** **Intermediate French II**  
This is the second course of a two-course sequence at the intermediate level. The sequence provides students with the tools necessary to increase their ability to function in French. Communicative activities, contemporary texts, vocabulary study, and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary French life and culture as well as the cultures of the Francophone world. (MLFR-301 Intermediate French I or equivalent proficiency; students must take the placement test if this is their first RIT French class, and they have some prior study of French). **Class 3, Credit 3 (F, S)**

**MLFR-351** **French Films and Hollywood**  
A comparative study of French films and their American remakes from the 1930s to the 21st century to determine what these films reveal about the cultural and cinematic contexts from which they emerge. Devotes particular attention to the (re)construction of race, space, gender, and national histories. Conducted in English. **Class 3, Credit 3 (offered regularly)**

**MLFR-401** **Advanced French I**  
This is the first course of a two-course sequence at the advanced level. This course will emphasize active spoken language use. Other skills will also be used, such as reading, writing and listening, but primarily as helps for developing conversational ability. Attention will also be given to grammatical accuracy. Readings will cover historical and current events in France and in other Francophone cultures. (MLFR-302 Intermediate French II or equivalent proficiency; students must take the placement test if this is their first RIT French class, and they have some prior study of French.) **Class 3, Credit 3 (F)**

**MLFR-402** **Advanced French II**  
This is the second course of a two-course sequence at the advanced level. This course will emphasize active spoken language use. Other skills will also be used, such as reading, writing and listening, but primarily as helps for developing conversational ability. Attention will also be given to grammatical accuracy. Readings will cover historical and current events in France and in other Francophone cultures. (MLFR-401 Advanced French I or equivalent proficiency; students must take the placement test if this is their first RIT French class, and they have some prior study of French.) **Class 3, Credit 3 (S)**

**MLGR-201** **Beginning German I**  
This is the first course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning German as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the German-speaking countries. **Class 4, Credit 4 (F, S)**

**MLGR-202** **Beginning German II**  
This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning German as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the German-speaking countries. (MLGR-201 Beginning German I or equivalent) **Class 4, Credit 4 (F, S)**

**MLGR-202T** **Beginning German II T**  
This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning German as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the German-speaking countries. (0525-461 Beginning German II or equivalent proficiency. See instructor for placement testing if this is your first RIT German class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**MLGR-301** **Intermediate German I**  
This is the first course of a two-course sequence at the intermediate level. The sequence provides students with the tools to increase their ability to function in German. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary German life and culture. (MLGR-202 Beginning German II or equivalent proficiency) **Class 3, Credit 3 (F, S)**

**MLGR-302** **Intermediate German II**  
This is the second course of a two-course sequence at the intermediate level. The sequence provides students with the tools to increase their ability to function in German. Communicative activities, contemporary texts, the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary German life and culture. (MLGR-301 Intermediate German I or equivalent proficiency) **Class 3, Credit 3 (F, S)**

**MLGR-401** **Advanced German I**  
This is the first course of a two-course sequence at the advanced level. This sequence is designed to develop in-depth proficiency in the four language skills of speaking, understanding, reading, and writing. This sequence develops the ability to understand and communicate freely on a variety of familiar and unfamiliar topics by expansion of the vocabulary base and by discussions, compositions, and oral reports based on cultural and literary texts. The sequence includes a rigorous study of advanced grammatical structures and usage. (MLGR-302 Intermediate German II or equivalent proficiency) **Class 3, Credit 3 (F)**

**MLGR-402** **Advanced German II**  
This is the last course of a two-course sequence at the advanced level. This sequence is designed to intensively develop proficiency in the four language skills of speaking, understanding, reading, and writing. This sequence develops the ability to understand and communicate freely by expansion of the vocabulary base and by discussions, compositions, and oral reports, based on cultural and literary texts. (MLGR-401 Advanced German I or equivalent proficiency) **Class 3, Credit 3 (S)**

**MLIT-201** **Beginning Italian I**  
This is the first course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning Italian as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the Italian-speaking countries. **Class 4, Credit 4 (F, S)**

**MLIT-202** **Beginning Italian II**  
This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning Italian as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the Italian-speaking countries. (MLIT-201 Beginning Italian I or equivalent) **Class 4, Credit 4 (F, S)**

**MLIT-202T** **Beginning Italian II T**  
This is the second course in a two-course sequence. The sequence provides students without prior exposure to the language with a sound basis for learning Italian as it is used today in its spoken and written forms. The goal of the sequence is proficiency in communication skills with an emphasis on oral proficiency. The sequence also acquaints students with contemporary culture and life in the Italian-speaking countries. (0525-501 Beginning Italian II or equivalent proficiency. See instructor for placement testing if this is your first RIT Italian class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**MLIT-301** **Intermediate Italian I**  
This is the first course of a two-course sequence at the intermediate level. The sequence provides students with the tools to increase their ability to function in Italian. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary Italian life and culture. (MLIT-202 Beginning Italian II or equivalent proficiency) **Class 3, Credit 3 (F, S)**

**MLIT-302** **Intermediate Italian II**  
This is the first course of a two-course sequence at the intermediate level. The sequence provides students with the tools to increase their ability to function in Italian. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary Italian life and culture. (MLIT-301 Intermediate Italian I or equivalent proficiency) **Class 3, Credit 3 (F, S)**

**MLIT-401** **Advanced Italian I**  
This is the first course of a two-course sequence at the advanced level. The sequence provides students with the tools to increase their ability to function in Italian. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary Italian life and culture. (MLIT-302 Intermediate Italian II or equivalent proficiency) **Class 3, Credit 3 (F)**

**MLIT-402**

This is the first course of a two-course sequence at the advanced level. The sequence provides students with the tools to increase their ability to function in Italian. Communicative activities, contemporary texts, and the study of vocabulary and grammar are used to expand all communication skills, especially oral proficiency. This sequence continues to address issues of contemporary Italian life and culture. (MLIT-401 Advanced Italian I or equivalent proficiency) **Class 3, Credit 3 (S)**

**Advanced Italian II****MLJP-201**

This is the first course in the first year sequence designed for students with no prior exposure to Japanese. It provides a sound introduction to the language as it is spoken and written today. A strong emphasis is placed on oral proficiency and the appropriate use of language in Japanese society. Hiragana and katakana syllabary is also taught for written communication. The course is a prerequisite for the Japanese foreign language/culture concentration and minor. It is also a prerequisite for the KIT/RIT summer program in Kanazawa, Japan. Not open to students with prior Japanese instruction. See instructor for placement. **Class 4, Credit 4 (F, S)**

**Beginning Japanese I****MLJP-202**

This is the second course in the first-year sequence. It provides a sound introduction to the language as it is spoken and written today. A strong emphasis is placed on proficiency and the appropriate use of language in the Japanese society. Students continue to learn how to use language in real-life situations for different communication purposes. Approximately 120 Kanji characters are also introduced for written communication. The course is a prerequisite for the KIT/RIT summer program in Kanazawa, Japan. Students must have a good command of Hiragana and Katakana and basic knowledge of Kanji to take this course. (MLJP-201 Beginning Japanese I or equivalent proficiency; see instructor for placement.) **Class 4, Credit 4 (F, S)**

**Beginning Japanese II****MLJP-202T**

This is the second course in the first-year sequence. It provides a sound introduction to the language as it is spoken and written today. A strong emphasis is placed on proficiency and the appropriate use of language in the Japanese society. Students continue to learn how to use language in real-life situations for different communication purposes. Approximately 120 Kanji characters are also introduced for written communication. The course is a prerequisite for the KIT/RIT summer program in Kanazawa, Japan. Students must have a good command of Hiragana and Katakana and basic knowledge of Kanji to take this course. (0525-481 Beginning Japanese II or equivalent proficiency. See instructor for placement testing if this is your first RIT Japanese class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**Beginning Japanese II T****MLJP-301**

This is the first course in the second-year sequence designed to give students more advanced instruction and practice in the skills of speaking, reading, writing, and comprehending contemporary Japanese. A strong emphasis is placed on proficiency through reading, writing, and speaking activities. Students learn cultural information and practice using the language in real life situations in Japanese society. Approximately 60 new Kanji are introduced. The course is a prerequisite for the KIT/RIT summer program in Kanazawa, Japan. (MLJP-202 Beginning Japanese II or equivalent proficiency (Students must take the placement test if this is your first RIT Japanese class.) **Class 3, Credit 3 (F, S)**

**Intermediate Japanese I****MLJP-302**

This is the second course in the second-year sequence designed to give students more advanced instruction and practice in the skills of speaking, reading, writing, and comprehending contemporary Japanese. A strong emphasis is placed on proficiency through reading, writing, and speaking activities. Students learn cultural information and practice using the language in real life situations in Japanese society. Approximately 120 new Kanji are introduced. (MLJP-301 Intermediate Japanese I or equivalent proficiency; students must take the placement test if this is your first RIT Japanese class) **Class 3, Credit 3 (F, S)**

**Intermediate Japanese II****MLJP-351**

This course aims to introduce students to modern Japanese society, its rich cultural heritage, and the use of Japanese language that reflects the societal norms. It provides students with a fundamental yet diverse knowledge of Japanese culture and Japanese language use. Course work will include lectures, readings, discussions, and working with multi-media resources. Knowledge of Japanese helpful but not necessary. **Class 3, Credit 3 (offered regularly)**

**Languages in Japanese Society****MLJP-401**

This course provides advanced students of Japanese with training in all four language skills. Students will practice oral communication with a high degree of proficiency in various social settings. They will improve communicative skills with discussions and debate. They will also receive training in reading semi-authentic and authentic materials with the help of a dictionary, as well as training in writing for a specific purpose, such as news reports and critical essays. This course may be taken as part of the Japanese language/culture concentration; the Japanese language/culture and Japanese minors; or as a liberal arts elective. (MLJP-302 Intermediate Japanese II or equivalent proficiency; students must take the placement test if this is your first RIT Japanese class) **Class 3, Credit 3 (F)**

**Advanced Japanese I****MLJP-402**

This course provides advanced students of Japanese with training in all four language skills. Students will practice oral communication with a high degree of proficiency in various social settings. They will improve communicative skills with discussions and debate. They will also receive training in reading semi-authentic and authentic materials with the help of a dictionary, as well as training in writing for a specific purpose, such as news reports and critical essays. (MLJP-401 Advanced Japanese I or equivalent proficiency; students must take the placement test if this is your first RIT Japanese class.) **Class 3, Credit 3 (S)**

**Advanced Japanese II****MLJP-403**

This course is designed to improve the four skills (i.e., speaking, listening, reading and writing) developed in the elementary/intermediate sequence to master formal interactions in Japanese. Students will learn the formal expressions through conversation as well as reading materials and discussion of the selected readings. The course gives students an opportunity to deepen their knowledge of the structure of Japanese society as well as to practice conversation in Japanese, especially in professional and formal contexts. Students will be able to cultivate skill in expressing their thought through classroom discussion and writing assignments. Moreover, they will learn a more advanced level of vocabulary, expressions, and kanji characters in preparation for Level 2/3 of the Japanese Proficiency Test. This course will be useful for students who are planning to seek employment in Japanese companies or in companies doing business in Japan, and also for students who want to learn more about business in Japan. This is a language class. (MLJP-401 Intermediate Japanese II or instructor's permission) **Class 3, Credit 3 (S)**

**Professional Japanese****MLJP-404**

Through selected readings of essays, novels, biographies of historical figures, and contemporary manga (Japanese comics), this course gives students the opportunity to learn about Japanese culture, society, and history, in the Japanese language. Also, through discussing and writing as well as reading, this course refines students' language skills with the aim of expressing their thoughts. Furthermore, through individual readings selected by the student and based on their area of interest and ability, this course provides the opportunity to develop expressive skills in Japanese. (MLJP-302 Intermediate Japanese II or equivalent) **Class 3, Credit 3 (F)**

**Japanese Culture in Print****MLJP-451**

This course aims to increase student understanding of basic characteristics of the Japanese language. Topics include the genetic affiliation of the Japanese language, sound system, word formation, syntactic structures, socio-cultural factors in language use, and historical development of the writing system. Students will become acquainted with the language from a linguistics perspective and develop analytical skills by solving linguistic problems pertinent to Japanese language. **Class 3, Credit 3 (offered regularly)**

**Structure of the Japanese Language****MLPO-201**

Beginning Portuguese I introduces the Portuguese language and culture to beginners, and builds the foundation skills in speaking, listening, reading, writing and culture. Based on Brazilian Portuguese, along with study of all Lusophone countries. Part of the SILP/WORLD languages program. Consult program coordinator if this is your first RIT Portuguese course (permission and GPA 2.85+ required to register). **Class 4, Credit 4 (F, S)**

**Beginning Portuguese I****MLPO-202**

Beginning Portuguese II continues the first-year study of Portuguese language and culture, including work in the present tense, the past tenses, and introducing the subjunctive mood, continuing to build the foundation skills in speaking, listening, reading, writing and culture. Based on Brazilian Portuguese, along with study of all Lusophone countries. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Portuguese course (permission and GPA 2.85+ required to register). (MLPO-201 Beginning Portuguese I or equivalent proficiency) **Class 4, Credit 4 (F, S)**

**Beginning Portuguese II**

**MLPO-202T**

Beginning Portuguese II T continues the first-year study of Portuguese language and culture, including work in the present tense, the past tenses, and introducing the subjunctive mood, continuing to build the foundation skills in speaking, listening, reading, writing and culture. Based on Brazilian Portuguese, along with study of all Lusophone countries. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Portuguese course (permission and GPA 2.85+ required to register). (0525-521 Beginning Portuguese II or equivalent proficiency. See instructor for placement testing if this is your first RIT Portuguese class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**MLPO-301**

**Intermediate Portuguese I**  
Intermediate Portuguese I is the first course in the second year of Portuguese language study. Course content concentrates on intensive grammar review, situation dialogues, conversation, and cultural readings, and includes work in all five skills (speaking, listening, reading, writing, culture). Part of the SILP/World languages program: consult the program coordinator if this is your first RIT Portuguese course. (MLPO-202 Beginning Portuguese II or equivalent proficiency) **Class 3, Credit 3 (F, S)**

**MLPO-302**

**Intermediate Portuguese II**  
Intermediate Portuguese II is the second course in the second year of Portuguese language study. Course content concentrates on intensive grammar review, situation dialogues, letter writing (business and personal), compositions, oral presentations, and cultural readings. Includes work in all five skills (speaking, listening, reading, writing, culture). Part of the SILP/World languages program: consult the program coordinator if this is your first RIT Portuguese course. (MLPO-301 Intermediate Portuguese I or equivalent proficiency) **Class 3, Credit 3 (F, S)**

**MLPO-401**

**Advanced Portuguese I**  
This is the first course of the advanced (third) year of Portuguese language and culture study. The course content is based on the first six films and the first two chapters of the textbook *Cinema For Portuguese Conversation* (Bonnie Wasserman, Focus Publishing, 2009). Course work covers the cultural themes, readings, grammar study, vocabulary, conversation and composition topics included in the book and the films. Practice in all five skills: speaking, listening, reading, writing, culture. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Portuguese course. (MLPO-302 Intermediate Portuguese II or equivalent proficiency) **Class 3, Credit 3 (F, S)**

**MLPO-402**

**Advanced Portuguese II**  
This is the second course of the advanced (third) year of Portuguese language and culture study. The course content is based on the last eight films and the last three chapters of the textbook *Cinema for Portuguese Conversation* (Bonnie Wasserman, Focus Publishing, 2009). Course work covers the cultural themes, readings, grammar study, vocabulary, conversation and composition topics included in the book and the films. Practice in all five skills: speaking, listening, reading, writing, culture. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Portuguese course. (MLPO-401 Advanced Portuguese I or equivalent proficiency) **Class 3, Credit 3 (F, S)**

**MLRU-201**

**Beginning Russian I**  
Beginning Russian I introduces the Russian language and culture to beginners, and builds the foundation skills in speaking, listening, reading, writing and culture, working toward functional competence. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Russian course (permission and GPA 2.85+ required to register). **Class 4, Credit 4 (F, S)**

**MLRU-202**

**Beginning Russian II**  
Beginning Russian II works on further development of communicative and functional skills in speaking, listening, reading, writing, and culture in first-year Russian language. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Russian course (permission and GPA 2.85+ required to register). (MLRU-201 Beginning Russian I or equivalent proficiency; Students must take the placement test if this is their first RIT Russian class.) **Class 4, Credit 4 (F, S)**

**MLRU-202T**

**Beginning Russian II T**  
Beginning Russian II works on further development of communicative and functional skills in speaking, listening, reading, writing, and culture in first-year Russian language. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Russian course (permission and GPA 2.85+ required to register). (0525-541 Beginning Russian II or equivalent proficiency. See instructor for placement testing if this is your first RIT Russian class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**MLRU-301**

**Intermediate Russian I**  
Intermediate Russian I starts the second year of Russian language study with intermediate-level development of functional skills in speaking, listening, reading, writing and culture. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Russian course. (MLRU-202 Beginning Russian II or equivalent proficiency; students must take the placement test if this is their first RIT Russian class.) **Class 3, Credit 3 (F, S)**

**MLRU-302**

**Intermediate Russian II**  
Intermediate Russian II continues the second year of Russian language study with intermediate-level development of functional skills in speaking, listening, reading, writing and culture. Part of the SILP/World languages program. Consult program coordinator if this is your first RIT Russian course. (MLRU-301 Intermediate Russian I or equivalent proficiency; students must take the placement test if this is their first RIT Russian class.) **Class 3, Credit 3 (F, S)**

**MLRU-401**

**Advanced Russian I**  
Advanced Russian I, the first in the advanced (third year) sequence of Russian language courses in the SILP/World languages program, does advanced-intermediate to advanced level work in all skills (speaking, listening, reading, writing, culture), including conversation, with increased work in reading and writing. See coordinator of the World languages program if this is your first RIT Russian class. (MLRU-302 Intermediate Russian II or equivalent proficiency; students must take the placement test if this is their first RIT Russian class.) **Class 3, Credit 3 (F, S)**

**MLRU-402**

**Advanced Russian II**  
Advanced Russian II, the second in the advanced (third year) sequence of Russian language courses in the SILP/World languages program, does advanced level work in all skills (speaking, listening, reading, writing, culture), including conversation, with increased work in reading and writing. See coordinator of the World languages program if this is your first RIT Russian class. (MLRU-401 Advanced Russian I or equivalent proficiency; students must take the placement test if this is their first RIT Russian class.) **Class 3, Credit 3 (F, S)**

**MLSP-201**

**Beginning Spanish I**  
This course introduces the Spanish language and the culture of Hispanic countries to beginners, and provides a basic foundation in all skills in Spanish (speaking, listening, reading, writing, culture) through intensive practice in a variety of media. Language work progresses from autobiographical information, through the present tense, to preliminary work in the past tenses. **Class 4, Credit 4 (F, S)**

**MLSP-202**

**Beginning Spanish II**  
This course continues the basic grammatical structures, vocabulary and situations of first-year Spanish. Beginning Spanish 2 continues work in the past tenses and includes work on the subjunctive mood, plus the future and conditional tenses. Students work on paragraph-length speech and writing, and move toward readiness for conversation and composition. (MLSP-201 Beginning Spanish I or equivalent proficiency. See instructor for placement testing if this is your first RIT Spanish class and you have prior study of the language.) **Class 4, Credit 4 (F, S)**

**MLSP-202T**

**Beginning Spanish II T**  
This course continues the basic grammatical structures, vocabulary and situations of first-year Spanish. Beginning Spanish II T continues work in the past tenses and includes work on the subjunctive mood, plus the future and conditional tenses. Students work on paragraph-length speech and writing, and move toward readiness for conversation and composition. (0525-561 Beginning Spanish II or equivalent proficiency. See instructor for placement testing if this is your first RIT Spanish class and you have prior study of the language.) This course is only for transition students who took Beginning II under quarters. **Class 4, Credit 4 (F, S)**

**MLSP-301**

**Intermediate Spanish I**  
This is the first course in the Intermediate Spanish sequence (second year). Intermediate Spanish 1 is a course in Conversation, along with grammar review and culture study. Emphasis is on tourist survival situation dialogues, various forms of conversation, grammar review, and both formal and informal culture (the arts and daily behavior). The basic skills learned in the first year courses are now put into practice. (MLSP-202 Beginning Spanish II or equivalent proficiency; see instructor for placement in the appropriate course) **Class 3, Credit 3 (F, S)**

**MLSP-302****Intermediate Spanish II**

This is the second course in the Intermediate Spanish sequence (second year). Intermediate Spanish II is a composition course, emphasizing grammar review, composition, business-letter writing, Spanish for the Professions, and culture, while also including work in speaking and listening. The basic skills learned in the first year courses are now put into practice. In addition to the language work, there is significant work on cultural topics of Spanish-speaking countries at the intermediate level. (MLSP-301 Intermediate Spanish I or equivalent proficiency; see instructor for placement in the appropriate course.) **Class 3, Credit 3 (F, S)**

**MLSP-351****Gender and Sexuality in Hispanic Studies**

This course introduces students to the study of gender and sexuality in cultural production from the Hispanic world. Students will read, view, and discuss diverse works from a variety of historical periods and geographical regions that deal with gender identity, sexuality, and interrelated social movements. This course refines students skills through discussions, presentations, and writing exercises on readings, lectures, and film screenings. Students will also develop research skills as they complete a project on a topic chosen in consultation with the instructor. The critical approach that will inform this course is feminist thought. **Class 3, Credit 3 (F)**

**MLSP-352****Caribbean Cinema**

This course provides an introduction to Hispanic Caribbean culture through cinema studies. We will study the role of film in Hispanic Caribbean societies as well as the unique artistic and technical achievements and obstacles of Cuban, Dominican, and Puerto Rican filmmakers. Topics covered include: the basics of film analysis; an introduction to Caribbean film history; the social context of the Hispanic Caribbean film industry; art and revolution; race, ethnicity, and religion; occupation, dictatorship, and war; gender, sexuality and exile; transnationalism and migration, and Hispanic Caribbean film in a global context. This course will take a cultural studies approach to the study of film as a social practice. Weekly films (1.5-2 hours in length) must be watched outside of class hours. All films with dialog have English subtitles. **Class 3, Credit 3 (S)**

**MLSP-353****Trauma and Survival in First-Person Narrative**

This course introduces students to first-person narratives about trauma and survival from Latin America, the Hispanic Caribbean, U.S. Latina/o communities, and Spain. Students will learn about Hispanic literature, culture, and history while exploring the themes of memory, community, and survival in autobiography, testimonial narrative, chronicle, memoir, epistolary narrative, essay, and the historical novel. Through in-class discussion, presentations, reading, and writing exercises, this course refines students' skills in oral expression, reading, writing, and critical thinking. Students will also develop research skills as they complete a project on a topic chosen in consultation with the instructor. **Class 3, Credit 3 (S)**

**MLSP-401****Advanced Spanish I**

This is the first course of a two-course sequence at the advanced level. This sequence is designed to further develop proficiency in the four language skills of listening, speaking, reading, and writing. This sequence develops the ability to understand and communicate more freely by expansion of vocabulary and grammar, and by exposure to authentic cultural materials, both textual and visual. (MLSP-302 Intermediate Spanish II or equivalent proficiency) **Class 3, Credit 3 (F)**

**MLSP-402****Advanced Spanish II**

This is the last course of a two-course sequence at the advanced level. This sequence is designed to further develop proficiency in the four language skills of listening, speaking, reading, and writing. This sequence develops the ability to understand and communicate more freely by expansion of vocabulary and grammar, and by exposure to authentic cultural materials, both textual and visual. (MLSP-401 Advanced Spanish I or equivalent proficiency) **Class 3, Credit 3 (S)**

**MLST-449****Special Topics Modern Languages and Cultural Studies**

This upper-level course will focus on a specific theme or topic in modern languages, chosen by the instructor, announced in the subtitle, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same, so be sure not to repeat the same topic. **Class 3, Credit 3**

**History****HIST-101****Making History**

How do historians understand and interpret the past? What tools do historians use to uncover the past? What does it mean to think historically? History is both an art and a science, and in this course, we will learn the methods, practices, and tools used to create historical knowledge. You will learn how to read texts with an eye toward their argument, how to ask historical questions, how to conduct historical research, and how to write a historical narrative. At the discretion of the instructor, the class may use examples from a particular historical era to ground course concepts in a specific historical tradition. **Class 3, Credit 3 (F)**

**HIST-102****Themes in U.S. History**

This introductory-level course will examine the social, cultural, political, technological and/or economic development of modern America as it is revealed through a particular historical topic or theme. The theme or topic of the course is chosen by the instructor, announced in the subtitle, and developed in the syllabus. **Class 3, Credit 3 (F, S)**

**HIST-103****The City in History**

This course offers an introduction to the study of history by exploring the history of a particular city. Cities are complicated places, where many peoples, cultures, and histories overlap and interact. Their histories are also shaped by many forces, economic, cultural, demographic, social, sexual, operating at levels from local to national to global. Studying a city offers a window into the history of a local place as well as a nation. The choice of the city is left up to the individual professor. Cities under study in the past have included Rochester, Las Vegas, and Paris. **Class 3, Credit 3 (S)**

**HIST-160****History of Modern East Asia**

Understanding the history of East Asia is integral to understanding the complex world that we live in, and will help us to understand that no single nation can live in isolation. One cannot endeavor to understand limited national entities alone; rather one must understand the interactions between cultures and across borders that help to define the world. Japan, for example, cannot be adequately understood without reference to China, Korea, and one might argue, the wider world. Therefore, we will undertake in this course to examine the region of East Asia historically from about 1600 to the present, paying special attention to interactions between the cultures and people of the region. **Class 3, Credit 3 (offered annually)**

**HIST-170****Twentieth Century Europe**

This course examines major themes and controversies in European history from 1900 to the present, placing particular emphasis on the early twentieth-century crisis of liberal democracy and the political alternatives proposed to parliamentary government: right-wing nationalism, communism, and fascism. Topics will include: the impact of World War I on European societies and politics; Popular Front movements in France and Spain; eugenics and the Nazi racial state; the Holocaust; occupation and resistance during World War II; decolonization; student rebellions in 1968; Cold War domestic politics; and the reshaping of post-communist and post-colonial Europe. Special attention will be placed racial politics and immigration, state surveillance regimes, and European debates over the Americanization and globalization of European cultures. **Class 3, Credit 3 (F)**

**HIST-180****Information Revolution**

The internet and cell phones seem to have revolutionized our society, changing how we learn about new things, relate to each other and understand ourselves. This course investigates the history of information and communication technologies to cast new light on these developments. We will ask how people formed political opinions, what ethical concerns new information and communication technologies raised, and how technologies changed the lives of the people using them. This course helps students understand the social, cultural, and ethical implications of "revolutionary" information and communication technologies. **Class 3, Credit 3 (F)**

**HIST-190****American Women's History**

This course surveys women's history in the United States from the colonial period to present. The course moves chronologically and thematically, focusing on the diversity of women's experiences across race, class, and geography as well as the construction of dominant gender norms. Topics include Native American, African American, and Euro-American women in colonial America; the Industrial Revolution and the ideology of domesticity, Women in the American West; women's paid and unpaid work; sexuality and reproduction; women's activism; and women's experiences of immigration and family life. **Class 3, Credit 3 (F)**



**HIST-191****The History of the Family in the U.S.**

The family is at the center of contemporary political debates involving social policies, gender roles, citizenship, marriage, and the role of the state. Politicians and commentators frequently invoke a mythical American family, one that is conflict-free, independent, and unchanging. These idealized depictions mask a far more complicated and richer historical reality of the development of family structures in the U.S. This course will examine both the diverse experiences of actual families in the American past, and changing ideologies about the family and its social role. Students will have the opportunity to write a history of their own family, or to complete an alternative research paper. **Class 3, Credit 3 (S)**

**HIST-201/INGS-201****Histories of Globalization**

This course examines narratives of globalization as human process. We will focus on contemporary and historical issues that are routinely conceived of as affecting or pertaining to the world's population in its entirety, such as human rights, humanitarianism, environmental degradation, trade, and military power. The world and its population will feature as a unit of analysis, and an emphasis will be placed on issues that appear to be in tension with the role of the nation-state and nationality, and highlight world and global citizenship. We will explore critiques of the conceptualization of globality and worldliness as a factor in determining social, cultural, and historical change. Cross-listed with INGS-201. **Class 3, Credit 3 (offered either F and/or S)**

**HIST-210/INGS-210****Introduction to Africa and the Diaspora**

This course is an introduction to the study of an enormous continent, Africa and its Diaspora. Because of the dimensions of the geography, population and time covered, one of the main purposes of this course is to pave the way to narrower regional or thematic classes. This course will emphasize the interdisciplinarity of African and Diaspora studies. We will explore contrasting and complementing disciplinary perspectives on Africa and its Diaspora. We will move our way through African and Diasporic cultures and histories both temporally and thematically. Lectures will introduce key themes and ideas, and you will discuss textual and visual evidence for African and Diasporic communities, cultures and ideas. This course is suitable to those new to the study of Africa and its Diaspora, and to those who are considering taking further classes or seminars in African and/or Diasporic studies. Part of the international and global studies program in a related track; the sociology/anthropology immersion; and the Africa and the Diaspora immersion. Cross-listed with INGS-210. **Class 3, Credit 3 (varies)**

**HIST-220****Introduction to Public History**

Public history is using the research-based methods and techniques of historians to conduct historical work in the public sphere. If you've gone to a museum, conducted an oral history, researched your old house, or learned from an interpreter at a park or historic site, you've seen public history in action. This course will introduce students to the wide variety of careers in public history, and will examine the challenges and opportunities that come with "doing" history in, with, and for the public. **Class 3, Credit 3 (S)**

**HIST-230****American Deaf History**

This course explores the history of the deaf community in the United States. It offers a broad survey of American deaf history from the early nineteenth century to the late twentieth century. Major events in American deaf history will be considered, including the foundation of schools for the deaf, the birth of American Sign Language, the emergence of deaf culture, the challenge of oralism, the threat of eugenics, and the fight for civil rights. **Class 3, Credit 3 (F)**

**HIST-231****Deaf People in Global Perspective**

This course explores the history of the deaf community in global perspective from the eighteenth to the twentieth century. It takes a comparative approach, exploring the histories of deaf people from around the globe, including deaf lives in Central America, Europe, Africa, and East Asia. Special attention will be given to the major events in European deaf history, as Europe was the site for the first schools for the deaf in the history of the world, and the world's first documented deaf culture, in France, emerged there as well. The spread of deaf education, the rise of indigenous signed languages, the birth of deafhood, and the fight for human rights will all be placed in a global context. **Class 3, Credit 3, (offered biannually)**

**HIST-238****History of Disability**

This course will explore the meaning of disability in the nineteenth and twentieth centuries. The course provides a cultural overview of disability and seeks to explore the social construction of disability, with special attention given to the cultural, intellectual, personal, and social histories of disability. Disability in history has been many (frequently contradictory) things: acquired at birth and acquired by war; a reason to promote eugenic policies or a reason to promote civil rights legislation; a medical diagnosis or a personal identity; visible in the body (as in the case of amputations) or invisible (as in the case of deafness); a source of family shame or a source of personal pride. How has the meaning and nature of disability changed over time? How can we understand the cultural meaning of the body in history? The course seeks to explore and explain these shifting meanings of disability within the context of Western history. Specific topics to be considered include freak shows, disabled veterans, prosthetic technologies, disability as culture, the history of eugenics, and political activism. **Class 3, Credit 3 (offered biannually)**

**HIST-240****Civil War America**

This class will examine American politics and society during the Civil War era. In addition to military affairs, students will focus on several broader themes, including the political, economic and social factors leading to the Civil War in the 1860s; the role of abolitionist, slave expansionist, and black freedom movements in the years before the Civil War; the development of emancipation policies during and after the war; and the reconstruction of the union following the war. Students will also examine the international dimensions of the Civil War as well as the way subsequent generations of Americans remembered it in history books, memoirs, and museums. **Class 3, Credit 3 (S)**

**HIST-245****American Slavery and Freedom**

This class will survey the history of slavery and freedom in the United States from the establishment of global slave systems in the colonial period through emancipation movements during the Civil War era. Students will examine key economic, political and social issues (from the development of slave labor systems to strategies of resistance among enslaved peoples) as well as the meaning of black freedom struggles during key eras (such as the American Revolutionary era and Civil War). **Class 3, Credit 3 (offered annually)**

**HIST-250****Origins of U.S. Foreign Relations**

This class analyzes the roots of U.S. foreign policy, beginning with the American Revolution and continuing through the Spanish-American War. It also examines the development of the United States from a small eighteenth-century experiment in democracy into a late nineteenth-century imperial power. Topics include foreign policy powers in the constitution, economic development, continental and overseas expansion, and Manifest Destiny. **Class 3, Credit 3 (F)**

**HIST-251****Modern U.S. Foreign Relations**

This course examines the late nineteenth-century emergence of the United States as an imperial power and its development into a twentieth-century superpower. Topics include U.S. politics and foreign policy, the influence of racial and cultural ideologies on policy, isolation and intervention, the Cold War, and the Afghanistan and Iraq wars. **Class 3, Credit 3 (S)**

**HIST-252****The United States and Japan**

This class examines the U.S.-Japanese relationship from the perspectives of diplomacy, economics, and culture. Fluctuating sharply during its 150 years, this relationship has featured gunboat diplomacy, racial conflict, war, and alliance. The course investigates U.S.-Japanese relations in the contexts of modernization, imperialism, World War II, the Cold War, and the 21st century. **Class 3, Credit 3 (F)**

**HIST-260****History of Premodern China**

This course will examine critically the early history of China: the origins of China, the early mytho-historical dynasties, early imperial China, and finally the late imperial era, ending at roughly 1850. Students will be able to trace the relationship to the Chinese to various non-Chinese peoples, particularly the semi-nomadic peoples on the northern frontier. Students will also examine the way that China's long and complicated past has shaped its present, and how its relations to other peoples has shaped its modern relations to both its neighbors and the west. **Class 3, Credit 3 (offered annually)**

**HIST-261** **History of Modern China**  
China occupies a rather large place in the consciousness of most Americans. It is the most populous country in the world, it has one of the biggest economies in the world and, in many ways, China has been seen to be in direct competition with America. Whatever the truth of these ideas, it is clear that China will play a major role on the world stage for the foreseeable future. This class will seek to analyze the historical circumstances surrounding the rise of modern China. What were the conditions that led to the establishment of, first, Nationalist China, followed by the People's Republic; why did the communist government enjoy such popular support; what were China's relations with the outside world; and finally, what is the state of China today? These are all questions that we will seek to answer in this course. **Class 3, Credit 3 (offered annually)**

**HIST-265** **History of Modern Japan**  
This course will seek to examine critically the history and culture of Japan and will address many of the stereotypes and misunderstandings that are an inevitable part of Japanese studies. We will do this by examining a number of materials such as primary documents in translation, Japanese films, and art such as woodblock prints. In doing so, I will try to present as complete and balanced a picture of Japan's history and culture as possible. This will not only be useful in understanding Japan and its past, but will also help in understanding many of the important regional issues that are confronting us here in the modern world. **Class 3, Credit 3 (offered annually)**

**HIST-266** **History of Premodern Japan**  
This class will introduce students to the history of Japan from the earliest times to the opening of the country in the mid nineteenth century. Through a variety of readings, discussions, and lectures, we'll tackle issues such as the origin of the Japanese people, early state formation, Japan in the larger East Asian context, and the rise of the warriors. We'll also examine the unique dual form of government that existed in Japan from the twelfth century, consisting of rule by the imperial court as well as by the warrior class in Japan, the well-known samurai. And finally, we'll look at several of the modern myths of Japanese history and try to address them in a balanced, historical manner. **Class 3, Credit 3 (offered annually)**

**HIST-270** **History of Modern France**  
This course explores pivotal themes in French history from the French Revolution of 1789 to the present. Topics will include the French Revolution, Napoleon III's Second Empire, French imperialism, World War I and nationalism, World War II and the Vichy regime, collaboration and resistance, and the 1968 student rebellions. Special emphasis will be placed on the recurring tension between secularism and Catholicism in French society, the role of French republicanism in shaping historic and contemporary debates about citizenship, race, and immigration, and France's relationship with its former colonial possessions and the United States. **Class 3, Credit 3 (offered biannually)**

**HIST-275** **Screening the Trenches: The History of WWI through Film**  
This course uses popular films to examine World War I as the global conflict that set the stage for the rise of communism, fascism, and subsequent wars in twentieth-century Europe. Students will gain an understanding of the major causes and outcomes of World War I while investigating how the war transformed class, gender, and racial politics in Europe. Special attention will be paid to the combat/trench experience, the home front/war front divide, the German occupation of Belgium and Northern France, "total war," the politics of shell-shock and disability, and the legacies of grief, mourning, and commemoration. Because World War I so greatly divided its participants, little consensus about the war's meaning emerged in its aftermath. Filmmakers have consequently used World War I as a "blank slate" on which to project political fantasies, condemn elements of their own societies, or imagine the future. Students will use secondary historical literature and original primary sources to analyze filmic representations of World War I and consider how filmmakers have deliberately misrepresented the past or constructed particular narratives about the war to serve their own ends. This course will therefore equip students to think critically about representations of the historical past in popular culture. **Class 3, Credit 3, (S)**

**HIST-280** **History of Modern Germany**  
This course covers major themes in German history from the formation of the German Empire in 1870 to the present. Topics include nation building and nationalism, industrialization and urbanization, imperialism at home and abroad, the first world war, the Weimar Republic, Nazi racism and the second world war, the divided Germany and the Cold War, and reunification and the fall of the Berlin Wall. The course may focus on specific questions such as gender, class, religion or race and ethnicity. This course leads you to explore how German history shaped the role of Germans and Germany in the world today as well as how it informs problems facing other regions and eras. **Class 3, Credit 3 (F)**

**HIST-290** **U.S. Since 1945**  
This class examines U.S. history from WWII to present, with emphasis on political, social and cultural change. Focuses on the meanings and boundaries of American citizenship, as well as the role of the U.S. in the world. Topics include the Cold War and McCarthyism; the GI Bill and the building of a suburban middle class; consumer culture and its critics; the Civil Rights Movement; Great Society liberalism; the Vietnam War, the New Left and the New Right, and the counterculture; feminism, the Religious Right, and changes in gender roles, sexuality and family life; deindustrialization and economic restructuring; globalism and immigration policy; the War on Drugs and the growth of a penal state; the end of the Cold War and the New World Order; and the War on Terror. **Class 3, Credit 3 (S)**

**HIST-301** **Great Debates in U.S. History**  
This course offers an analysis and interpretation of the main themes in the history of the United States over a broad period of time that extends to the modern era. We will look at how issues such as race, class, gender, and the environment have shaped American history, as well as debates over the multiple meanings of that history. **Class 3, Credit 3 (S)**

**HIST-302** **Special Topics in History**  
This upper-level course will focus on a specific theme or topic in history, chosen by the instructor, announced in the subtitle, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same, so be sure not to repeat the same topic. **Class 3, Credit 3 (offered annually)**

**HIST-310/INGS-310** **Global Slavery and Human Trafficking**  
This course examines historical and contemporary dimensions of global slavery and human trafficking. The trans-Atlantic slave trade was the world's largest forced migration between continents, but it was only one of many slave trades that shaped societies throughout the world. In order to understand the historical significance of global slave trades, we will compare it to other systems of slavery. In examining the historical significance and legacies of the slave trade, we will link different regional histories to the growth of market-based capitalist economies into the twentieth century. The course will also examine the changing meaning of the term "slavery" and examine some modern forms of forced labor, bondage, and slavery that persist to this day in all sectors of the global economy. We will explore the rise of human trafficking, and global anti-trafficking programs and campaigns. Part of the international studies degree program in a related track; the sociology/anthropology immersion; and the Africa and the Diaspora immersion. Cross-listed with INGS-310 Global Slavery and Human Trafficking. **Class 3, Credit 3 (varies)**

**HIST-321** **Special Topics in Public History**  
Public history is the practice of history for, and by, audiences outside the classroom. This course will focus on a specific theme or topic in public history, chosen by the instructor, announced in the subtitle, and developed in the syllabus. The topics of this course will vary, but the course number will remain the same, so be sure not to repeat the same topic. **Class 3, Credit 3 (S)**

**HIST-322** **Monuments and Memory**  
Monuments are physical objects that were constructed to help us remember the past, but a deeper analysis reveals that the relationship between monuments and the memories they embody is complex and changes over time. We will tackle the process of memorializing, the monuments that result, and seek greater insight into the arguments these artifacts make about the past, the present, and our place in the world. **Class 3, Credit 3 (F)**

**HIST-323** **America's National Parks**  
The National Parks are some of America's most treasured and spectacular landscapes, but even these wild places are the product of historical forces. In this class, we will explore the history of America's National Parks, and use these spaces to unpack the relationship between Americans, their land, and their history. **Class 3, Credit 3 (F)**

**HIST-324** **Oral History**  
Oral history is the craft of collecting information about the past from those who lived through it. There are few opportunities for historical research that is more satisfying or more challenging than oral history. In this class, we will learn about oral history methods, techniques, and ethics. We will read some of the finest examples of the genre. Then we will go out and add to the world's understanding of its past by conducting oral histories of our own. **Class 3, Credit 3 (F)**

**HIST-325****Museums and History**

Many more people learn history from museums than from textbooks. What is it that is so special about encountering the “real thing” in a museum? Why are Dorothy’s Ruby Slippers the most visited artifact in the National Museum of American History? Do history museums themselves have an important history? Join us as we investigate the connections between our history, our museums, and the material artifacts that tell historical stories. **Class 3, Credit 3 (offered annually)**

**HIST-326****Doing History in a Digital World**

Digital history is a nebulous concept, but at its core is a recognition that the widespread availability of computers and their networks has fundamentally altered the way history is produced and consumed. Sources in digital format simultaneously present opportunities and challenges that force us to rethink what is possible in history. Digital tools including blogs, wikis, video sharing sites, and many others help bring history to new audiences in different ways. In this course, we will investigate the landscape of digital history and tackle the exciting task of creating and understanding history in the digital age. **Class 3, Credit 3 (S)**

**HIST-330****Deaf People and Technology**

The deaf community has a long and complicated relationship with technological devices. The deaf community, for instance, was quick to embrace the new technology of moving pictures, and many deaf actors found work in early Hollywood during the silent film era. Most lost their livelihoods when sound was introduced to motion pictures. Deaf people were left out of the communication revolution brought about by the telephone for many years, but now the deaf community is increasingly a wired community, as texting, tweeting, and blogging makes more communication technologies accessible to deaf users. This course will explore the historical relationship between technology and deafness. It will consider how views of deafness frequently shape technology, that is, if deafness is viewed as a pathological illness, technologies are focused on curing it (e.g., cochlear implants), whereas, if deaf people are viewed as members of linguistic and cultural minority, technologies are harnessed to make it easier for that minority to interact with the majority culture (e.g., relay systems). It will consider how deaf people have used, created, and adopted technologies to their own ends. It will also explore the complicated, and controversial, relationship between Deaf people and medical technologies such as hearing aids, cochlear implants, and in vitro fertilization (IVF). **Class 3, Credit 3 (offered biannually)**

**HIST-333****Diversity in the Deaf Community**

Students in this course will be introduced to the study of diversity in the Deaf community related to race, ethnicity, sexuality and other factors. Students will learn to analyze the implications of such diversity in terms of self-perception, self-esteem, and acculturation. Students also will learn how the Deaf experience transcends race, ethnicity and other factors to bond members of the Deaf community and help define Deaf culture. **Class 3, Credit 3 (F)**

**HIST-334****Oppression in the Lives of Deaf People**

Students in this course will examine various forms of oppression across different cultures and communities. Students will analyze the influence of oppression on minority groups with respect to resistance and the struggle for social justice. Finally, students will examine and apply experiences of other minority groups in recent history to the Deaf community. **Class 3, Credit 3 (S)**

**HIST-335****Women and the Deaf Community**

Deaf history, as a field, has often neglected the story of deaf women. Scholar Arlene B. Kelly has recently asked, Where is deaf herstory? This course seeks to correct that gender imbalance in deaf history. We will study deaf women’s history. This will include a consideration of deaf-blind women, as well, as women like Helen Keller were often the most famous deaf women of their era. But this course also seeks to look at the role of hearing women in deaf history. Hearing women dominated the field of deaf education in the late nineteenth century. They had a tremendous impact on the lives of deaf children and the events of deaf educational history. Hearing women were also important figures in deaf history as mothers. As mothers of deaf children, hearing women were frequently asked to behave as teachers in the home. Their embrace of this role often led them to endorse oral education, and oppose the sign language. Hearing mothers in this way were pitted against their adult deaf daughters, who frequently went on to learn sign language against their mothers’ wishes. The historically complex relationship between women and the deaf community will be explored in this course. **Class 3, Credit 3 (offered biannually)**

**HIST-345****Environmental Disasters**

This class will survey the history environmental disasters (from floods to oil spills) in modern American and global society. Students will study several specific disasters (for example, Hurricane Katrina, the Great Midwestern Floods of the 1990s, Love Canal, and the Haitian Earthquake of 2008) and analyze a series of broader themes that illuminate their meaning, including the economic impact of various disasters, the legal and political ramifications of modern disasters, and the social and cultural meaning of disasters in various societies. **Class 3, Credit 3 (offered annually)**

**HIST-350****Terrorism, Intelligence, and War**

This course investigates the historical, political, moral, and legal dimensions of terrorism, intelligence, and war. It uses a case-study approach with themes that include just war theory, terrorism in the colonial and post-colonial worlds, domestic terrorism, and mechanisms of intelligence and covert operations. **Class 3, Credit 3 (S)**

**HIST-365****Conflict in Modern East Asia**

The twentieth century has sometimes been called the Pacific Century, which is ironic since this period of time has been anything but pacific! The twentieth century saw the rise of four great Pacific powers: the US, Japan, China and the Soviet Union, and saw the eclipse of several others, including the British and French Empires. Furthermore a major front of the Cold War was played out on the Asian continent, namely the Korean and Vietnam wars, as well as the US standoff with Communist China. And of course the Second World War, the greatest concentrated period of human destruction, played out at the midpoint of the twentieth century. This class will analyze these conflicts both as conflicts in and of themselves, but will also look at the backdrop against which these conflicts were played out. Beginning with the subjugation of China in the 19th century, our class will examine the many conflicts that defined this region through the end of the twentieth century. **Class 3, Credit 3 (offered annually)**

**HIST-369****Histories of Christianity**

The history of Christianity is not simply the history of the religion of the west. Rather, Christian history is a long and complex movement that has profoundly affected Asia, Africa, Europe, and the New World. At various times there were several competing ideologies of Christianity, of which the west’s was only a single example. Christianity also has a long history of interacting with other religions, from Zoroastrianism and Manichaeism to Judaism and Islam. This course will trace the development of Christianity paying special attention to how the Christian tradition developed in places such as Africa and Asia. We will, of course, also study Christianity in its western forms, but we will make an effort to dive into the rich tradition of this religion in all its many forms. **Class 3, Credit 3 (offered annually)**

**HIST-390****Medicine and Public Health in American History**

This course introduces students to the social and cultural history of medicine by examining differing concepts of disease, health, and healing throughout American history. Themes include the professionalization of medicine, the role of science in medical research and practice, popular understanding and experience of health and illness, and the role of the state in providing medical care. We will explore how science and medicine defined social categories of difference, including race and gender, and how these categories in turn shaped medical thought and practice. The course format combines lectures, discussions, and films and readings include historical documents and case studies. **Class 3, Credit 3 (S)**

**HIST-402****Special Seminar in History**

This upper-level small group seminar will focus on a specific theme or topic in history, chosen by the instructor, announced in the subtitle, and developed in the syllabus. All sections of this course are writing intensive. The topics of this course will vary, but the course number will remain the same, so be sure not to repeat the same topic. **Class 3, Credit 3 (S)**

**HIST-421****Hands-on History**

Get hands-on experience researching, interpreting, and writing history. The class will tackle a common historical theme (announced in the subtitle), then do original historical research on a topic of your choice within the overall theme. Our themes do not just rehash old topics with little new information to uncover. Instead, we focus on relatively unexplored areas of the past, where your research can shed new light on unknown topics. You will learn about history by doing it! All majors are welcome. **Class 3, Credit 3 (S)**

**HIST-439****Biography as History**

This course will look at biography as a form of history. By studying biographies that approach their subjects with various formats and methods of presentation, the class will examine how the craft of biography shapes our contemporary understanding of the historical past. Among the questions to be examined in this course are: how does biography reveal the historical circumstances of the subject's life to give readers a broader understanding of the historical context of that life? How effectively can contemporary readers explore the past through the prism of one person's life? Can the history of an era be effectively told through an examination of one person's life? What are the benefits of the biographical approach to history? What are the drawbacks? What are the benefits of biography as a form of public history? That is, when people can get their history through the Biography Channel, how important is it for public historians to grapple with the impact of biography as a form with a unique grip on the public imagination? **Class 3, Credit 3 (S)**

**HIST-450****Modern Japan in History, Fiction, and Film**

This course offers an introduction to modern Japanese history, highlighting social and aesthetic traditions that have formed the foundations for Japanese literature and cinema. It explores how writers and directors have drawn on this heritage to depict historical experiences. **Class 3, Credit 3 (F)**

**HIST-462****East-West Encounters**

The Age of Discovery, beginning in the fifteenth century and culminating with the advent of European imperialism, is one of the most fascinating, as well as problematic, periods in the history of both Asia and Europe. Too often historians frame the interaction between Asia and Europe in uniquely European terms and present Asia as a passive partner in this process of discovery. In fact, this period presents us with a number of complex issues such as national identity, the nature of European expansion, and the Asian response to European journeys to the East. This course will undertake to re-examine the age of discovery not only from a European point of view, but also from an Asian standpoint. In the process, we will see how many of the issues that we are facing in the region are products of a long and complex relationship between Europe and Asia. Students will also examine the issues that have arisen between the east and the west in the twentieth century and that continue into our own time. **Class 3, Credit 3 (F, S)**

**HIST-465****Samurai in Word and Image**

One of the most enduring images of premodern Japan in the samurai, replete with sword and armor. This course will seek to examine the role of the samurai in Japanese history, examining popular perceptions in Japanese film, woodblock prints, and texts. We will also use a variety of secondary sources to critically examine some of the portrayals of the samurai and how they stand up to historical reality. Students will be encouraged to participate in extensive discussions as we deal with a great variety of media and try to arrive at an image of the samurai that is historically accurate. And finally, we will examine issues such as feudalism and the warrior code and how those historical concepts relate to the west at about the same time period. **Class 3, Credit 3 (F, S)**

**HIST-470****Science, Technology, and European Imperialism, 1800-1965**

Between 1800 and 1945, Western nations dominated approximately three-quarters of the earth's surface through imperialism. This course examines how industrialization, technological developments, and the emergence of the modern "sciences" facilitated Europe's conquest and colonization of vast territories overseas. The course opens with a brief overview of the role of biology and science in shaping early imperial encounters (the Columbian Exchange). Students will then consider how 19th-century botany, zoology, acclimatization, cartography, geography, and anthropology became "imperial" sciences that facilitated formal conquest by producing knowledge about distant cultures, "races," and environments. The Industrial Revolution produced new technological "tools"—steamboats, railroads, and weapons—that facilitated the "Scramble" for territory in the late 19th century. The course will consider how these inventions shaped patterns of conquest and colonial rule in the late 19th and early 20th centuries. Throughout the course, students will interrogate how Europeans' faith in the superiority of Western technology, scientific knowledge, and medicine shaped the evolution of the European "civilizing mission"—the cultural and political logic that defined interactions between Europeans and non-Western populations. At the same time, they will evaluate how Africans and Asians experienced living under colonial rule, and in some cases, how they deployed Western technology as weapons of resistance to imperialism. **Class 3, Credit 3 (S)**

**Interdisciplinary-Liberal Arts****ITDL-101****Career Exploration Seminar**

This seminar is designed to introduce students to the process by which they can make an informed decision in selecting career options and identifying an educational program which will lead to their career goals. With the assistance of facilitators familiar with assessment instruments, careers and the RIT programs, students begin by assessing their interests, values, skills and personal traits. Students will be introduced to online and print resources used for researching occupational information and may be asked to interview faculty and administrators as well as professionals working in fields in which they are interested. Students will complete a variety of activities including class discussions, journal entries, papers and presentations, allowing them the opportunity to reflect on information gathered throughout the course. This seminar is required for students in the university studies and liberal arts exploration programs. **Class 1-2, Credit 1 (F, S)**

**International and Global Studies****INGS-101****Global Studies**

Within the past three decades, planetary computerization, burgeoning media industries, and other global processes have significantly altered the ways in which we experience our local and global worlds. Global reconfigurations of time and space change our consciousness, sense of self and others, and the material realities in which we live and work. This course provides the conceptual tools to assess emerging global processes, interactions and flows of people, ideas and things that challenge historical patterns of international studies and relations. The course will introduce you to international and global processes in areas such as global cultural economies, global cities, new forms of democracy and civil society, global religions, sexualities, health, and environments, increased competition for resources, political conflict, war and terrorism. Beyond understanding the causes and consequences of global change, this course will introduce you to ethical dilemmas in global justice movements, and in transferring ideas and technologies in new global contexts. **Class 3, Credit 3 (F)**

**INGS-201/HIST-201****Histories of Globalization**

This course examines narratives of globalization as human process. We will focus on contemporary and historical issues that are routinely conceived of as affecting or pertaining to the world's population in its entirety, such as human rights, humanitarianism, environmental degradation, trade, and military power. The world and its population will feature as a unit of analysis, and an emphasis will be placed on issues that appear to be in tension with the role of the nation-state and nationality, and highlight world and global citizenship. We will explore critiques of the conceptualization of globality and worldliness as a factor in determining social, cultural, and historical change. Cross-listed with HIST-201. **Class 3, Credit 3 (F and/or S)**

**INGS-210/HIST-210****Introduction to Africa and the Diaspora**

This course is an introduction to the study of an enormous continent, Africa and its Diaspora. Because of the dimensions of the geography, population and time covered, one of the main purposes of this course is to pave the way to narrower regional or thematic classes. This course will emphasize the interdisciplinarity of African and Diaspora studies. We will explore contrasting and complementing disciplinary perspectives on Africa and its Diaspora. We will move our way through African and Diasporic cultures and histories both temporally and thematically. Lectures will introduce key themes and ideas, and you will discuss textual and visual evidence for African and Diasporic communities, cultures and ideas. This course is suitable to those new to the study of Africa and its Diaspora, and to those who are considering taking further classes or seminars in African and/or Diasporic studies. Part of the international and global studies program in a related track; the sociology/anthropology immersion; and the Africa and the Diaspora immersion. Cross-listed with HIST-210. **Class 3, Credit 3 (varies)**

**INGS-270/ANTH-270****Cuisine, Culture, and Power**

Physically, culturally, and socially, humans live through food and drink. Spanning the globe, as nearly limitless omnivores, humans have developed myriad ways of collecting and cultivating food and taking advantage of local environments. We also put food to work for us socially by creating cuisine. Through cuisine, we forge and nourish relationships, commune with deities, and through luxury choices, demonstrate our “taste” and lay claim to elite status. Through the cultural practices of production and consumption of food and drink, we wield power. Food and drink consumption patterns have sustained slavery, poverty, malnutrition, and illegal immigration, and have laid waste to the environment. In this class, we explore physical, cultural, social, political, and economic dimensions of food and become more aware of how the private, intimate act of a bite connects us to the rest of humanity. Counts toward the international and global studies program (sustainable futures track); sociology and anthropology program (cultural anth track); sociology and anthropology minor; cultural anthropology immersion. Cross-listed with ANTH-270. **Class 3, Credit 3 (F, biennially)**

**INGS-310/HIST-310****Global Slavery and Human Trafficking**

This course examines historical and contemporary dimensions of global slavery and human trafficking. The trans-Atlantic slave trade was the world’s largest forced migration between continents, but it was only one of many slave trades that shaped societies throughout the world. In order to understand the historical significance of global slave trades, we will compare it to other systems of slavery. In examining the historical significance and legacies of the slave trade, we will link different regional histories to the growth of market-based capitalist economies into the twentieth century. The course will also examine the changing meaning of the term ‘slavery’ and examine some modern forms of forced labor, bondage, and slavery that persist to this day in all sectors of the global economy. We will explore the rise of human trafficking, and global anti-trafficking programs and campaigns. Part of the international studies degree program in a related track; the sociology/anthropology immersion; and the Africa and the Diaspora immersion. Cross-listed with HIST-310. **Class 3, Credit 3 (varies)**

**INGS-455/ECON-452/ANTH-455****Economics of Native America**

This course will analyze current and historic economic issues faced by Native Americans. It will also examine government policies enacted by and directed toward Native Americans with a focus on their economic implications. This will be done using standard economic models of the labor market, poverty, trade, development and gaming. Cross-listed with ECON-452 and ANTH-455. (ECON-101 Principles of Microeconomics or equivalent) **Class 3, Credit 3 (S)**

**INGS-489****Special Topics**

This course introduces a topic new to the International and Global Studies curriculum. Topic varies by semester. **Class 3, Credit 3 (semester varies)**

**INGS-499****Co-op**

Paid work experience in a field related to international and global studies (at least 160 hours of work, completed over at least four weeks). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (Third-year status and permission of instructor) **Class 0, Credit 0 (F, S, Su)**

**INGS-501****Capstone Seminar**

This upper division seminar constitutes the final core requirement in the international and global studies degree program. Students will enroll in this course in their final year of study. The capstone seminar will further develop and sharpen the student’s understanding of globalization and international processes. The course uses a problem-solving focus to provide a detailed analysis of one or more contemporary issues in the field of international and global studies, culminating in a written senior thesis and project presentation (INGS-101 Global Studies and senior status). **Class 3, Credit 3 (F)**

**INGS-502****Advanced Research**

Seminar for majors in international and global studies. Upon successful completion of the capstone seminar, qualified students may engage in enhanced research in a specific area or dimension of their capstone project under the supervision of a faculty expert. May be taken either as an elective in the advanced study option in international and global studies or as an institute elective. Under the supervision of and collaboration with a faculty expert, the students will further explore, investigate, and rewrite an aspect of their senior project for a conference presentation, for publication, or for enhancement of expertise in their selected field specialization (INGS-501 Capstone Seminar; corequisite: GPA 3.0 or higher and permission of instructor). **Class 3, Credit 3 (F/S/Variable)**

**INGS-597****Study Abroad**

Students will develop skills in critical thinking, ethical reasoning, problem-solving, and communication in an international setting through participating in a Study Abroad program (at least four weeks). (Second-year status and permission of instructor) **Class 0, Credit 0 (F, S, Su)**

**INGS-598****Internship**

Internship in a field related to international and global studies (at least 160 hours of work, completed over at least four weeks). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (Third-year status and permission of instructor) **Class 0, Credit 0 (F, S, Su)**

**Literature****ENGL-150****FYW: The Future of Writing**

This First Year Writing Intensive course is designed to develop first-year students’ proficiency in analytical writing, rhetorical reading, and critical thinking by focusing in particular uses of narrative. Increasingly, professionals, scholars, artists, and public figures recognize the use of stories across genres. Students will acquire informed practice in using narrative in different disciplines, and become aware of storytelling as one among a number of rhetorical strategies for inquiry. Students will be expected to give presentations as well as write papers both in response to the reading material and in services of their own independent arguments. **Class 3, Credit 3 (F, S, Su)**

**ENGL-151****Honors: Future of Writing**

The Honors First Year Writing course is a three-credit seminar limited to 16 students per section. The course is designed to develop first-year students’ proficiency in analytical writing, rhetorical reading, and critical thinking. Students will read, understand, and interpret a variety of texts representing different cultural perspectives and/or academic disciplines. Academic, non-fiction texts, chosen around a particular theme, are designed to challenge students intellectually and to stimulate their writing for a variety of contexts and purposes. Through inquiry-based assignment sequences, students will develop academic research and literacy practices that will be further strengthened throughout their academic careers. Particular attention will be given to the writing process, including an emphasis on teacher-student conferencing, self-assessment, class discussion, peer review, formal and informal writing, research, and revision; small class size promotes frequent student-instructor and student-student interaction. The course also emphasizes the principles of intellectual property and academic honesty for both current academic and future professional writing. (Qualification through admission to the Honors Program) **Class 3, Credit 3 (F, S, Su)**

**ENGL-210****Literary and Cultural Studies**

Students will study literary and cultural texts spanning traditional literature to contemporary media and culture (including mythology, poetry, plays, novels, film, graphic novels, television, and digital literature). Students will analyze these texts from a variety of perspectives and become familiar with the history of debates about the “literary tradition” and/or culture as arenas of circulating texts. Thematic focus will vary by individual sections. **Class 3, Credit 3 (F, S, Su)**

**ENGL-211****Introduction to Creative Writing**

Introduction to Creative Writing is designed to guide students into the craft of creative nonfiction and fiction prose or poetry. The primary goal is to experiment with various forms of creative writing and to produce at least one polished work. The course uses peer feedback and workshops in the development of creative writing projects. **Class 3, Credit 3 (variable; offered annually)**

**ENGL-215****Text and Code**

We encounter digital texts and codes every time we use a smart phone, turn on an app, read an e-book, or interact online. This course examines the innovative combinations of text and code that underpin emerging textual practices such as electronic literatures, digital games, mobile communication, geospatial mapping, interactive and locative media, augmented reality, and interactive museum design. Drawing on key concepts of text and code, students will analyze shifting expressive textual practices and develop the literacies necessary to ‘read’ and understand them. Practicing and reflecting on such new media literacies, the course explores their social, cultural, creative, technological, and legal significance. To encourage multiple perspectives on these pivotal concepts of text and code and their import, the course includes guest lectures by scholars and practitioners in these fields. **Class 3, Credit 3 (offered annually)**

**ENGL-301****The Art of Poetry**

This course emphasizes the enjoyment and study of poetry with primary attention to major poetry in English. Through close readings of individual poems, lectures on specific poets, and theories of poetics, students will develop (and apply) a good working vocabulary of the concepts and terminology used to discuss and analyze poetry. **Class 3, Credit 3 (offered annually)**

**ENGL-302****The Short Story**

This course will introduce students to the art of the short story and will familiarize them with some of its most talented writers. The desire to tell stories is one of the most basic human needs, yet the pure difficulty of short fiction lay in that the author is challenged to convey its meaning in such compact form, to do a lot with a little, as it were. Readings will be both American and Global in scope and may include works by authors such as Chekhov, Carver, Conrad, Kafka, Chopin, Hemingway, O'Connor, and Ellison. **Class 3, Credit 3 (offered regularly)**

**ENGL-304****Drama and Theater**

This course examines drama as a genre and theater as a performing art. Intensive study of at least one major playwright or period complements a general survey of drama/theater. Historical time periods and sample of dramatic arts include pieces as far-ranging as ancient Greece to modern Broadway. **Class 3, Credit 3 (F, S, Su)**

**ENGL-305****Auto/Biographical Literature**

James Merrill said that we live in an age of "me-moir" in American culture—a claim challenged by the diversity of 21st century representations in art, film, and literature. This interdisciplinary course explores a rich spectrum of contemporary life-writings, ranging from traditional autobiography and biography to graphic memoir, from visual self-portraits to global film. We will examine contemporary tales that reveal the inner life and world experiences of those around us, paying careful attention to the way that language is used to construct and reflect identity. Auto/Biography explores lives lived within cultures, societies, and even professions. **Class 3, Credit 3, (offered annually)**

**ENGL-310****Introduction to Language Science**

Interested in language and how languages work? This course offers an intriguing survey of the basic concepts of linguistics, which is the scientific study of human languages. Students will be introduced to core linguistic disciplines and principles through discussion, multimedia, and hands-on analysis of a wide range of linguistic data based on current linguistic models, with the opportunity to try out linguistic investigation tools. We will discuss a variety of languages, including sign languages, to illustrate core concepts in linguistics. Topics also surveyed include the origins of languages, languages' organization in the brain, what languages have in common and how they differ, language globalization and language endangerment, and forensic linguistics. **Class 3, Credit 3 (F, offered annually)**

**ENGL-315****History of Digital Literature**

Since the initial development of the computer, writers have collaborated with programmers, illustrators, and soundscapists to create digital literatures. Following from radical techniques in print literatures such as concrete poetry, Choose Your Own Adventure novels, and re-orderable/unbound fictions, digital literatures exploit the potential of digital formats to explore questions of interactivity, readership, authorship, embodiment, and power. In this class, we will learn to analyze and appreciate digital literatures not simply through their content, but also through the relation of content to form, media, programming platforms, and distribution formats. Our consideration of digital literatures will lead us to cell phones, web pages, video games, virtual reality environments, and genome sequencers. **Class 3, Credit 3 (offered annually)**

**ENGL-325****Honors English**

A critical examination of themes, topics, theories and practices in a literary or writing studies area associated with existing courses in the English curriculum, or with a special topics area. The approach to this literary or writing studies topic will be specially geared to honors students and others who wish to participate in a more in-depth and rigorous exploration of a literary or writing set of topics. **Class 3, Credit 3 (F, S)**

**ENGL-340****Literary Diseases**

This course takes a literary approach to a set of broad humanist questions about how we represent illness and disease in imaginative forms. It explores the links between narrative, disease, and culture by focusing on works of fiction, drama, film, and non-fiction media that represent disease and illness. As early as ancient Greek drama, diseases have been key metaphors and framing narratives in literature. The course allows students to see how narrative has been an important part of accounting for and analyzing disease both at the individual and epidemiological levels. The course will also allow students to see how diseases are turned into metaphors, and how and why this transformation can we should think critically about such metaphors. Students are encouraged to think critically about how illness is deployed for social and political purposes when, for instance, 'infection' is used as a metaphor for immigration or invasion. Students are also encouraged to apply methods of literary and cultural analysis to contemporary phenomena such as representations of health and illness issues in contemporary popular culture and information media. **Class 3, Credit 3 (offered occasionally)**

**ENGL-345****History of Madness**

This course will study the changes in definitions, explanations, and depictions of madness as expressed in psychiatric texts, asylum records, novelists, cartoonists, artists, photographers, film-makers, and patient narratives. Certainly, madness has assumed many names and forms: the sacred disease, frenzy, hysteria, mania, melancholy, neurosis, dementia, praecox, schizophrenia, phobia, post-traumatic stress disorder. Those afflicted have been admired, pitied, mocked, hidden from public view, imprisoned, restrained, operated on, hospitalized, counseled, analyzed, and medicated. The brain has long been a source of interest, particularly the disordered brain. This course explores the brain from the history of madness. The course takes a humanist, rhetorical, and historicist approach to the question of madness within changing social institutions and popular discourse. **Class 3, Credit 3 (offered regularly)**

**ENGL-351****Language Technology**

Ever wondered what makes a conversation with a computer possible? We will explore the relationship between language and technology from the invention of writing systems to current human language technologies. Topics include script decipherment, machine translation, speech and dialog systems, computational linguistic inference, and tools that support users with language disabilities. We will also trace how science and technology are shaping language, discuss relevant intelligent computing concepts, and study ethics of advances in language processing by computers. Students will have the opportunity to experience text analysis with relevant tools. This is an interdisciplinary course and technical background is not required. (Recommended, but not required: ENGL-310 Introduction to Language Science) **Class 3, Credit 3 (S, offered annually)**

**ENGL-360****Written Argument**

This course will focus on academic writing specifically, the arguments presented in different fields and professions about issues of significance. Students will learn about the rhetorical, ethical, emotional, historical, and logical elements of persuasion as they relate to written and visual arguments, and they will practice making claims, providing evidence, exploring underlying assumptions, and anticipating counter-arguments as they relate to different audiences. In addition to argument analyses, students will develop arguments of their own through inquiry-based essays. **Class 3, Credit 3 (offered regularly)**

**ENGL-361****Technical Writing**

Provides knowledge of and practice in technical writing. Key topics include audience analysis; organizing, preparing and revising short and long technical documents; designing documents using effective design features and principles, and formatting elements using tables and graphs; conducting research; writing technical definitions, and physical and process descriptions; writing instructions; and individual and group peer editing. **Class 3, Credit 3 (offered regularly)**

**ENGL-371****Language, Dialects and Identity**

This course is an introduction to sociolinguistic theory, application, and methodology with a focus on the U.S. context. We will examine varieties of language that result from regional and social factors (gender, race, ethnicity and class). We will also explore the ways in which language is tied to our identity and marks our place in society as a result of such variation. Topics may include (but are not limited to): dialects of American English, language and gender, bi/multilingualism, attitudes toward non-standard and standard varieties of English, and language policy (e.g. the movement to declare English the national language; African American English/Ebonics). **Class 3, Credit 3 (offered annually)**

**ENGL-375****Storytelling Across Media**

This course introduces the basic elements of narrative, reflecting on key concepts in narrative theory such as story and plot, narration and focalization, characterization, storyspace, and worldmaking to enhance students' understanding of how stories work and to understand how such storytelling strategies convey their meaning and themes. After an initial exploration of storytelling traditions emerging from oral myth and short stories in print, we expand our inquiries into what a narrative is and what it can do by considering what happens to storytelling in graphic novels, digital games, and in recent electronic literature. Reflecting on competing definitions and varieties of narrative, the course raises the overarching question of why how we access, read, write, and circulate stories as a culture matters. Expect to "read" stories in a variety of media, to review basic concepts and conversations drawn from narrative theory, and to creatively experiment with the storytelling strategies we are analyzing in class. No familiarity with specific print, digital, or visual media necessary, though a willingness to read and reflect on stories in various media and to analyze their cultural significance will be essential. **Class 3, Credit 3 (offered annually)**

**ENGL-376****Experimental Writing**

Is it true that literature makes nothing happen? Experimental writing is built on the opposite assumption! This course introduces students to innovative texts that challenge our usual ways of thinking about the relationship of language to the world: the cultural contexts within which language functions, the conflicts out of which it arises, the aesthetic pleasures with which it is associated, and the purposes—intentional or other—which it serves. Writing experiments can test boundaries and break limits, offering us ways to reconsider and redefine our own experience—social, intellectual, emotional, spiritual. Moving from magic to modernity, from monster to machine, we will explore the transformative power of experimental writing. **Class 3, Credit 3 (offered annually)**

**ENGL-381****Science Writing**

Study of and practice in writing about science, environment, medicine and technology for audiences ranging from the general public to scientists and engineers. Starts with basic science writing for lay audiences, emphasizing writing strategies and techniques. Also explores problems of conveying highly complex technical information to multiple audiences, factors that influence science communication to the public, and interactions between scientists and journalists. The course examines new opportunities for covering science (especially on the Internet), important ethical and practical constraints that govern the reporting of scientific information, and the cultural place of science in our society. **Class 3, Credit 3 (offered regularly)**

**ENGL-391****Dangerous Texts**

This course will examine how suppression of information has been orchestrated throughout history in different contexts. The process of suppressing information—of people in power attempting to hide images, sounds and words—must itself be viewed in perspective. We must recognize acts of censorship in relation to their social settings, political movements, religious beliefs, cultural expressions and/or personal identities. The texts that we will study were all considered dangerous enough to be banned by governments. What is it that makes a certain work dangerous at a particular time and how does this danger manifest itself in stories, novels (print and graphic), and poetry? We will ask: what features of political and cultural regimes do artists tend to single out for criticism? What is it that makes intellectuals (in general) and imaginative writers (in particular) so potent a threat to established power? Do issues like these matter only in totalitarian regimes, or can we learn something about the book-banning pressures in our own society? How do social media technologies complicate discussions of censorship and creativity? **Class 3, Credit 3 (offered annually)**

**ENGL-400****Special Topics: Literary and Cultural Studies**

A focused, in depth study and analysis of a selected topic in literary and/or cultural studies. Specific topics vary according to faculty assigned. **Class 3, Credit 3 (F, S, Su)**

**ENGL-403****The Novel**

This course examines the art and process of the novel as a genre of writing through explorations and analysis of its literary form, its themes, its stylistic tendencies, and its diverse social and cultural and historical contexts and aims. Reading a variety of novels from different historical periods and/or cultural contexts, the course identifies defining features of novels, according to different critical traditions, and considers their differing assessments of its origins and of its social and political import. It also introduces and practices literary analysis of novels, using a careful scrutiny of elements of fiction such as plot, point of view, setting, symbol, or theme, to reveal how writers convey meaning and generate specific relations between text and reader and to identify key stylistic tendencies such as realism, sentimentalism, modernism, and postmodernism. **Class 3, Credit 3 (S)**

**ENGL-406****Shakespeare: Tragedies**

For almost four hundred years Shakespeare's work has stood as a monument to the literary imagination. In this course, we will study Shakespeare's tragedies with a view toward exploring the influence of his work through the ages, as well as addressing questions of canonicity. Through class discussion, interactive activities, and examination of film, students will develop strategies both to investigate the literary and theatrical power of these works as well as to consider their cultural presence in both contemporary American culture and Shakespeare's England. Particular attention will be devoted to literary theory and the variety of interpretation in order to inform readings of the plays. **Class 3, Credit 3 (offered annually)**

**ENGL-407****Shakespeare: Comedies**

Our notions of comedy are considerably different than Shakespeare's time. Yet, the parameters set forth in his plays continue to influence the way we understand the form. In this course, we will read a selection of Shakespeare's comedies including some problem plays in order to develop an understanding of genre and its influence. Through class discussion, interactive activities, and examination of films, students will develop strategies both to investigate the literary and theatrical power of these works as well as to consider their cultural presence in both contemporary American culture and Shakespeare's England. Particular attention will be devoted to literary theory and a variety of interpretations that inform readings of the plays. **Class 3, Credit 3 (offered annually)**

**ENGL-408****Modern Poetry**

From Walt Whitman's "barbaric yawp," to Emily Dickinson's "letter to the world that never wrote to me," and Baudelaire's "breath of wind from the wings of madness," Modern Poetry is a body of literature characterized by bold changes in voice, form, and subject matter. This course offers a close examination of poetry of the 19th and 20th centuries, with attention to such things as the role played by technological, historical, and political developments; what it means to be "modern" and how other modern arts movements, for instance, visual arts, music, or film, have influenced poetry. **Class 3, Credit 3 (offered annually)**

**ENGL-409****Mythology and Literature**

This course is a scholarly investigation into the cultural, historical, social, psychological, religious and spiritual, literary and performative dimensions of world myth. It examines different approaches to the study of myth emerging from disciplines such as anthropology, history, literary studies, and psychology. Special attention will be paid to the effect of these narratives on literature and other kinds of cultural texts, past and present. We will also use myth to develop, and critically reflect on, comparative approaches to world cultures. **Class 3, Credit 3 (offered annually)**

**ENGL-410****Film Studies**

Film studies familiarizes students with a number of different critical approaches to film as a narrative and representational art. The course introduces students to the language as well as analytical and critical methodologies of film theory and criticism from early formalist approaches to contemporary considerations of technologies and ideologies alike. Students will be introduced to a selection of these approaches and be asked to apply them to a variety of films selected by the instructor. Additional screening time is recommended. **Class 3, Credit 3 (offered annually)**

**ENGL-411****Topics in American Literature**

The course introduces students to American literature by tracing a particular theme through a historical survey of canonical, non-canonical, and contemporary novels, stories, poetry, and drama, as well as non-fiction forms (speeches, autobiographies, essays, etc.). Students will gain a broad understanding of American literary trends while also gaining a deep understanding of the given themes. These themes will be broadly conceived, but will also lend themselves to social, cultural, and political questions. These themes may include but are not limited to horror, gardens and machines, natives and strangers, borders, etc. While these themes deal with abstract or conceptual ideas, they lead to questions about gender, race, ethnicity, empire, and other historical problems in debates over American exceptionalism, empire, and ideology. **Class 3, Credit 3 (offered annually)**



**ENGL-412****American Studies**

American studies is a crossroads space where American culture and history are studied from multiple perspectives. It offers a glimpse into a big picture of America through literary, historical, and cultural snapshots of American life. It asks students to think in relational ways. What did it mean, for example, to be an American in 1953 and how is that experience different from today? How are the ideals of America as the land of liberty and freedom perceived at home and in the world? How do national politics shape literary formations? This version of the course focuses on American literature of the 1950s that decade wedged between the end of World War II and the beginning of the psychedelic 1960s. Through literature, film, photography, and popular culture we develop a deeper understanding of the complex and shifting meanings of American identity, individually and nationally. By holding a mirror up to a single decade we also expand our awareness and understanding of our own times. **Class 3, Credit 3 (offered annually)**

**ENGL-413****African-American Literature**

Participants will explore the landscape of African-American literature, and learn of its development throughout the 19th and/or 20th Centuries. From Phyllis Wheatley, Paul Laurence Dunbar, Ida B. Wells to Toni Morrison, from the Harlem Renaissance, and the Black Arts Movements of the 1960s to Hip-Hop this course will explore African-American writers who inspired a civil rights and cultural revolution. Through writing, reading and research, they will grow to understand how, despite legal limits on freedom and social participation imposed because of their color in American society, blacks created styles of verbal and written expressions unique within the American experience and contributed to the shape, growth and development of the nation's literary character. **Class 3, Credit 3 (offered annually)**

**ENGL-414****Topics in Women's and Gender Studies**

This course will explore a key theme or critical question in women's and gender studies. Drawing from, and reflecting on approaches from a variety of disciplines, we will read social, cultural, and artistic texts and practices in a new light. How do cultural texts and practices (such as novels, graphic novels, plastic surgery, in vitro fertilization, music videos, bulimia, facebook, video games, advertising, etc.) encourage us to think about gender, sex, sexuality, race, class, nation, transnation, science, and power? How do these texts and practices travel from culture to culture but refuse easy translation? How has women's and gender studies and the creative, activist, and academic practices challenged gendered and racialized power structures in the past, in the present, and how might it transform its methods to confront current challenges? What connections can be drawn between women around the world without erasing their distinct differences? How do we put that international perspective on women's and men's lives into practice in our own daily lives? **Class 3, Credit 3 (offered annually)**

**ENGL-415****Topics in British Literature**

The course introduces students to British literature by tracing a particular era through a historical survey of canonical, non-canonical, and contemporary novels, stories, poetry, and drama, as well as non-fiction forms (speeches, autobiographies, essays, etc.). Students will gain a broad understanding of literary trends in British literature. **Class 3, Credit 3 (offered regularly)**

**ENGL-416****Topics in Global Literatures**

This course will approach literature as a global phenomenon, considering some of the key historical forces that have been bringing the globe's inhabitants into contact with one another through cultural, aesthetic and commercial expression. We will examine a host of literary, artistic, and popular forms that exist along the conduits and fault-lines of the global world system: possible primary texts include television programs and commercials, film, animation, music, visual art, literature and new media. **Class 3, Credit 3 (offered annually)**

**ENGL-417****Deaf American Literature**

The major focus of this course is on "the image of the deaf and "the deaf experience" as depicted in literature. The course attempts to define "deafness" and the cultural roles it plays in both texts by deaf authors and texts about deaf persons, as well as to examine particular literary forms related to the deaf experience. Thus, attention is also given to studying ASL poetry. **Class 3, Credit 3 (offered occasionally)**

**ENGL-418****Great Authors**

This course provides an in-depth look at literary giants and the masterpieces of prose or poetry they have created; it's an opportunity to see the role they played both within the context of their own time and within the larger span of literary history. These great authors confront key questions of modernity that continue to occupy us to this day; they ask the question of what it means to be human and explore fundamental human themes. They give us a fresh perspective on the past and on ourselves. **Class 3, Credit 3 (offered annually)**

**ENGL-419****Literature and Technology**

Surveying the rise of computing technologies, information theories, and information economies in the last century, this course considers their impact on literature, culture and knowledge-formation. In particular, we will reflect on topics such as the relationship between social and technological transformation, literary print and digital cultures, and electronic literature. **Class 3, Credit 3 (offered annually)**

**ENGL-420****Science Fiction**

This course provides a selective survey of science fiction from its antecedents to its foundational texts and through many of its developments in the 20th and 21st centuries. With a variety of authors who exhibit varying intentions and effects, the course approaches these texts as literary form, as cultural artifact, as philosophical speculation, and as scientific and technological imagination. **Class 3, Credit 3 (offered annually)**

**ENGL-421****The Graphic Novel**

This course charts the development of the graphic novel, examines that history in relation to other media (including literary works, comics, film, and video games), and reflects on how images and writing function in relation to one another. Primary readings will be supplemented with secondary works that address socio-historical contexts, interpretive approaches and the cultural politics of the medium, such as representations of class, race, gender and ethnicity. **Class 3, Credit 3 (offered annually)**

**ENGL-422****Maps, Spaces and Places**

The course takes as its premise that spatial thinking is critically important. Spatial thinking also informs our ability to understand many areas of 21st century culture. The diverse writers, critics and filmmakers represented in this course are rethinking space as a dynamic context for the making of history and for different organizations of social and communal life. Mobile interfaces and geospatial technologies enable us to engage with our surroundings in new ways. The study begins with a meditation on the language of maps and mapmaking, and how they work, exploring the idea that to present a useful and truthful picture, an accurate map must tell lies. The course develops into an exploration of the ways, particularly in texts, that mapmaking creates cultural routes, mobile forms of ethnography, and ways of imagining travel and tourism in the era of globalization. The proliferation of location-aware mobile devices call for new understanding of space and networks of power, as we define public space and locational privacy. **Class 3, Credit 3 (offered annually)**

**ENGL-425****Global Cinemas**

This course introduces students to one or more national or regional motion picture (including video and digital formats) traditions other than North American (Hollywood) film (though even this film tradition can be examined in its global significance). While the rest of the world is exposed to American cinema extensively, we in North America have only recently been exposed to film from China, Latin America, Iran, and other non-Western film traditions. Even European cinema (East and West) remains little understood among mainstream movie audiences. This course increases students' awareness of at least one cinematic tradition beyond that of mainstream North American cinema. Lectures and readings will situate the films within the broader socio-historical context of the national, regional, or ethnic tradition. Students will become familiar with the aesthetic of a particular national cinema, including its connections with other art forms from the region and elsewhere. Moreover, students will become familiar with the inherently transnational nature of most cinema, including the significance and limits of such transnationalism. The specific focus of the course will vary depending on faculty offering the course. **Class 3, Credit 3 (offered annually)**

**ENGL-440****Poetry Workshop**

This course is for students who want to explore in-depth the literary genre of poetry and add to their skills as a poet. Through reading and discussion of poems they will see their own writing in a larger context. Weekly class critiques will provide the opportunity to give and receive helpful feedback. This is an exploration of the techniques of writing poetry in both open and closed forms. **Class 3, Credit 3 (offered regularly)**

**ENGL-441****Fiction Workshop**

This course is for students who want to explore in-depth the literary genre of fiction and add to their skills as a creative writer. Through reading and discussion of stories they will see their own writing in a larger context. Weekly class critiques will provide the opportunity to give and receive helpful feedback. **Class 3, Credit 3 (offered biannually)**

**ENGL-442****Creative Nonfiction Workshop**

This course is for students who want to understand and experiment with the genre of creative nonfiction and to add to their skills as a creative writer. In this intensive workshop students will explore the use of “I” as a guide, seek the extraordinary within the ordinary, and find the story within the facts. Reading/ reflection and writing/revision will be emphasized all semester. The focus will be on the creation of several essays and the experimentation with style and subcategories of this fourth genre. Ongoing work will be discussed with peer editors, which will not only help students rethink their work but teach them to become better editors. Through reading and discussion they will see their own writing in a larger context. Weekly group critiques will provide the opportunity to give and receive helpful feedback. **Class 3, Credit 3 (offered annually)**

**ENGL-450****Free and Open Source Culture**

This course charts the development of the Free Culture movement by examining the changing relationship between authorship and cultural production based on a variety of factors: law, culture, commerce and technology. In particular, we will examine the rise of the concept of the individual author during the last three centuries. Using a variety of historical and theoretical readings, we will note how law and commerce have come to shape the prevailing cultural norms surrounding authorship, while also examining lesser known models of collaborative and distributed authoring practices. This background will inform our study of the rapid social transformations wrought by media technologies in last two centuries, culminating with the challenges and opportunities brought forth by digital media, mobile communications and networked computing. Students will learn about the role of software in highlighting changing authorship practices, facilitating new business and economic models and providing a foundation for conceiving of open source, open access, participatory, peer-to-peer and “free (as in speech, not beer)” cultures. **Class 3, Credit 3 (offered annually)**

**ENGL-457****Language, Dialects, and Identity**

What are dialects of American English? How does language communicate identity? The sociolinguistic profile of the United States is extremely diverse—contrary to the common myth. This course is an exciting introduction to sociolinguistic theory, application, and methodology with a focus on the US context. We will examine varieties of language in the USA that result from regional and social factors (gender, race, ethnicity, and class). In this journey we will explore the ways in which language communicates our identity and marks our place in society and community as a result of such variation. Topics could also include but are not limited to: cross-cultural communication in the USA, attitudes toward non-standard and standard English, discourse analysis, language and gender, and language policy. **Class 3, Credit 3 (variable; offered annually)**

**ENGL-462****Worlds of Writing**

Worlds of Writing is a course that explores a range of storytelling mediums in an attempt to better understand how writing serves the function of both self-expression and discovery. Through critical reading, analytical thinking, and subjective writing, we will examine memoir, short stories, poems, essays, documentary, TV, photographs, interviews, and online and print publications. Direct response to the source material will be demonstrated through class discussion and a hybrid of formal and creative writing opportunities, which may include but are not limited to: cultural reflection, character analysis, formal essay, and cross-medium memoir. **Class 3, Credit 3 (offered occasionally)**

**ENGL-463****Writing the Self and Others**

In Writing the Self and Others, we will examine the nature of non-fiction storytelling and narrative approaches to writing about the self and others. This exploration will be accomplished by reading a range of texts rooted in the human experience, analyzing stylistic choices, writing to reveal identity, and understanding the relationship between character and content. Through critical reading, analytical thinking, and subjective writing, we will examine texts including (but not limited to) memoir, essays, and documentary, among other mediums. Direct response to the source material will be demonstrated through class discussion and a hybrid of formal and creative writing opportunities, which may include but are not limited to: memoir, creative non-fiction, in-class writing, character analysis, portraiture, and multi-genre. **Class 3, Credit 3 (offered annually)**

**ENGL-466****Early Black Writers**

Participants will learn about the African-American literary tradition from the 17th century to the early 1900s. Through writing, reading and research, they will grow to understand how, despite legal limits on freedom and social participation imposed because of their color in American society, blacks created styles of verbal and written expressions unique within the American experience and contributed to the shape, growth and development of the nation's literary character. **Class 3, Credit 3 (offered annually)**

**ENGL-467****Black Writers Today**

Participants will explore the landscape of African-American literature today, and learn of its development throughout the 20th Century, from the Harlem Renaissance. Through writing, reading and research, they will grow to understand how, despite legal limits on freedom and social participation imposed because of their color in American society, blacks created styles of verbal and written expressions unique within the American experience and contributed to the shape, growth and development of the nation's literary character. **Class 3, Credit 3 (offered annually)**

**ENGL-470****Evolving English Language**

Where do our words come from? Why does Old English look like a foreign language? What causes English to change? Is the English language evolving into Englishes? This course surveys the fascinating story of the English language and its context from its modest beginnings to its present status as a global language to answer such questions as these. Designed for anyone who is curious about the history and periods of the English language or the nature of language change. **Class 3, Credit 3 (offered annually)**

**ENGL-472****Special Topics: Writing Studies**

A focused, in depth study of a selected topic in writing. Specific topics vary according to faculty assigned. **Class 3, Credit 3 (offered occasionally)**

**ENGL-480****Rhetoric of Science**

As science and technology increasingly affect society, it is important to understand how scientific information and discovery is argued about and decided upon within the scientific community, and then communicated to the general public. This course is an introduction to the theory and practice of rhetoric, the art and craft of persuasion, and how scientists go about using rhetoric in the construction of scientific knowledge. Examples will be drawn from key figures and texts in the history of science, ongoing controversies in contemporary scientific debates, the popularization of science in public media, and the representation of science in popular culture. Readings include genres of science writing that raise the question: What does it mean to say that science is rhetorical? **Class 3, Credit 3 (offered regularly)**

**ENGL-481****Introduction to Natural Language Processing**

This course provides a theoretical foundation as well as hands-on (lab-style) practice in computational approaches for processing natural language text. The course will have relevance to various disciplines in the humanities, sciences, computational, and technical fields. We will discuss problems that involve different components of the language system (such as meaning in context and linguistic structures). Students will additionally collaborate in teams on modeling and implementing natural language processing and digital text solutions. We will program in Python and use the Natural Language Toolkit and related tools (such as Weka). (ENGL-351 Language Technology or computer programming experience is required for this course) **Class 3, Credit 3 (S, offered at least every two years)**

**ENGL-482****Language and Brain**

This course explores language and the human mind. Topics include innateness of language, language emergence, neural localization of language, how language links to thought, modeling language processing and comprehension, reading/writing processes, and speech and language disorders and clinical linguistic conditions (including atypical language due to aphasia, autism, etc.). We will touch upon how language relates to other modalities (vision/eye movements, etc.) and how it functions as a window to other cognitive processes (such as emotion and reasoning). Students will read accessible language research in cognitive science. The course includes discussion of methodology and has a friendly overview of foundational concepts in quantitative linguistics and methods for investigating language and brain questions. **Class 3, Credit 3 (offered annually)**

**ENGL-542****Advanced Creative Writing Workshop**

This course is for students who have completed a creative writing workshop and want to explore in-depth a literary genre or add to their skills as a creative writer whether interested in poetry, fiction, non-fiction or a combination of genres. The focus will be on the creation of a significant piece of writing for a final project. In addition to planning and producing a single, sustained creative work, students will complete other exercises and assignments in order to experiment with other genres. Through reading and discussion they will see their own writing in a larger context. Weekly class critiques will provide the opportunity to give and receive helpful feedback. **Class 3, Credit 3 (offered regularly)**

**ENGL-582**                      **Advanced Topic in Computational Linguistics**  
Study of a focus topic of increased complexity in computational linguistics. The focus topic varies each semester. Students will develop skills in computational linguistics analysis in a laboratory setting, according to professional standards. A research project plays a central role in the course. Students will engage with relevant research literature, research design and methodology, project development, and reporting in various formats. ENGL-481 Introduction to Natural Language Processing or instructor's consent. **Class 3, Credit 3 (F, offered once every two years)**

## **Museum Studies**

**MUSE-220**                      **Introduction to Museums and Collecting**  
This course examines the history, theory, ideology, and practice of collecting within the institutional context of the museum. It considers the formation of the modern museum, and focusing on the American context, investigates the function and varieties of museums, ranging from natural history, anthropology, science and technology, history, and art. The course explores the history of the museum and its evolution institutionally, ideologically, and experientially. The course also considers the operations of museums from accessioning through deaccessioning, examining museum management, collections management and collections care. The course also explores museum governance and the professional ethics and legal constraints that affect museum professionals. The course examines how a museum carries out its mission of public education through its collections and exhibitions, as well as through its educational programs and community outreach and visitor studies. Current issues in the museum world are also considered, including: the museum's educational function versus its entertainment function; the problems of staying solvent in an era of diminishing governmental and corporate subsidies; deaccessioning collections to support the museum operations; issues of art theft and repatriation (ranging from colonial era and Nazi era plunder, the disposition of human remains and sacred objects, and illicit trafficking); the evolving responsibilities of the museum to its public and the cultural heritage; and the rise of the virtual museum. Throughout the semester, the course examines museums and their practices through the perspectives of colonialism, nationalism, class, race, age, gender, and ethnicity. The course includes field trips to local museums and collections throughout the semester. **Class 3, Credit 3 (F)**

**MUSE-221**                      **Introduction to Public History**  
Public history is using the research-based methods and techniques of historians to conduct historical work in the public sphere. If you've gone to a museum, conducted an oral history, researched your old house, or learned from an interpreter at a park or historic site, you've seen public history in action. This course will introduce students to the wide variety of careers in public history, and will examine the challenges and opportunities that come with "doing" history in, with, and for the public. The course will be of most interest to museum studies majors, history minors, and other students with a substantial interest in the practice of history. **Class 3, Credit 3 (S)**

**MUSE-222**                      **Panel Painting**  
This is a studio based class in which student recreate an egg tempera panel. Students will explore the history of pigments and painting technology through use of primary sources and hands on projects. Production methods and technology of artists' materials will be explored by the recreation of a medieval panel painting. Deterioration and alteration of pigments and paintings will be reviewed. **Class 3, Credit 3 (F)**

**MUSE-223**                      **Historic Photographic Processes**  
This is a studio based class in which student recreate a number of different nineteenth century photographic processes. Students will explore the history of photographic technology through use of primary sources and hands on projects. The chemistry and deterioration of the materials will be reviewed through the use of primary texts, projects and discussion. Required course for museum studies major. **Class 3, Credit 3 (S)**

**MUSE-224**                      **History and Theory of Exhibitions**  
Art exhibitions are organized around a curatorial premise, a statement that articulates an idea allowing for the selection of work included in an exhibition. This course begins with an overview of exhibition history, starting with the transformation of the Louvre into the first public art museum following the French Revolution, where art history, a discipline developed in the 19th century, was enlisted to organize exhibition. The course then examines the proliferation of types of exhibitions that accompanies modernism, up to the present, paying close attention to the curatorial premise animating the exhibitions. Required course for museum studies major. **Class 3, Credit 3 (S)**

**MUSE-354**                      **Exhibition Design**  
This course examines the history and practice of exhibition design. It reviews the history of exhibitions within the development of museum-like institutions. In this course the following aspects of exhibition design are considered: curatorial premise or theme, exhibition development timeline, exhibition site, contracts and contractual obligations, budgets and fundraising, publicity material, didactic material, and exhibition design. The course includes field trips to local institutions and collections throughout the semester. Required course for museum studies major. **Class 3, Credit 3 (F)**

**MUSE-355**                      **Fundraising, Grant Writing, and Marketing for Nonprofit Institutions**  
This course examines the growing autonomy of collecting institutions as they are cut off from various forms of governmental sponsorship and public subsidy and their subsequent needs for raising money from outside, non-traditional sources. The course looks at issues of needs assessment, budgeting, and strategic planning. It focuses on the design and implementation of effective fundraising campaigns, as well as on the organization and writing of successful grant proposals. It also considers the importance of marketing to overall institutional success. Required course for museum studies major. **Class 3, Credit 3 (F)**

**MUSE-356**                      **Interactive Design for Museums**  
This is a project based course which explores the intersection of interactive design and museum education. Interactive museum programs have the potential to engage museum visitors by encouraging creative exploration, independent interpretation, and deeper understanding. Students will learn how to make the study of material culture more interesting and approachable by creating interactive projects for both the museum and the internet. Students will learn to incorporate educational outcomes into engaging learning experiences for museums. Required course for museum studies major. (MUSE-220 Introduction to Museums and Collecting) **Class 3, Credit 3 (S)**

**MUSE-357**                      **Collections Management and Museum Administration**  
This course presents an overview of the administration and management of museums and their collections. The course examines the governance structure of museums, focusing on personnel responsible for their administration, curation and education, and operations, as well as on the mission statement and policies they determine. The course also details the management of collections, including the development of a collections policy, management of that policy, documentation and record keeping, acquisitions, and the creation/management of exhibitions. Finally, the course considers collections care or preventive conservation, looking at both the facility and collections. Throughout the semester legal and ethical issues pertaining to museums and their collections will be emphasized. Required course for museum studies major. (MUSE-220 Introduction to Museums and Collecting) **Class 3, Credit 3 (S)**

**MUSE-438**                      **Conservation and Analysis of Cultural Materials**  
This course examines the philosophies, ethics, and analytical methods of art conservation. An overview of deterioration mechanisms and conservation strategies for a variety of materials including: stone, glass, ceramic, wood, paper, new media, metals, textiles, oil paintings and archaeological materials will be presented. Analytical methods for material analysis and authentication will be reviewed. This course has a laboratory component in which students will learn pigment analysis and the identification of print and photographic processes. (MUSE-220 Introduction to Museums and Collecting, MUSE-222 Panel Painting, MUSE-223 Historic Photographic Processes) **Class 3, Credit 3 (F)**

**MUSE-491**                      **Senior Thesis I**  
The Senior Thesis in Museum Studies I is the first course in the final sequence required for completion of the degree program. In this section, students will work with their thesis advisers to define their senior thesis project, engage in preliminary research, write an abstract containing the thesis statement/research question, construct their formal thesis proposal, and develop a plan of work for Senior Thesis in Museum Studies II. (MUSE- 220 Intro to Museums and Collecting; MUSE-222 Panel Painting, MUSE-223 Historic Photographic Processes, MUSE-356 Interactive Design for Museums, MUSE-438 Conservation and Analysis of Cultural Materials, and internship) **Class 3, Credit 1 (S)**

**MUSE-492**                      **Senior Thesis II**  
The Senior Thesis in Museum Studies II is the second course in the final sequence required for completion of the degree program. In this section, under the guidance of their thesis advisers, students will to their research and write their literature review. They will also revise their content outline based on this research. Finally, they will develop a new plan of work for the completion of their thesis in Senior Thesis in Museum Studies III. (MUSE-491 Senior Thesis I and internship) **Class 3, Credit 2 (F)**

**MUSE-599**

A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Credit 1-12 (F, S, Su)**

## Philosophy

**PHIL-101****Introduction to Philosophy**

An introduction to some of the major problems, methods and insights of philosophy with readings from both classical and contemporary sources. **Class 3, Credit 3 (offered several times annually)**

**PHIL-102****Introduction to Moral Issues**

This course examines ethical questions that arise in the course of day-to-day individual and social life. Some consideration will be given to ethical theory and its application to such questions, but emphasis will be on basic moral questions and practical issues. Examples of typical issues to be examined are: What are the grounds for moral obligations like keeping promises or obeying the law? How do we reason about what to do? Examples of typical moral issues that may be introduced are capital punishment, euthanasia, abortion, corporate responsibility, the treatment of animals, and so forth. **Class 3, Credit 3 (offered several times annually)**

**PHIL-103****Critical Thinking**

An introduction to philosophical analysis, especially as it may be applied in contexts other than professional philosophy, but also including normative issues such as ethics and aesthetics. **Class 3, Credit 3 (offered several times annually)**

**PHIL-201****Ancient Philosophy**

This course examines the origin and development of Western philosophy in ancient Greece from Thales in the sixth century down to at least the fourth century B.C.E., concentrating on the central ideas of the pre-Socratics, the Sophists, Socrates, Plato, and Aristotle. Some attention might also be given to the Hellenistic philosophers (Epicureans, Stoics, and Sceptics). This was a period of remarkable intellectual creativity in philosophy, mathematics, medicine, rhetorical theory, ethics, aesthetics and cosmology. Questions to be considered in this course will include: What are the nature and limits of knowledge? Is knowledge even possible? What is the nature of language? How reliable is perception? What is the true nature of reality? What is the origin and nature of the material world? Is moral knowledge possible? What is the nature of happiness, and what sort of life would make people happy? Required course in the philosophy major. **Class 3, Credit 3 (offered regularly)**

**PHIL-202****Foundations of Moral Philosophy**

This course is a survey of foundational, and normative, approaches to moral philosophy and their motivating moral questions. Topics will include virtue ethics, deontology, consequentialism, and other approaches. Some of the questions to be examined are: How is human nature related to morality? What are the grounds for moral obligations? Is there an ultimate moral principle? How do we reason about what to do? Can reason determine how we ought to live? What are moral judgments? Are there universal goods? What constitutes a morally worthwhile life? Can morality itself be challenged? Required course in the philosophy major unless PHIL-415 has been taken. **Class 3, Credit 3 (offered regularly)**

**PHIL-203****Modern Philosophy**

This course examines the history of modern philosophy, from Descartes through Kant. It concentrates on the development of modern thought, examining the concepts of mind, body, and causation among others. This period marked the beginning of modern science, with a rich ferment of ideas, and the philosophy of the period is essential to understanding modern science as well as contemporary problems about consciousness, mind/body interaction, causation, and so on. Questions to be considered in this course include the following: What can we know? How do we come to know what we can know? What is the scope and what are the limits of our knowledge? What is the nature of reality? Do we have access to reality? How is causal interaction possible, if at all? Does God exist, and if so, how do we know and what relation does God have to the world? Required course in the philosophy major. **Class 3, Credit 3 (offered regularly)**

**PHIL-204****Introduction to Logic**

An introduction to systematic methods of reasoning, such as induction, syllogistic, propositional and predicate logic, along with some associated philosophical issues, such as the nature of truth, future contingents, abduction, scientific method, and human vs. machine reasoning. More advanced topics might be touched on, such as modal logic, and fuzzy logic. Required course in the philosophy major unless PHIL-302 has been taken. **Class 3, Credit 3 (offered regularly)**

**PHIL-301****Philosophy of Religion**

This course will examine critically definitions, assumptions, and arguments central to religion. Topics may include interpreting the nature of religion, arguments for and against the existence of God, the relation between theology and philosophy, the relation between God and the world, paganism, the problem of evil, and the nature of religious language and experience. **Class 3, Credit 3 (offered regularly)**

**PHIL-302****Symbolic Logic**

An introduction to symbolic, or formal, deductive logic and techniques, such as truth tables, truth trees, and formal derivations. The emphasis will be on propositional (or sentential) logic and first-order predicate logic. Required course in the philosophy major unless PHIL-204 has been taken. **Class 3, Credit 3 (F, S, Su)**

**PHIL-303****Philosophy of Art/Aesthetics**

This course introduces students to thinking philosophically about the nature of art and its relation to other human experiences. Among the topics considered are the aesthetic experience, the relation between morality and art, ugliness in art and truth in art. (One philosophy course strongly recommended) **Class 3, Credit 3 (offered regularly)**

**PHIL-304****Philosophy of Law**

An introduction to philosophical analysis centering on the nature, extent and justification of law, the nature of legal thought, and the problems and theories of justice and the relationship between law, ethics and morality. **Class 3, Credit 3 (offered regularly)**

**PHIL-305****Philosophy of Peace**

An introduction to some of the philosophical dimensions of the search for world peace, including the elements that would constitute a just and lasting peace, nations as moral entities, justice and national self-interest, force and violence, the morality of the use of force, peace-making and peace-keeping groups. **Class 3, Credit 3 (offered regularly)**

**PHIL-306****Professional Ethics**

This course critically examines ethical issues that arise in professional life. The course will examine not only the general relationship between ethics and professional life but the particular consequences of ethical considerations within the student's own profession and the professions of others with whom the student must live and work. **Class 3, Credit 3 (offered regularly)**

**PHIL-307****Philosophy of Technology**

Technology is a ubiquitous and defining force in our world. This course investigates how our conceptions of technology have emerged within philosophy, as well as the role technology plays in shaping how we live and how we reflect upon questions of meaning and value in life. Technological modes of understanding, organizing and transforming the world shape our relationships with others, with ourselves and with nature at fundamental levels. We will explore how these modes have emerged and why they emerged so predominantly within a Western social and intellectual context. **Class 3, Credit 3 (offered regularly)**

**PHIL-308****Environmental Philosophy**

A variety of decision procedures may be and have been used to determine what to do regarding various environmental issues. We might make the choice that has the least worst alternatives, or the best alternatives, or is approved by the majority of those who vote or of those who are affected, etc. Each alternative can determine what is reasonable and moral, and assessing them presents theoretical problems. We examine each in terms of morality, examine their pre-suppositions and consequences, determine whether we can assess them, and if so, how. Students begin to learn to be conscious of and assess the decision procedures that are often buried in policy recommendations regarding particular environmental problems. **Class 3, Credit 3 (offered regularly)**

**PHIL-309****Feminist Theory**

This course examines the main currents in contemporary feminist thought. Feminist theory explores the nature and effects of categories of sex and gender upon our ways of living, thinking and doing, while also challenging how gendered assumptions might shape our conceptions of identity and inquiry more generally. Different conceptions of sex and gender will be discussed, and the course will investigate how these concepts affect our lives in both concrete and symbolic ways. Special attention will be paid to how gendered assumptions color our understanding of knowledge production, experiences of embodiment and emotion, public and private activities, and the nature of ethical decision making. **Class 3, Credit 3 (offered regularly)**

**PHIL-310****Theories of Knowledge**

Epistemology, or the theory of knowledge, examines how we come to know what we know. This course covers historical and contemporary approaches to the question of what knowledge is, what makes a belief true, and how beliefs are justified. Philosophical skepticism, the idea that we actually know nothing at all, will also be discussed, as well as possible responses. Other topics may include epistemic relativism, feminist epistemology, naturalism, the internalism/externalism debate, and the application of epistemology to other fields. **Class 3, Credit 3 (offered regularly)**

**PHIL-311****East Asian Philosophy**

This course is an introduction to the origin and development of the philosophical traditions of primarily China and Japan through a consideration of selected thinkers, schools, and classic texts of Daoism, Confucianism, Buddhism, and Zen. Questions of metaphysics, epistemology, and ethics are emphasized with reference to the nature of reality and the person, social harmony and self-realization, causality, right action, and enlightenment. Comparisons may also be made with Western philosophers, both contemporary and classical. **Class 3, Credit 3 (offered regularly)**

**PHIL-312****American Philosophy**

This course examines the contributions of American philosophers from the colonial era to the present day. From the New England Transcendentalists of the 19th century, to the Pragmatism and Neo-Pragmatism of the 20th and 21st, American philosophy has responded to the demands of a pluralistic, ever-changing society. Because American philosophy is a reflection of American culture, it has also offered a unique perspective on perennial philosophical problems in ways that have differed sharply from dominant forms of European philosophy. Authors may include Ralph Waldo Emerson, Henry David Thoreau, Frederick Douglass, Susan B. Anthony, C.S. Peirce, Jane Addams, William James, John Dewey, Richard Rorty, and Cornel West. (one philosophy course strongly recommended) **Class 3, Credit 3 (offered regularly)**

**PHIL-313****Philosophy of Film**

Introduces students to models of film interpretation and critique that arose in pre-war Europe and that have burgeoned since; these models combine philosophical, aesthetic, economic and psychoanalytic methods of analysis. Among the topics considered are the nature of the image, ideology and alienation, trauma, fetishism, magical realism, realism and anti-realism in film. **Class 3, Credit 3 (offered regularly)**

**PHIL-314****Philosophy of Vision and Imaging**

This course examines how philosophers and others have understood the nature and primacy of sight. It explores how technologies of seeing and imaging have influenced theories of sight and our most dominant and authoritative practices of seeing and representing in the humanities and the arts, as well as in the natural and social sciences. The course will focus on the impact these theories and practices of seeing and representing both analogue and digital have on the nature of knowing, as well as on how they shape and mediate our experiences of personal and social identity and agency more generally. **Class 3, Credit 3 (offered regularly)**

**PHIL-401****Great Thinkers**

An examination of the thought of some of those philosophers who have been most influential in the history of ideas. An attempt is made to cover in some depth the works of one or more of these great thinkers. The student will begin to recognize the enduring nature of some of our most pressing problems, as well as the intellectual foundation of proposed solutions. **Class 3, Credit 3 (offered regularly)**

**PHIL-402****Philosophy of Science**

An examination of the nature of the scientific enterprise; possible discussion topics include the presuppositions of science, its logic, its claims to reliability, and its relationships to society and to problems of human values. Completion of one course in philosophy (at the 200 or 300 level) or a major in COS or CHST or PSYC-BS. **Class 3, Credit 3 (offered regularly)**

**PHIL-403****Social and Political Philosophy**

An examination of some of the main problems of social and political philosophy through an analysis, comparison and critical examination of various views concerning the natures of individuality and society and the relations between them. (Completion of one course in any of the following disciplines: PHIL, POLS, SOCI, or CRIM) **Class 3, Credit 3 (offered regularly)**

**PHIL-404****Philosophy of Mind**

The Philosophy of Mind includes issues of metaphysics, epistemology, logic, psychology, aesthetics, linguistics, cognitive science, artificial intelligence, and biology, to name a few. Issues to be investigated include: Is there an ontological difference between minds and bodies? Could there be minds without bodies? Can I know that I have a mind? Are there other minds in the universe? Can I be conscious of my own consciousness? Can other things have the kinds of experiences which I have? (Completion of one course in Philosophy) **Class 3, Credit 3 (offered regularly)**

**PHIL-405****Philosophy of the Social Sciences**

This course examines the methods, foundations, assumptions and purposes of the social sciences. In particular, it will examine the ways in which science and non-science are distinguished as well as the similarities and differences between the social and natural sciences. Special attention will be paid to the ways in which both Anglo-American and European philosophical traditions approach the social sciences. Other topics may include the role of values in social scientific inquiry, the processes of explanation and theory confirmation in the social sciences, and various conceptions of interpretation and meaning in the social sciences. The course will also examine how the tensions between claims of universality and claims of relativism, claims of objectivity and claims of partiality should be understood within the social sciences. (Completion of one prior course in philosophy (at the 200 or 300 level) or a major in CRIM-BS, PSYC-BS, INGS-BS, SOCANT-BS, POLS-BS, ECON-BS, or PUBL-BS) **Class 3, Credit 3 (offered regularly)**

**PHIL-406****Contemporary Philosophy**

This course examines developments in philosophy since 1900. During this time philosophy evolved along with science, politics, and the arts. In some cases philosophy responded to new discoveries and theories while at other times it precipitated movements that had far-reaching effects. A range of philosophical approaches may be discussed, including existentialism, experimental philosophy, feminist theory, hermeneutics, logical positivism, neo-pragmatism, phenomenology, and postmodernism. The connections among different approaches may also be addressed. (Must have completed one 200- or 300-level PHIL course) **Class 3, Credit 3 (offered regularly)**

**PHIL-407****Philosophy of Action**

This course explores the three central philosophical issues of action theory: what is an action, what is an agent, and what is metaphysical freedom. The first part of the course examines the most significant theories of action and the different ways in which they characterize intentional behavior. The second part of this course explores the nature of agency. The third part of this course focuses on the classical problem of free will. (Completion of one course in philosophy is required) **Class 3, Credit 3 (offered regularly)**

**PHIL-408****Critical Social Theory**

Introduces students to models of cultural critique that arose in pre-war Germany and that have burgeoned in our contemporary aesthetic and philosophical practices. These models combine philosophical, aesthetic, economic and psychoanalytic methods of analysis. Among the topics considered are alienation and reification, hegemony or false consciousness, trauma, fetishism, the authoritarian personality and state, advertising and modern technology, and the relative autonomy of art. (Completion of one course in philosophy is required) **Class 3, Credit 3 (offered regularly)**

**PHIL-409****Existentialism**

Existentialism is distinguished by its emphasis on human existence and the way its meaning is created through actions and choices. Existentialism focuses on the concept of individual freedom in an effort to respond authentically to the possibilities which life presents, emphasizing the importance of certain psychological states (e.g., anxiety, anticipation of death, fear, care, responsibility, and hope) and extreme situations in bringing us to an awareness of our radical freedom. This course will consider such philosophers and writers as Dostoevski, Kierkegaard, Nietzsche, Berdyaev, Heidegger, Jaspers, Camus, Sartre, Kafka, Beauvoir, Marcel, Buber, Ortega, and Unamuno. (Completion of one course in philosophy is required) **Class 3, Credit 3 (offered regularly)**

**PHIL-410****Medieval Philosophy**

This course is an introduction to the philosophical thought during the medieval period (approximately 300 C.E. to 1500 C.E.). It will consider the thought of various major figures from the Christian, Jewish, and Islamic traditions, and will take up this period's two principal areas of concern: the philosophy of religion and theology, on the one hand, and metaphysics and epistemology, on the other. (One 200- or 300-level PHIL course, or permission of instructor) **Class 3, Credit 3 (offered regularly)**

**PHIL-411****Metaphysics**

Metaphysics is the study of the general features of existence or reality. This course focuses on the fundamental concepts of being as developed in several major philosophers from the Greeks to the present. Discussion will focus on such topics as God, time, space, substance, essence, existence, process, causality, possibility, necessity, chance, and value. (One 200- or 300-level PHIL course or permission of instructor) **Class 3, Credit 3 (offered regularly)**

**PHIL-412****Nineteenth Century Philosophy**

The nineteenth century marks a radical shift in the history of philosophy and culture and stands in its own right as a distinct period of thought between the modern era and the contemporary era. This course will consider such philosophical positions as idealism, empiricism, existentialistic romanticism, Marxism, evolution, nihilism, positivism, pragmatism, and the role of the arts and aesthetics. Philosophers considered include Schelling, Fichte, Hegel, Schopenhauer, Mill, Marx, Darwin, Kierkegaard, Nietzsche, Comte, Bradley, Green, Peirce, and James. (One 200- or 300-level PHIL course or permission of instructor) **Class 3, Credit 3 (offered regularly)**

**PHIL-413****Philosophy and Literary Theory**

Introduces students to models of literary theory from the mid-twentieth century to the present and familiarizes them with the key works of literature to be analyzed. Prepares students to practice questioning and critiquing texts using the philosophical, aesthetic, economic and psychoanalytic methods of analysis which have come to form the foundation of contemporary literary theory. Among the topics considered are culture and imperialism, performativity, the encounter of modern literature and modern technology, structuralism and semiotics, the role of psychoanalysis, the role of the academy, and the relative autonomy of art. (One course in philosophy or permission of instructor) **Class 3, Credit 3 (offered regularly)**

**PHIL-414****Philosophy of Language**

This course examines how philosophers and others have understood the nature of language. It explores the classical philosophical contexts in metaphysics, epistemology, aesthetics and rhetoric in which concerns about the nature of language arose. In addition, the course focuses on recent debates, within both contemporary analytic and continental traditions of philosophy. Some likely areas of inquiry will be: theories of reference, description and naming; theories of meaning, metaphor and narrative; functionalist, pragmatist and naturalist accounts; structuralist, post-structuralist, and hermeneutic accounts, among others. The prominence of one or the other of these debates and approaches will vary. (One course in philosophy or permission of instructor) **Class 3, Credit 3 (offered regularly)**

**PHIL-415****Ethical Theory**

This course examines the theoretical basis of ethics and morality, namely the theoretical commitments that enter into any judgment that a particular action is right or wrong. Possible topics may include: different ways of understanding the concepts of right and wrong; the existence or non-existence of moral facts; different criteria of moral actions; different conceptions of the good life. Required course in the Philosophy degree program. (PHIL-202 Foundations of Moral Philosophy or 0509-211 Introduction to Ethics, or permission of instructor) **Class 3, Credit 3 (offered regularly)**

**PHIL-416****Seminar in Philosophy**

Examines some area of philosophy at an advanced undergraduate level. The area examined may vary from semester to semester. The seminar is designed especially for those whose interest in philosophy goes beyond the requirements of the liberal arts curriculum. (Completion of two courses in philosophy is required) **Class 3, Credit 3 (offered several times annually)**

**PHIL-449****Special Topics**

A critical examination of issues in some area of philosophy not covered in other philosophy courses. **Class 3, Credit 3 (offered regularly)**

**PHIL-499****Philosophy Co-op**

One semester of work experience in a professional setting related to the philosophy major. (At least third-year standing and departmental approval required.) **Class 0, Credit 0 (varies)**

**PHIL-571****Honors Philosophy**

A critical examination of issues in some area of philosophy, but especially geared for honors students and others who wish to participate in an honors section. **Class 3, Credit 3 (offered occasionally)**

**PHIL-595****Senior Thesis in Philosophy**

This course is required of philosophy majors during their senior year. A student will choose a faculty member to serve as a primary advisor. With the advisor's guidance, a student will research and write a substantial paper on a specific philosophical topic. Students will be encouraged to investigate a particular question in depth, likely building on earlier coursework. The finished thesis will be discussed and examined by a committee including two other faculty members. (PHIL-416 Seminar in Philosophy; senior standing) **Class 3, Credit 3 (offered in consultation with faculty adviser)**

**Political Science****POLS-110****American Politics**

This course examines the basic principles, themes and institutions of American politics. We will approach the study of American politics from four interrelated topics: 1) American political values and constitutional foundations; 2) mass politics and political socialization; 3) political institutions; and 4) public policy. Current events will be discussed throughout the course in an effort to promote responsible citizenship. In addition to providing a basic overview of American politics, this course seeks to develop critical thinking, group dynamic and communication skills that are transferrable outside the classroom. **Class 3, Credit 3 (offered every semester)**

**POLS-120****Introduction to International Relations**

The purpose of this course is to provide basic knowledge of the field of international relations. Among the topics to be addressed are key theoretical concepts, themes and controversies in the field such as: important state and non-state actors in international politics, security, economic relations between states, levels of analysis, and schools of thought. **Class 3, Credit 3 (offered every semester)**

**POLS-200****Law and Society**

This course provides students with a fundamental literacy about law as an immensely and ubiquitous presence in society. It focuses on the relationships between law and other social institutions, and examines the values and interests that are expressed in law and shaped by legal structures and processes. Consensus and conflict perspectives on the law are compared and contrasted, and applied to understanding the law's impact on everyday life. This course takes an explicit interdisciplinary approach to understanding law. This course is offered for those interested in critical inquiry of law within a framework of a broad liberal arts education. **Class 3, Credit 3 (F)**

**POLS-210****Comparative Politics**

The course provides a mode of analysis for the study of political systems. Basic concepts of political science are utilized to present a descriptive and analytical examination of various political systems that can be classified as liberal democracies, post-communist, newly industrializing countries, and Third World. Particular attention is paid to the governmental structure, current leadership and major issues of public policy of those selected political systems under review. **Class 3, Credit 3, (S)**

**POLS-220****Global Political Economy**

Examines the interplay between states and markets, and the interaction of the global economy and international politics. The course will cover political economy, political ideology, global trade, international capital investment, debt, the integration of national financial markets, and the impact of globalization on the human condition and the environment. (POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-250****State and Local Politics**

This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. The course's major objective is to give the student a sophisticated understanding of these aspects of the political process. The first focus is on the federal system of government, including the interdependence of the three levels. The course continues by examining the state level followed by a focus on local government. A final topic is policy-making, including revenues and expenditures, which again illustrate the interrelationship of the three levels. (POLS-110 American Politics or equivalent) **Class 3, Credit 3 (F)**

**POLS-290****Politics and the Life Sciences**

This course examines the intersection between politics and the life sciences. The course will examine the biological approach to human behavior, paying special attention to the implications of biological explanations of behavior for political systems. Topics to be covered may include the biological approach to morality, law, and international conflict, as well as the political and policy implications of new research in the biological sciences including biotechnology. (POLS-110 American Politics, POLS-120 Intro to International Relations, or equivalent) **Class 3, Credit 3 (F)**

**POLS-295****Cyberpolitics**

Innovations in digital communication technologies have the potential to affect many aspects of politics and government. Beyond specific elements such as elections and delivery of government services, these developments have the potential to expand and redefine the nature of political participation and civic engagement, and to alter the structure of political power. This course examines the potential and promise of digital democracy, and attempts to separate hype from a realistic examination of actual impacts. (POLS-110 American Politics, POLS-120 Intro to International Relations, or equivalent) **Class 3, Credit 3 (S)**

**POLS-305****Political Parties and Voting**

Political parties are a crucial part of the democratic process, as are elections. Parties and elections serve as a critical link between citizens and their government, as parties and candidates promote policies favored by voters. This course studies parties, their history, their future and their role in the democratic process. Overall emphasis is on the degree to which parties perform or fail to perform as a link between citizens and government. (POLS-110 American Politics, POLS-120 Intro to International Relations, or equivalent) **Class 3, Credit 3 (F)**

**POLS-310****The Congress**

This course examines the role of the legislature in the U.S. political process. Topics studied include elections, party organization, committees, interest-group activities and executive-legislative relations. (POLS-110 American Politics, POLS-120 Intro to International Relations, or equivalent) **Class 3, Credit 3 (offered every two years) (F)**

**POLS-315****The Presidency**

A study of the role of the presidency in the American political system. Among the topics considered are the nomination and election process, evolution, expansion and limitation of presidential powers, factors in decision-making and the various leadership functions performed by the American presidency. Part of the American politics concentration and minor; the political science minor; and may also be taken as an elective. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-320****American Foreign Policy**

A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures, and philosophies shaping the development of foreign policy. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-325****International Law and Organizations**

The study of international law and organizations is the study of international cooperation and governance. The course will cover a variety of theoretical and substantive topics including the theories of international law and organizations, the historical development of international organizations, how these organizations work in practice, and whether they are effective. Emphasis will be placed on the United Nations and the role and usefulness of nongovernmental organizations in international organization. Several of the substantive issues discussed are interstate violence and attempts to address humanitarian concerns, globalizations, and the environment. (POLS-110 American Politics, POLS-120 Intro to International Relations, or equivalent) **Class 3, Credit 3 (F)**

**POLS-330****Human Rights in Global Perspective**

This course explores the theoretical meaning, both domestically and internationally, and the institutional and political aspects of human rights. Issues covered include the definition of human rights; the relationship between civil and political rights and economic, social and cultural rights; the meaning and impact of humanitarian and international human rights law; the impact of cultural relativism in the definition and assessment of the promotion and protection of human rights; the significance of different religious perspectives; the question of the legitimacy of humanitarian interventions and the effects of globalization on human rights perceptions and practices. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-335****Politics in Developing Countries**

This course uses comparative theoretical perspectives to explore the ways in which the historical, cultural, economic and political context of the societies of Africa, Asia and Latin America determines the patterns of their political processes. Focus is directed to such factors as history, religion, economic underdevelopment, and culture and their impact on the efforts to promote the values of liberalization and democratization, economic and social modernization and political and social stability. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3(F)**

**POLS-345****Politics and Public Policy**

A study of the politics of the policy process covering these basic questions: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government implement public policy? How does government evaluate public policy? (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-350****Politics of East Asia**

This course examines the East-Asian countries using the following comparative criteria as the organizing guidelines: modern political history of the country, political economy and development, governance and policy making, representation and participation, major domestic and foreign policy issues. Prospect of the countries in the 21st century are analyzed and discussed. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-355****Political Leadership**

The most fundamental proposition of this course is that political leadership makes a crucial difference in the life of a nation. It will examine how leadership may serve as either a constructive or destructive force in the pursuit of some shared national goal or purpose. The course will consider a diverse range of leaders and their respective styles and types of leadership. What are the common traits, if any, of political leadership? Each leader will be studied in terms of his or her historical context, the means and ends each employed in the pursuit of political goals, and the particular qualities both virtues and vices each embodied as a political leader. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-410****Evolutionary International Relations**

This course examines the biological explanations of international conflict. Topics will include the evolutionary approach to human behavior, international conflict, and the relevance for evolutionary explanations as an alternative or supplement to current paradigms of international relations like realism and rational choice. Finally, the course will look at what an evolutionary understanding of politics means for peace-keeping missions, global governance, and the stability of international cooperation. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-415****Evolution and the Law**

This course examines the evolutionary approach to law. The course will consider the relevance of evolutionary theory to the analysis of law, the roots of rule of law, the relationship between natural law and common law, as well as the strengths and limitations of the evolutionary approach to specific themes within law, such as property law and family law. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-420****Primate Politics**

This course examines the biological approach to the study of political order. Students will learn about the basic political structures of the great apes, how they differ, and how an understanding of these primate social structures can help us understand human political behavior. Specific topics might include the biological explanations of patriarchy and matriarchy, the biology of dominance structures, and the biology of leadership choice. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-425****Constitutional Law**

A study of the Constitution of 1787 and the manner in which it was written. The focus of the course is on the way the people have, through the Constitution, delegated powers and responsibilities of government to the Congress, the president, the courts and the States. Selected Supreme Court opinions will be considered to shed light on how the Constitution has been read and how thoughtful citizens might read it. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-430****Constitutional Rights and Liberties**

This course provides an introduction to the Supreme Court's legal and political reasoning on civil rights and liberties—that is, the fundamental individual rights of a free society contained in the Bill of Rights. Particular emphasis will be placed on the First Amendment as the cornerstone of a free society guaranteeing religious liberty and the right to free speech. The course will also examine how the Court has balanced constitutional rights and liberties in the First, Fourth, Fifth and Sixth Amendments against the need for enhanced national security. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**



**POLS-435 American Political Thought**  
Provides a general overview of the political ideas, concepts, issues and principles which taken together compose the stream of American political thought. Examines major controversies, which have marked the developing body of the literature by examining the contributions of major political thinkers. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-440 War and the State**  
Explores the enduring reality of war through an analysis of regional and global conflicts since the establishment of the modern international system. Key concepts include deterrence, appeasement, offensive-defensive military strategies, and international balances of power. These will be applied to several historical cases to explain why wars occur and how they might be avoided. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-445 Terrorism and Political Violence**  
This course examines the causes, methods, and responses of non-state groups attempting to establish new political orders. The combined use of violence with the tactic of terror distinguishes these groups from others seeking political change. Special attention will be given to national and international efforts attempting to resolve such conflicts. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (offered annually)**

**POLS-455 Comparative Public Policy**  
As modernization theorists predict, industrial and post-industrial societies tend to face similar public policy issues in such areas as public education, health care, public transportation, public housing and the environment. However, the political responses to these challenges have varied in significant ways in different countries. Many states have developed extensive welfare state systems, while some have put more emphasis on market-based solutions. The course seeks to explore and analyze the factors that explain these differences and assess the extent to which the different approaches succeed in meeting these policy challenges. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-460 Classical Constitutionalism, Virtue and Law**  
This course will examine the classical quest for personal and political order. It will concentrate on the foundations of classical political science and its search for the best regime. The course will also examine the classical understanding of constitutionalism, or the regime as the form for encouraging virtue through the rule of law, in contrast to the modern view that attempts to combine liberty and property. Along the way, the enduring questions of cosmology, human nature, justice and the good will be examined. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (F)**

**POLS-465 Modern Constitutionalism, Liberty and Equality**  
This course examines the founding principles of modern constitutionalism and the modern state. Special attention will be paid to the theory and practice of the principles of equality, liberty, and consent. A major effort throughout the course will be made to consider the assessments and prescriptions for modern constitutionalism offered by American and continental political thinkers. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-481 Women in Politics**  
A study of feminist thought as it applies to the political, economic and social status of women and how it has been expressed through the women's political movement. Students study a number of public policies as they apply to and affect women and examine the opportunities for women to participate in the political process. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-485 Politics Through Fiction**  
This course explores contemporary issues facing the American and global political order through the lens of fiction. Particular attention will be paid to the grounds of sound political deliberation, the limitations of prudence and the theory and practice of American political principles both home and abroad. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-490 Politics Through Film**  
This course explores the enduring issues facing the American and global political order through the lens of film. Particular attention will be paid to the principles of sound political deliberation, the limitations of political leadership and the theory and practice of American political principles both at home and abroad. This course emphasizes the practice of writing. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (S)**

**POLS-515 Experiential Learning: Political Science**  
The purpose of the Experiential Learning: Political Science option is to give students first hand experience in an appropriate organization or study abroad program that meets the needs of the student's career objectives. Students are closely supervised at the host organization, developing their pre-professional skills while learning the organizations programs, agenda and methods. Part of the political science degree. (Restricted to political science majors with junior status) **Credit 0 (offered as needed)**

**POLS-525 Special Topics in Political Science**  
Special topics will examine a political theme, issue or problem at an advanced undergraduate level. The subject matter examined will vary from year to year according to the availability of faculty and the interests of students. The course is designed especially for those whose interest in politics goes beyond the requirements of the liberal arts curriculum. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent) **Class 3, Credit 3 (offered occasionally)**

**POLS-530 Political Science Capstone**  
In-depth study of any theme, problem or work within the discipline of political science, for example the foundations of self-government, foreign policy, international law and organizations, and the fundamental problems of international relations. Course content will be determined in consultation with the instructor. Teams of students will write a substantial paper on a topic related to the general themes of the seminar. Students will also present their findings electronically by way of a Web site or wiki. (Restricted to students with senior status.) (POLS-110 American Politics, POLS-120 Intro to International Relations, POLS-290 Politics and the Life Sciences, POLS-295 Cyberpolitics, or equivalent) **Class 3, Credit 3 (F)**

**POLS-599 Independent Study**  
A student may register for an independent study project subject to the approval of the faculty sponsor, student's department, the academic committee of the college of liberal arts and the dean of the college of liberal arts and providing that she or he has a minimum GPA of 2.7 at time of application. An independent study project is not a substitute for a course. It enables the interested student and his or her faculty sponsor to coordinate their efforts on subjects and topics that range beyond the normal sequence of course selection. (POLS-110 American Politics, POLS-120 Intro to International Relations or equivalent; GPA 2.7) **Class 3, Credit variable (offered occasionally)**

## Psychology

**PSYC-101 Introduction to Psychology**  
Introduction to the field of psychology. Provides a survey of basic concepts, theories, and research methods. Topics include: thinking critically with psychological science; neuroscience and behavior; sensation and perception; learning; memory; thinking, language, and intelligence; motivation and emotion; personality; psychological disorders and therapy; and social psychology. Required course for psychology majors. **Class 3, Credit 3 (F, S, Su)**

**PSYC-111 Honors Introduction to Psychology**  
A state-of-the-art survey of major subfields in psychology and the scientific study of behavior and mental processes. Topics include: a critical evaluation of psychological science; neuroscience and behavior; sensation and perception; learning; memory; thinking, language, and intelligence; motivation and emotion; personality; psychological disorders and therapy; and social psychology. Besides textbook reading, students will read and discuss current publications on the topics we explore. **Class 3, Credit 3 (F, S)**

**PSYC-221 Abnormal Psychology**  
This course will serve as an introduction to the study of psychopathology and mental illness. The course examines the major categories of mental disorder not only from the descriptive point of view, but also in terms of the major theoretical explanations of the causes of disorder. The major treatment modalities also are covered. This is a required course for psychology majors in the clinical track. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S)**

**PSYC-222** **Biopsychology**  
Introduction to the field of behavioral neuroscience, the study of neurobiological basis of cognition and behavior. Topics include neuroanatomy and physiology, localization of function, brain injury, research methods in behavioral neuroscience, and biological basis of language, memory, emotion, conscious states, and sexual behavior, with an evolutionary perspective. This is a required course for psychology majors in the biopsychology track. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S)**

**PSYC-223** **Cognitive Psychology**  
This course examines how people perceive, learn, represent, remember and use information. Contemporary theory and research are surveyed in such areas as attention, pattern and object recognition, memory, knowledge representation, language acquisition and use, reasoning, decision making, problem solving, creativity, and intelligence. Applications in artificial intelligence and human/technology interaction may also be considered. This is a required course for psychology majors in the cognitive track. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S)**

**PSYC-224** **Perception**  
This course covers perception in all of the sensory modalities (vision, hearing, taste, smell, touch). We will trace what happens to the physical stimulus as our sensory systems analyze it to produce complicated perceptions of the world around us. We will explore the fact that many complex perceptual phenomena draw upon explanations at the physiological, psychological, and cognitive levels. Topics on sensory perception in non-human animals may also be covered. This is a required course for psychology majors in the visual perception track. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S)**

**PSYC-225** **Social Psychology**  
This course explores topics related to behaviors and mental processes of individuals in social situations. Topics include: methodology, social perception, social cognition, the self, attitudes, prejudice, attraction, social influence, pro-social behavior, aggression, and behavior in groups. Course activities include lecture, class demonstrations, and assignments. The flavor of the course is experiential and applications-oriented. This is a required course for psychology majors in the social track. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S)**

**PSYC-231** **Death and Dying**  
This course examines the role of loss including death in our lives and the way we give and receive support during difficult times. It also looks at how society enfranchises some grievers and disenfranchises others. Included in this course is an examination of our options as consumers of funeral and burial services, grief counseling and other products and services which can either minimize or abate our grief. Central to the course is an examination of the ethical principles which apply to abortion, euthanasia and suicide and an examination of the ways in which the choices we make may be structured to express our core values. Finally, the course explores how the American way of death differs from that of other societies and how we might incorporate the wisdom of other cultures into our own practices. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-232** **Developmental Psychology**  
This course explores the process of human development, from conception through adolescence and continuing through later adulthood. The developmental approach integrates across many areas of psychology, including perception, cognition, social and emotional development, personality, morality, human factors, and neuroscience. Topics will include such things as infant brain plasticity, the development of identity in adolescence, and memory changes in adulthood. In addition, experimental methods of developmental research will be introduced and practiced, including issues specific to studying children and adults. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-233** **History and Systems in Psychology**  
This course explores the history of psychology from ancient to modern times and examines topical and philosophical questions that have persisted. Psychological schools of thought to be covered include pre-modern philosophical influences, structuralism, functionalism, behaviorism, psychoanalysis, humanistic psychology, cognitive psychology, psychological testing, and positive psychology. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-234** **Industrial and Organizational Psychology**  
Industrial and organizational (I/O) psychology is a branch of applied psychology that is concerned with efficient management of an industrial labor force and especially with problems encountered by workers in a mechanized environment. Specific areas include job analysis, defining and measuring job performance, performance appraisal, tests, employment interviews, employee selection and training, and human factors. This course covers the basic principles of the above areas as well as applications of current research in I/O psychology. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-235** **Learning and Behavior**  
This course covers topics in learning such as non-associative learning, classical conditioning, instrumental conditioning, stimulus control of behavior, reinforcement, generalization and discrimination, and observational learning. Topics on learning and behavior in non-human animals may also be covered. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-236** **Personality**  
This course is intended for students who are interested in learning the history and current status of personality theories. Students will learn the strengths and weaknesses of the major personality theories, as well as how to assess, research and apply these theories. As much as possible, application to real life situations will be discussed. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-237** **Psychology of Gender**  
The purpose of this course is to examine the psychology and lives of girls and women. In addition to the influence of culture, biological and genetic differences will be highlighted for each of the different topics. The topics covered include gender stereo-types, the development of gender roles, gender comparisons, love relationships, sexuality, motherhood and violence against women. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-238** **Psychology of Religion**  
This course examines (primarily social) psychological approaches to religious and spiritual belief, behavior, and experience. Topics include psychological approaches to religion, religious development in children and adolescents, religious development in adults and old age, religious conversion, religious orientation, religious attitudes and behaviors, religion and well-being, group dynamics in religious communities, religion as a "total institution," cults and deprogramming, need theories and religion, and religion and politics. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-239** **Positive Psychology**  
This course will provide a survey of the emerging field of positive psychology. Topics covered will include defining and assessing "the good life"; the relationships between life satisfaction and personal factors such as wealth, education, and longevity; cross-cultural perspectives; virtues and strengths; and biological factors (i.e., genetics and neurological correlates). The focus will be on contemporary empirical psychology literature, though the course will also draw on literature from historical, philosophical, and economic disciplines. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S, Su)**

**PSYC-250** **Research Methods I**  
This course will serve as an introduction to research methods in psychology, with the goal of understanding research design, analysis and writing. Topics include examining the variety of methods used in psychology research, understanding research ethics, developing empirical hypotheses, designing experiments, understanding statistical concepts, interpreting results, and writing research and review papers in APA style. This is a required course for all psychology majors, and is restricted to students in the psychology major. This course is offered in sequence with PSYC-251. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F)**

**PSYC-251** **Research Methods II**  
This course will serve as an advanced research methods course in psychology, and will build on the foundational knowledge presented in Research Methods I. Topics and tasks for this course include designing single and multi-factor experiments, interpreting correlational research, completing statistical analyses appropriate to design, completing and analyzing an IRB application, understanding observational and survey research, and presenting results in APA style. This is a required course for all psychology majors, and is restricted to students in the psychology major. This course is offered in sequence with PSYC-250 Research Methods I. (PSYC-250 Research Methods I) **Class 3, Credit 3 (S)**

**PSYC-310****Psychophysiology**

This course is intended for students in the biopsychology track. This course provides a comprehensive introduction to psycho-physiology. Students will learn about various psychophysiological measures and their use in the study of areas such as attention, emotion, and language. Topics may include mind-body interaction, somatic and autonomic nervous system function, central and peripheral physiological measures (e.g., EEG, EMG, cardiac reactivity, skin conductance responses), psychophysiological research methods, and applied psychophysiology. Students will be expected to be able to write at an upper level using APA format. Part of the biopsychology track for the psychology major. (PSYC-222 Biopsychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-311****Psychopharmacology**

This course is intended for students in the biopsychology track. A comprehensive introduction to psychoactive drugs. Topics include pharmacokinetics, pharmacodynamics, synaptic transmission, drugs of abuse and drugs used in the treatment of mental disorders, and the behavioral and cognitive effects of these drugs. Students will be expected to be able to write at an upper level using APA format. Part of the biopsychology track for the psychology major. (PSYC-222 Biopsychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-312****Biological Bases of Mental Disorders**

This course is intended for students in the biopsychology track. This course covers the biological underpinnings of psychiatric mental disorders such as anxiety disorders, mood disorders, psychotic disorders, and developmental disorders. Topics will include neuroanatomy, neurophysiology, genetics and biologically based treatments of mental disorders. Students will learn about biologically based research methods used to study mental disorders and to think critically about research findings in the field. Students will be expected to be able to write at an upper level using APA format. Part of the biopsychology track for the psychology major. (PSYC-222 Biopsychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-320****Clinical Psychology**

This course is intended for students in the clinical track. This course is designed to provide a broad overview of the field of clinical psychology, including the way in which it is similar to and different from other mental health disciplines (psychiatry, social work, school psychology). The course will cover the basic foundations of clinical psychology, training models and graduate programs, clinical assessment, clinical interventions, and subspecialties in clinical psychology (e.g., neuropsychology, child clinical). Part of the clinical track for the psychology major. (PSYC-221 Abnormal Psychology and PSYC-250 Research Methods I) **Class 3, Credit 3 (F or S)**

**PSYC-321****Psychological Testing**

This course is intended for students in the clinical track. This course is intended for students in the psychology major to develop knowledge of psychological testing theory, methods, and applications. Students will first learn about the history of psychological testing, types of tests, and uses of tests. Students will learn about test development and standardization procedures including item construction, sampling, norms, reliability, validity, administration procedures, and scoring. A brief review of relevant statistical concepts will be provided. Students will learn how to locate and evaluate available psychological tests. Examples of psychological tests from various areas of application will be reviewed and critiqued. Part of the clinical track for the psychology major. (PSYC-221 Abnormal Psychology and PSYC-250 Research Methods I) **Class 3, Credit 3 (F or S)**

**PSYC-322****Psychotherapy**

This course is intended for students in the clinical track. Students will learn the strengths and weaknesses of the major therapeutic approaches. They will learn the efficacy of these approaches. They will learn the theoretical and research bases for the approaches. As much as possible, application to real life situations will be discussed. Part of the clinical track for the psychology major. (PSYC-221 Abnormal Psychology and PSYC-250 Research Methods I) **Class 3, Credit 3 (F or S)**

**PSYC-330****Memory and Attention**

This course is intended for students in the cognitive track. This course reviews current research in the areas of memory and attention. This course will consider such memory topics as: classic theories of memory, Baddeley's model of working memory, information processing, implicit and explicit memory, principles of forgetting, developmental changes in memory, skill memory, autobiographical memory, eyewitness memory, and the neural bases of memory. Attention topics covered in this course will include: selective and divided attention, search and vigilance, signal detection theory, and neural correlates of attention. Part of the cognitive track for the psychology major. (PSYC-223 Cognitive Psychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-331****Language and Thought**

This course is intended for students in the cognitive track. This course examines the structure of human language and its relationship to thought, and surveys contemporary theory and research on the comprehension and production of spoken and written language. In addition, we will discuss categorization, representation of knowledge, expertise, consciousness, intelligence, and artificial intelligence. Topics on language and thought in non-human animals may also be covered. Part of the cognitive track for the psychology major. (PSYC-223 Cognitive Psychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-332****Decision Making, Judgment, and Problem Solving**

This course is intended for students in the cognitive track. This course explores judgment, decision-making and problem-solving processes and focuses on the social and cognitive aspects of complex information processing. Major topics include normative, descriptive (heuristics and biases), and naturalistic approaches to decision-making, as well as selective perception, memory and hindsight biases, framing effects, social influences, group processes and human error. Models of decision-making considered include the prospect theory, expected utility theory, and Bayes' Theorem. Problem solving will be examined from perspectives of formal, computational methods as well as intuition and creativity. Experimental methods and applications in design of systems and decision aids will receive special attention. Part of the cognitive track for the psychology major. (PSYC-223 Cognitive Psychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-340****Interpersonal Relationships**

This course is intended for students in the social track. This course explores topics related to interpersonal relationships including: methodology, communication in relationships, romantic relationships, friendships, work relationships, as well as individual differences that can influence the development, maintenance, and cessation of relationships. Course activities include lecture, class discussions, and assignments. Part of the social track for the psychology major. (PSYC-225 Social Psychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-341****Group Processes**

This course is intended for students in the social track. This course explores social psychological phenomena at the level of the group. It explores intra-group processes such as cohesion, norms, network structure, social influence, task productivity, group decision making and polarization. It also explores intergroup processes, especially those related to intergroup conflict and cooperation, such as social categorization, social identity, and stereotyping. Part of the social track for the psychology major. (PSYC-225 Social Psychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-342****Attitudes and Social Cognition**

This course is intended for students in the social track. This course explores social psychological phenomena at the level of the individual. This course addresses those domains of social behavior in which cognition plays a major role, including the interface of cognition with overt behavior, affect, and motivation. Among topics covered are the formation, change, and utilization of attitudes, attributions, and stereotypes, person memory, self-regulation, and the origins and consequences of moods and emotions insofar as these interact with cognition. This course also explores the influence of cognition on significant social phenomena such as persuasion, communication, prejudice, social development, and cultural trends. Part of the social track for the psychology major. (PSYC-225 Social Psychology and PSYC-251 Research Methods II) **Class 3, Credit 3 (F or S)**

**PSYC-350****Visual System and Psychophysics**

This course is intended for students in the visual perception track. The course focuses on visual perception and the methods used for studying sensation and perception. Structures in the human and other visual systems will be examined along with neurophysiology relevant to vision in particular and perception in general. Classical psychophysics, forced choice methods, staircases and other specialized techniques will be examined. Students will collect and analyze psychophysical data to demonstrate their understanding of the methods and their application in vision science. Part of the visual perception track for the psychology major. (PSYC-224 Perception and PSYC-250 Research Methods I) **Class 3, Credit 3 (F or S)**

**PSYC-351****Color Form and Object Perception**

This course is intended for students in the visual perception track. The course focuses on the perception of the surface properties of objects, including color, form and other attributes. The course will examine how information is encoded by the visual system, with an emphasis on recognizing objects in scenes and surfaces. Receptive field properties, parallel processing in vision, the binding problem and other issues in vision science will be presented and discussed. The course requires students to read primary sources and to gain some experience with the design of experiments. Empirical research in vision will be conducted including data collection and analysis. Students are recommended to take PSYC-350 Visual System and Psychophysics before this course, but it is not required. Part of the visual perception track for the psychology major. (PSYC-224 Perception and PSYC-250 Research Methods I) **Class 3, Credit 3 (F or S)**

**PSYC-352****Depth, Motion and Space Perception**

This course is intended for students in the visual perception track. The course focuses on the perception of the three-dimensional space, including the perception of depth and motion. This course will examine how sensory data are used to produce an accurate representation of the world. This course will include some discussion of multimodal perception given the interactions that occur between audition, touch, and vision to produce a 3D representation. Topics will include receptive field properties in relevant areas of cortex, parallel processing in vision, the uncertainty of extracting accurate 3D properties from 2D input and related material. The course requires students to read primary sources and to gain some experience with the design of experiments. Empirical research in vision will be conducted including data collection and analysis. Students are recommended to take PSYC-350 Visual System and Psychophysics before this course, but it is not required. Part of the visual perception track for the psychology major. (PSYC-224 Perception and PSYC-250 Research Methods I) **Class 3, Credit 3 (F or S)**

**PSYC-401****Research Methods III**

This course is intended for students in the psychology major to develop experimental research expertise and put into practice some of what is learned in Research Methods I and II. Students will explore topics of interest for further research in psychology. They will develop one research idea that could either form the basis for a senior project in psychology or is a valid test of a research idea. Students will be supervised by the course instructor as they develop a research question, conduct a literature review, write the introduction, and examine questions about control, validity and reliability. This course will culminate in a research proposal. Students going on to Senior Project in Psychology can use this as a proposal course and must find their faculty adviser for senior project before they finish this course. Students who are not planning for Senior Project will practice writing a proposal and the related skills required to critically examine an advanced topic in psychology. This course is restricted to students in the psychology major. (PSYC-251 Research Methods II and any 300 level psychology course) **Class 3, Credit 3 (F, S)**

**PSYC-444****Honors Special Topics: Psychology**

Focuses on contemporary issues and topics not covered in depth in other psychology courses. Concentrates on student discussion of primary source readings on topics such as persuasion, stereotypes, evolutionary psychology, forensic psychology, cognition, perception, clinical techniques, the neuron, drugs and behavior, rumor psychology, intelligence, sexuality, morality, or health psychology. May also be taken as an elective. (PSYC-101 Introduction to Psychology) **Class 3, Credit 3 (F, S)**

**PSYC-499****Psychology Co-op****PSYC-502****Seminar in Psychology**

This course is intended for students in the psychology major to integrate material covered in earlier courses and examine broad topics in psychology. The specific topics covered will vary from semester to semester. This course is an opportunity for faculty and students to examine issues that transcend sub-disciplines in psychology. Students will read original research and examine influential theories relevant to the topic. (PSYC-251 Research Methods II and any 300-level psychology course) **Class 3, Credit 3 (F, S)**

**PSYC-510****Senior Project in Psychology**

This course is intended for students in the psychology major to demonstrate experimental research expertise, while being guided by faculty advisers. The topic to be studied is up to the student, who must find a faculty adviser before signing up for the course. Students will be supervised by the adviser as they conduct their literature review, develop the research question or hypothesis, develop the study methodology and materials, construct all necessary IRB materials, run subjects, and analyze the results of their study. This course will culminate in an APA style paper and poster presentation reporting the results of the research. Because Senior Project is the culmination of a student's scientific research learning experience in the psychology major, it is expected that the project will be somewhat novel, will extend the theoretical understanding of their previous work (or of the previous work of another researcher), and go well beyond any similar projects that they might have done in any of their previous courses. This course is restricted to students in the psychology major. (PSYC-401 Research Methods III and permission of instructor.) **Class 3, Credit 3 (F, S)**

**Public Policy****PUBL-101****Foundations of Public Policy**

This interdisciplinary course introduces the student to the concept of public policy, the policymaking process, the role of stakeholders and interest groups, and the basic dimensions of quantitative and qualitative policy analysis. A range of public policy issues, such as environmental policy, science and technology policy, health policy, and information and communications policy will be explored at local, state, federal and international levels. **Class 3, Credit 3 (F)**

**PUBL-120****Contemporary Issues in Public Policy**

This course provides students the understanding of the concepts of public policy formation and implementation, and the role of citizens, other stakeholders, and interest groups. Students will engage in analysis of a wide array of contemporary socio-economic issues, through structured writing assignments and class presentations. The course content is structured to provide students with the skills to increase their writing proficiency, and the opportunities to publicly communicate and defend their ideas. **Class 3, Credit 3 (F)**

**PUBL-201****Values and Public Policy**

This course focuses on the connections and interplay between personal and social values and public policy. It explores how values and norms influence public policies and how the resulting expressions of values within public policy impact the implementation and effectiveness of policy choices. It explores how different countries make widely different policy choices based on their values. The course also considers how new developments in science and technology influence the interplay between values and policy across multiple issues. In addition, this course explores how to formulate values-based explanations of certain public policy preferences. Topics range across the policy issue spectrum. **Class 3, Credit 3 (F)**

**PUBL-210****Introduction to Qualitative Policy Analysis**

This is a course in the practical aspects of doing theoretically informed qualitative social research with policy applications. Special attention will be given to the processes by which research problems are formulated, research designs selected, data gathered and interpreted, and inferences and conclusions drawn. Special attention will be paid to survey techniques and content analysis. Through example, illustration, and application, specific research skills will be simulated using case studies. **Class 3, Credit 3 (S)**

**PUBL-301****Public Policy Analysis**

This course provides students with necessary tools to help them become effective policy analysts. The course places particular emphasis on understanding the policy process, the different approaches to policy analysis, and the application of quantitative methods for evaluating public policies. Students will apply these tools to contemporary public policy decision making at the local, state, federal, and international levels. (PUBL-101 Foundations of Public Policy) **Class 3, Credit 3 (F)**

**PUBL-302****Decision Analysis**

This course provides students with an introduction to decision science and analysis. The course focuses on several important tools for making good decisions, including decision trees, cost-benefit analysis, risk analysis, and multi-attribute decision making. Students will apply these tools to contemporary public policy decision making at the local, state, federal, and international levels. (PUBL-101 Foundations of Public Policy) **Class 3, Credit 3 (S)**

**PUBL-489****Special Topics**

Allows examination of a special problem or topical area in the field of public policy. Topics and specific content and methods vary from year to year or semester to semester. **Class 3, Credit 3 (F, S)**

**PUBL-499****Public Policy Co-op**

One semester of paid work experience in a professional setting related to the public policy major. (At least third-year and department approval required.) **Class 0, Credit 0 (F, S, Su)**

**PUBL-500****Senior Project**

This project-based course represents the culminating educational experience for public policy degree students. In the course, students work to identify and analyze a real-world policy-related problem at the local, state, federal, or international level. Typically, projects are informed by, and delivered to, outside stakeholders or clients who work with the students to help formulate, structure, and/or carry out the project. Students work in a teaming environment under the guidance of a faculty advisor. Under special circumstances students may work individually with the approval of the instructor. **Class 3, Credit 3 (F, S)**

**PUBL-510****Technological Innovation and Public Policy**

Technological innovation, the incremental and revolutionary improvements in technology, has been a major driver in economic, social, military, and political change. This course will introduce generic models of innovation that span multiple sectors including: energy, environment, health, and bio- and information-technologies. The course also analyzes how governments choose policies to spur and shape innovation. Students will be introduced to a global perspective on innovation policy including technology transfer and appropriate technology. **Class 3, Credit 3 (S)**

**PUBL-520****Information and Communications Policy**

This course examines how federal and international policies are developed to influence innovation in, and regulation of, information, computer, and communications technologies. In particular the course will examine such topics as privacy, freedom of speech, cybersecurity, copyrights and intellectual property rights, access to information technology, and regulation of the Internet. **Class 3, Credit 3 (F)**

**PUBL-530****Energy Policy**

This course provides an overview of energy resources, technologies, and policies designed to ensure clean, stable supplies of energy for the future. The course evaluates the impacts of fossil fuel, renewable energy, and hydrogen technologies on society and how public policies can be used to influence their development. The development of U.S. energy policy is of particular concern, although a global perspective will be integrated throughout the course. **Course 3, Credit 3 (S)**

## Science, Technology and Society

**STSO-120****Introduction to Environmental Studies**

This course explores the human condition within an environmental context by emphasizing critical environmental problems facing humans on both a global and regional scale. The approach will be interdisciplinary. The issues, their causes, and their potential solutions will be analyzed with respect to ethical, social, historical, political, scientific, and technological factors. **Class 3, Credit 3 (F, S, Su)**

**STSO-140****Science, Technology and Values**

This course explores the concepts and effects of science and technology on society, analyzes the relationship between science and technology, examines how each has come to play a major role today, and looks at how science and technology have affected and been affected by our values. This course also considers the environmental aspects of science and technology. Science and technology are often assumed to be value free, yet people, guided by individual and societal values, develop the science and technology. In turn, the choices people make among the opportunities provided by science and technology are guided by their individual values. **Class 3, Credit 3 (F, S)**

**STSO-201****Science and Technology Policy**

Examines how local, state, federal and international policies are developed to influence innovation, the transfer of technology and industrial productivity in the United States and other selected nations. **Class 3, Credit 3 (F, S)**

**STSO-220****Environment and Society**

This course introduces the interdisciplinary foundations of environmental science via an analysis of sustainability within a socio-cultural context. This is a required course for the environmental science major. **Class 3, Credit 3 (F)**

**STSO-240****Social Consequences of Technology**

Modern society is increasingly based on technology. With each advance due to technology, unanticipated problems are also introduced. Society must define and solve these problems or the advances may be diluted or lost. In this course we study several interactions between technology and the world in which we live. We investigate how various technologies developed and compare the expected effects of the new technologies with the actual results. **Class 3, Credit 3 (F, S)**

**STSO-245****History of Women in Science and Engineering**

Using biographical and social-historical approaches, this course examines the history of women's involvement in science and engineering since the birth of modern science in the seventeenth century; the historical roots of gender bias in the Western scientific enterprise; and the influx of women into science and engineering since the mid-to-late twentieth century. Cross-listed with women's and gender studies. **Class 3, Credit 3 (S)**

**STSO-321****Face of the Land**

Based on field trips and critical readings, this course explores how the land around us has been shaped and reshaped through a variety of geological forces and historical developments. By considering the natural landforms of the United States (and other countries, as appropriate), students see how the nature of land has determined its value. As technological innovations occur, old relationships with the land have been altered. Thus the course offers students a historical approach to the relationship of technology and society, as evidence by the landscape. The seminar format for this course will also advance students' writing, speaking, and research skills. **Class 3, Credit 3 (S)**

**STSO-325****History of the Environmental Sciences**

This course surveys the history of the environmental sciences from antiquity to the present. The environmental sciences include those sciences that deal with the Earth's physical and organic environments, ranging from geology and biology to evolutionary theory and ecology. A prominent theme is the influence of social, religious, and political ideas on theories of how the Earth and its plants and animals have evolved. **Class 3, Credit 3 (offered regularly)**

**STSO-326****History of Ecology and Environmentalism**

This course explores the history of ecological science, from the eighteenth century to the present, and it features the political use of ecological ideas in environmental debates, from the nineteenth century to the present. We investigate how social and political ideas have influenced ecological science, how ecological concepts have influenced Western politics and society, and how different generations of ecological researchers have viewed their role in society. **Class 3, Credit 3 (F)**

**STSO-330****Energy and the Environment**

This course will examine contemporary energy issues, with particular emphasis placed on the environmental implications associated with energy consumption and production. Students will learn about various energy technologies and fuels (including nuclear, coal, oil, natural gas, solar, biomass, and wind) and the environmental tradeoffs associated with each of these energy systems. **Class 3, Credit 3 (F)**

**STSO-341****Biomedical Issues: Science and Technology**

A study of the impact of science and technology on life, our view of life and of the value issues that arise from this impact. **Class 3, Credit 3 (offered occasionally)**

**STSO-342****Gender, Science and Technology**

This course explores the importance of gender within Western science and technology. It considers how masculine and feminine identities are socially and culturally shaped, how sex and gender are being significantly transformed, and how rethinking gendered practices may help make science and technology fairer and more responsive. Cross-listed with women's and gender studies. **Class 3, Credit 3 (F)**

**STSO-345** **Makers of Modern Science**  
Approaches the history of science through studying biographies of modern scientists. Modern science is understood to be science from the Scientific Revolution of the sixteenth and seventeenth centuries to the present. Emphasis will be on recent scholarship devoted to analyzing science in context, i.e., the way it actually develops through the lives of individuals, in particular social and political contexts. **Class 3, Credit 3 (offered occasionally)**

**STSO-346** **Technology in American History**  
This course explores the development of technology in American history, from the time of first contact between Europeans and Native Americans to the present. It emphasizes, for different periods in American history: the technological contributions of individuals or distinctive groups, the main features of important technological systems, and the way technology shaped—and was shaped by—the social, economic, and political institutions of the time. **Class 3, Credit 3 (F)**

**STSO-421** **Environmental Policy**  
This course introduces students to federal, state, and local environmental policies and the various policy paths leading to their establishment. Students will understand how societal values inform the content of environmental policies and the impacts, in turn, of these policies on society. In addition, the class will explore how environmental economics informs the new tools of environmental policy. The course covers a range of environmental policies at the U.S. and international levels addressing problems such as air and water pollution, climate change, energy use, and community sustainability. **Class 3, Credit 3 (S)**

**STSO-422** **Great Lakes**  
This course utilizes the Great Lakes Basin as an integrating context for understanding global environmental issues. Examining the basin through an interdisciplinary environmental lens the class applies social science approaches to environmental problem solving. Students assess the local, regional, national and international scope of Great Lakes environmental issues through lecture, role-play, and field experiences and consider the importance of government action, public policy, ethics, economics, sociology, history, and engineering while applying social science analysis skills such as surveys, interviews, and content analysis to better understand the depth of local environmental problems and their potential solutions. Environmental Science majors prepare a proposal for an environmental consulting project. **Class 3, Credit 3 (F)**

**STSO-441** **Cyborg Theory: (Re)thinking the Human Experience in the 21st Century**  
The developing cybernetic organism or cyborg challenges traditional concepts of what it means to be human. Today medical science and science fiction appear to merge in ways unimagined a century ago. By exploring scientific and cultural theories, science fiction, and public experience, this class examines the history and potential of the cyborg in Western cultures. **Class 3, Credit 3 (S)**

**STSO-442** **Science, Technology and Society Classics**  
STS classics are books that involve science or technology and that also have notable social significance. In this course students will read several such books to advance their understanding of how society learns about, explores, and evaluates science and technology. The seminar format for this course will also advance students' writing, speaking, and research skills. **Class 3, Credit 3 (F)**

**STSO-445** **The Natural Sciences in Western History**  
This course explores the development of the natural sciences in Western history, from ancient times to the present. It emphasizes how astronomy, physics, chemistry, and biology have changed over time, and it seeks to place those changes in their social, economic, cultural, and religious contexts. **Class 3, Credit 3 (S)**

**STSO-446** **History of Chemistry**  
This course surveys the history of chemistry from antiquity to the present. Emphasis will be placed on developments since the Renaissance; on changing views of how matter is structured and how different substances react (or fail to react); and on the political, social, and cultural contexts that influenced the rise of new chemical concepts and practices. **Class 3, Credit 3 (offered occasionally)**

**STSO-489** **Special Topics**  
Allows examination of a special problem or topical area in the field of STS or Environmental Studies. Topics and specific content and methods vary from year to year or semester to semester. **Class 3, Credit 3 (F, S)**

**STSO-510** **Interdisciplinary Capstone Seminar**  
This course is an upper-level undergraduate seminar that explores how science, technology, society, environment and policy are understood in contemporary and historical contexts. The course brings together a variety of views and readings to offer an interdisciplinary approach to understanding the complex ways in which citizens make and understand the world. (Enrollment in Dept. of STS/Public Policy) **Class 3, Credit 3 (F, S)**

**STSO-521** **Biodiversity and Society**  
This course explores the problems, issues, and values stemming from the current massive loss of biodiversity. Various justifications for preserving or conserving biodiversity will be examined. Although principals of conservation biology are presented, the social/cultural dimensions of the issue will be emphasized. **Class 3, Credit 3 (S)**

**STSO-550** **Sustainable Communities**  
The concept of sustainability has driven many national and international policies. More recently, we have become aware that unless we physically build and rebuild our communities in ways that contribute to sustainability, making progress toward that goal is unlikely. It is equally important to recognize the social aspects of sustainability. In addition, it is at the local level that the goals of equity (a key consideration in community sustainability), most often achieved through citizen participation and collaborative processes are most easily realized. This course will broaden students understanding of the concept of sustainability, particularly the concept of social sustainability. This course focuses on sustainability as a way to bring light to the connections between natural and human communities, between nature and culture, and among environmental, economic, and social systems. Working closely with local organizations, students will explore the applicability of theoretical concepts. **Class 3, Credit 3 (F)**

**STSO-599** **Independent Study**  
A program of study executed by an individual student with assistance and guidance by an instructor, outside a classroom setting. Guidelines for designing and gaining approval for an independent study are provided in College of Liberal Arts Policy I.D. **Class variable, Credit 1–12 (F, S, S)**

## Sociology

**SOCI-102** **Foundations of Sociology**  
Sociology is the study of the social world and socialization processes. Sociologists study the broader picture of how societies are structured and organized through a macro-sociological analysis as well as how individuals create their own social reality symbolically through their interactions with others in a micro-sociological analysis. Students in this course will learn the fundamentals of each approach and come away with a sociological framework which they can critically apply to their own lives. Required for the sociology track of the sociology and anthropology major. **Class 3, Credit 3 (F, S)**

**SOCI-103** **The Urban Experience**  
Cities have an important effect on social interaction. Through their design, they bring together diverse groups of people, in unique spatial settings which can create and maintain opportunities for either interaction or segregation. This course examines theories explaining urban life, the development and growth of cities, their role in shaping human interaction, and the problems that emerge within and surrounding them. Topics covered include education, immigration, residential segregation, poverty, homelessness, crime, sprawl, sustainable development and urban planning. Counts toward sociology and anthropology major (urban studies track). **Class 3, Credit 3 (varies)**

**SOCI-104** **Honors Sociology**  
This course explores how sociological concepts, theories and research account for such social phenomena as socialization, deviance, social structure, stratification, political and religious affiliation and social change. It will also explore how social factors account for political and economic behavior and the speed and spread of technological change. (Honors Program status or permission of instructor) **Class 3, Credit 3 (varies)**

**SOCI-201/ANTH-201** **Writing about Society and Culture**  
This course explores the research and writing process in anthropology and sociology. By way of conducting your own library research project, you will become familiar with how research questions are formulated, the purpose and process of scholarly literature review, and how to conduct library research in the disciplines. We will also consider why anthropologists and sociologists write the way they do and ongoing debates about representation and authorship. Cross-listed with ANTH-201. (Any one of the following: ANTH-102 Cultural Anthropology, ANTH-103 Archaeology and the Human Past, SOCI-102 Foundations of Sociology, SOCI-103 Urban Experience, INGS-101 Global Studies, or permission of instructor) **Class 3, Credit 3 (F)**

**SOCI-210 African-American Culture**  
This course will describe the historical and contemporary conditions that have given rise to the distinctive cultural orientation of African-Americans in the United States. Students will be provided with an explication of African-American culture as it is perceived by the majority of African-Americans. Furthermore, the course will outline an operational articulation of the African-American experience, and analyze the characterological responses that result from it. Counts toward sociology and anthropology major (sociology track). **Class 3, Credit 3 (S)**

**SOCI-215 The Changing Family**  
This course examines the essential concepts and theories fundamental to the social science of family studies. It analyzes family systems with reference to gender role, participation in the workplace, marital relationships and communication between parents and children. The course also focuses on ways in which changes in the economy and technology have influenced the form of the family, and men's and women's work. Counts toward the sociology and anthropology major (sociology track). **Class 3, Credit 3 (varies)**

**SOCI-220 Minority Group Relations**  
The course will provide a context in which to examine the multiple and contradictory social relations of domination, subordination, resistance, and empowerment. The kinds of questions we will explore focus on how power, knowledge, meaning, and cultural representation are organized. We will analyze a variety of political and ideological themes which bear upon the formation of minority group relations, their identity and how these themes complicate the processes by which people construct their understanding of the nation, world, of others, and themselves. Through reflection on theoretical texts and fictional works, as well as film and other popular media, we will consider for ourselves how culture is differently represented and signified, and how the politics of understanding and misunderstanding minority relations work through practices within and outside cultural institutions. **Class 3, Credit 3 (varies)**

**SOCI-225 Social Inequality**  
This course examines various forms of social inequality, including economic, political, health, higher education, race and sex inequality. It uses a variety of sociology's ideas to explain why these kinds of inequality exist, how they persist and what can be done about them. Required for sociology and anthropology majors in the sociology track. **Class 3, Credit 3 (S)**

**SOCI-230 Sociology of Work**  
This course analyzes and assesses social relations of paid labor. Sociology's major ideas about the ways we work will be examined and applied to numerous important topics such as: workplace organization, unions, labor legislation, health and safety, workplace culture, interplays between work and family, experiences of work as alienating or satisfying, inequalities at work, and social mobility. Counts toward sociology and anthropology major (sociology track). **Class 3, Credit 3 (F)**

**SOCI-235 Women, Work, and Culture**  
In this course, we analyze historical and contemporary patterns of gender, race/ethnicity, sexuality, and the organization of work. Using the theoretical perspectives we analyze the work historically undertaken by women in societies and its relationship to broader political and economic structures. While our primary focus is on the U.S., we will also conduct a cross-cultural analysis of gender and work in developing and industrializing societies. Specific issues include gender discrimination (e.g., wage discrimination, sexual harassment), sexuality, reproduction, and women organizing to control their work and working conditions. **Class 3, Credit 3 (varies)**

**SOCI-240 Deaf Culture in America**  
This course is an introductory survey of Deaf culture in the United States. Students will study the scholarly literature pertaining to various social groups in the Deaf community and have contact with their members. This course will familiarize students with the characteristics of Deaf Culture, as well as general perceptions of the Deaf community within the dominant mainstream society. **Class 3, Credit 3 (F, S)**

**SOCI-245 Gender and Health**  
This course examines connections between gender and health that are both conceptual and empirical. Students will explore the causes of gender-based differences in health outcomes through case studies of sexual and reproductive rights, HIV/AIDS epidemics and violence. Students will also examine global gender and health trends. The course concludes with an examination of gender inequity in health care and policy implications of these inequities. Counts toward the international and global studies major (transnational gender studies track), the sociology and anthropology major (sociology track), minor in sociology and anthropology, and immersion in health and culture. (ANTH-102 Cultural Anthropology or SOCI-102 Foundations of Sociology) **Class 3, Credit 3 (varies)**

**SOCI-302/ANTH-302 Qualitative Research**  
Learning about social and cultural groups is a complex and ethically sensitive process. In this course, we explore common qualitative research methods for social and cultural research. We evaluate the utility of such methods for different purposes and contexts, including cross-cultural contexts. We consider common ethical dilemmas in research with human subjects, the ethical responsibilities of researchers, and common techniques for minimizing risks to subjects. Cross-listed with ANTH-302. (Any one of the following: ANTH-102 Cultural Anthropology, ANTH-103 Archaeology and the Human Past, SOCI-102 Foundations of Sociology, SOCI-103 Urban Experience, INGS-101 Global Studies, or permission of instructor.) **Class 3, Credit 3 (varies)**

**SOCI-303/ANTH-303 Quantitative Research**  
The research conducted by sociologists and anthropologists generates large, complex data sets that are difficult to interpret subjectively. Multivariate quantitative methods are an important tool for understanding these data. This course presents an introduction to quantitative research in sociology and anthropology: how to craft a research question and research design that utilize quantitative data, how to select appropriate quantitative techniques and apply them, how to present results, and how to critically evaluate quantitatively based knowledge claims. Topics include: research design, collecting and coding data, non-metric data, data screening, exploratory data analysis, selection and use of appropriate analysis techniques, comparing groups, exploration of variance, classification, and modeling. The course features laboratory exercises and a final project in which the student selects a research problem and data set, which they analyze and present to the class. Cross-listed with SOCI-303. (Any one of the following: ANTH-102 Cultural Anthropology, ANTH-103 Archaeology and the Human Past, SOCI-102 Foundations of Sociology, SOCI-103 Urban Experience, INGS-101 Global Studies, or permission of instructor) **Class 2, Lab 2, Credit 3 (S, biennial)**

**SOCI-310 U.S. Housing Policy**  
Housing is a critical component in assuring basic survival. Through the design, sale, and development of housing in the United States, many Americans' lives are shaped by their residence. In response, this course examines the role of American housing policy in its relationship to other social issues, including racial segregation, endemic poverty, educational and economic inequality, sprawl and traffic, and environmental degradation. Special emphasis will be paid to explain how current housing policy both creates and eliminates housing options and their related social issues. (SOCI-103 Urban Experience or SOCI-102 Foundations of Sociology) **Class 3, Credit 3 (varies)**

**SOCI-315 Global Exiles of War and Terror**  
Daily we watch, seemingly helplessly, as people are displaced from their communities, homelands, and countries and subsequently seek asylum around the world, sometimes within our own local communities. Causes of displacement include war, violence, persecution, and modes of terror that increasingly affect the lives of women and children. In addition to the loss of human life and potential, the ensuing consequences of violent displacement include poverty, disease, physical and psychological trauma, hopelessness, and vulnerability to human rights abuses. In this course, we explore how the rights and dignity of refugees can be protected. We also examine resettlement processes and, for those who are eventually repatriated, we address how they can successfully reintegrate into reconstructing societies that remain barely functional. Most importantly, we consider how the trauma of displacement can be minimized. (ANTH-102 Cultural Anthropology or SOCI-102 Foundations of Sociology) **Class 3, Credit 3 (varies)**

**SOCI-320 Population and Society**  
This course examines systematic theories of population dynamics, and considers demographic changes as causes and consequences of social processes. Students will participate in group projects that synthesize related material, complete written responses to reading assignments, and participate in class discussions. Counts toward the sociology and anthropology major (sociology track), international and global studies major (sustainable futures track), minor and concentration in sociology and anthropology. (ANTH-102 Cultural Anthropology or SOCI-102 Foundations of Sociology) **Class 3, Credit 3 (varies)**



**SOCI-325** **Community Economic Development: Rochester**  
The City of Rochester will serve as a dynamic laboratory for applying perspectives and insights in community planning, with a particular focus on community economic development. The course requires students to conduct extensive field studies so as to gain first-hand knowledge of such urban forms as neighborhoods and commercial centers, to examine and assess policies formed to address the City's past and present challenges, and to formulate alternative policies. The City's industrial transformation, especially since 1945 from an economic and industrial powerhouse to a community of secondary importance will be examined and will provide the context for the field studies and stakeholder meetings. Comparative research on cities experiencing similar changes may be included. **Class 3, Credit 3 (S)**

**SOCI-330** **Urban Deviance**  
This course explores how various types of crime are able to thrive in urban environments, examining their consequences on larger society. Course topics will include gangs, organized crime, white collar crime, street crime, and drug- and sex-related crime. (SOCI-103 Urban Experience or SOCI-102 Foundations of Sociology) **Class 3, Credit 3 (varies)**

**SOCI-335** **Urban Cultures**  
This course examines the perennial ability of American cities to attract and maintain the loyalty of a diverse population of individuals who prefer to live in an environment which is fast-paced, change-oriented, privacy-protecting and open to social and cultural experimentation. It explains how the vibrancy of the creative class fuels innovation and provides the city with the energy and stimulation to meet the needs of a vast array of citizens while remaining ever open to the contributions of newcomers. (ANTH-102 Cultural Anthropology or SOCI-102 Foundations of Sociology; SOCI-103 Urban Experience) **Class 3, Credit 3 (varies)**

**SOCI-340** **Urban Planning and Policy**  
This course will examine the sociological and political implications of policies and planning decisions that have impacted the growth patterns of American cities and suburbs in the post-World War II era. Particular emphasis will be given to land use decisions that have favored suburbs over cities, the loss of tax base which impacted these cities' ability to perform basic functions for their citizens, and the adverse impact of federal and state government policies and programs on the functionality of urban areas and the efficiency of local governments. Students will examine case studies on urban development, and conduct field research on governmental structures and policies that will enable them to develop alternative strategies and policies. (SOCI-103 Urban Experience) **Class 3, Credit 3 (F)**

**SOCI-345** **Urban Poverty**  
Urban poverty has been recognized as a persistent problem in the United States since the middle of the last century. In many cities, poverty is associated with high levels of teenage pregnancy, low levels of employment, limited educational attainment, chronic community-based health problems, and high levels of crime. This course examines causes, consequences, and proposed policy solutions to urban poverty. Special emphasis will be paid to U.S. urban poverty. (SOCI-103 Urban Experience or SOCI-102 Foundations of Sociology) **Class 3, Credit 3 (varies)**

**SOCI-350** **Social Change**  
This course describes and applies competing explanations for major transitions in a variety of institutions, including the economy, work, politics, family and education. These transitions are seen within historical and global contexts, but the interplay of these changing social structures with individual experience is explored as well. Topics include economic, racial and gender stratification, culture, labor-management relations, and the source and consequences of technological change. Students will learn to understand, assess, and manage social change rather than to simply react to it. Counts toward the sociology and anthropology degree (sociology track) and the minor in sociology and anthropology. (ANTH-102 Cultural Anthropology or SOCI-102 Foundations of Sociology) **Class 3, Credit 3 (biennially)**

**SOCI-410** **Diversity in the City**  
This course examines the city as an amalgamation of diverse communities, with people engaged in interpreting and responding to urban life. It examines changes in the structure of urban neighborhoods, and how these neighborhoods are impacted by social, economic, spatial and political conditions. Issues such as ethnic enclaves, urban poverty, homelessness, unemployment, public and park space and ethnic/racial segregation will be investigated. (SOCI-103 Urban Experience) **Class 3, Credit 3 (varies)**

**SOCI-489** **Special Topics**  
This course introduces a topic new to the Sociology and Anthropology curriculum. Topic varies by semester. Counts toward the sociology/anthropology Minor. **Class 3, Credit 3 (semester varies)**

**SOCI-498** **Practicum**  
Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. The Practicum may consist of internship, study abroad, or archaeological or ethnographic field school (consisting of at least 160 hours, completed over at least four weeks). (third-year status and permission of instructor) **Credit 0 (F, S, Su)**

**SOCI-499** **Co-op**  
Paid work experience in a field related to sociology or urban studies (at least 160 hours of work, completed over at least four weeks). Students will apply the accumulated knowledge, theory, and methods of the discipline to problem solving outside of the classroom. (Third-year status and permission of instructor) **Class 0, Credit 0 (F, S, Su)**

**SOCI-501** **Senior Research Project**  
Students will design and conduct a library-based research project with supervision of a faculty member, bringing to bear the knowledge and theoretical perspectives accumulated during the prior years of study. (Any one of the following courses: SOCI-201 Writing about Society and Culture, SOCI-301 Social and Cultural Theory, SOCI-302 Qualitative Research, SOCI-303 Quantitative Research; fourth-year status) **Class 3, Credit 3 (S)**

**SOCI-502** **Scholar's Thesis I**  
This is the first course of a two-semester Scholar's Thesis sequence in sociology or urban studies, in which students will conduct an original research project. In this first course, working with a thesis advisor, students will formulate a research question, conduct a literature review, prepare the research design, and begin data collection, following the conventions of the disciplines. (Fourth-year status, 3.2 GPA, and permission of thesis advisor) **Class 3, Credit 3 (F)**

**SOCI-503** **Scholar's Thesis II**  
This is the second course of a two-semester Scholar's Thesis sequence in sociology or urban studies, in which students will conduct an original research project. In this second course, working with a thesis advisor, students will finalize data collection, analyze the data, write and defend a thesis paper, following the conventions of the discipline. (SOCI-502 Scholar's Thesis I, fourth-year status, 3.2 GPA, and permission of thesis advisor) **Class 3, Credit 3 (S)**

**SOCI-599** **Independent Study**  
The student explores in depth a topic of choice, under supervision of a faculty member. The student will typically meet weekly with the instructor to discuss the readings and will write paper(s) that synthesize and critique them, or the student may work with the faculty member on original research. (Permission of the instructor) **Credit 1-12 (varies)**

# Center for Multidisciplinary Studies

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*Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).*

*Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.*

## Business Administration and Management

**BUSI-221** **New Venture Development**  
This course presents factors to be considered by those interested in the ownership and management of small business enterprises. Includes who should be an entrepreneur, guidelines for starting a new business, basic legal considerations, and approaches for obtaining credit and capital. Revised course includes staffing, purchasing, supplier relations, cash flow management, and managerial skills needed to run any business or corporate department. **Class 3, Credit 3 (F, S)**

**BUSI-324** **Introduction to Logistics and Transportation**  
The course studies the logistics and transportation industry as part of the growing emphasis on distribution technologies. Introduces basic understandings of the function areas of logistics management and their interrelationships and how transportation and distribution play a significant role in the success of a business. (Third year status or permission of the instructor) **Class 3, Credit 3 (F, S)**

**BUSI-409** **Core Concepts of Project Management**  
Focuses on the skills of project management and is organized around the project management life cycle, providing students with basic project management concepts: projects, project manager, organizational structure, team make-up, planning, scheduling, budgeting, PERT/CPM, resources, monitoring and control, and termination. Introduces the framework and nine knowledge areas of *A Guide to the Project Management Body of Knowledge (PMBOK Guide)* as defined by the Project Management Institute (PMI). Course not intended for those students planning to take advanced course work in project management and may not be substituted for BUSI-410 Introduction to Project Management. Students should have elementary management experience. (MGMT-160 World of Business or MGMT-215 Organizational Behavior; STAT-145 Introduction to Statistics I, or MTSC-311 Business Statistics; or permission of instructor) **Class 3, Credit 3 (F)**

**BUSI-410** **Project Management**  
Addresses project management from a multidisciplinary perspective, covering the fundamental nature of and techniques for managing a broad range of projects—public, commercial, and non-profit. Topics include project environment, planning, conflict resolution, budgeting, scheduling, resource allocation, monitoring/controlling, and project termination. Addresses the behavioral and quantitative facets of project management. Incorporates the use of spreadsheets, project management software, and simulation for risk analysis software. Introduces the framework and nine knowledge areas of *A Guide to the Project Management Body of Knowledge (PMBOK Guide)* as defined by the Project Management Institute (PMI). Students should have elementary management experience. This course may not be substituted for BUSI-710 in the Advanced Certificate in Project Management. (MGMT-160 World of Business or MGMT-215 Organizational Behavior; STAT-145 Introduction to Statistics I or MTSC-211 Introduction to Business Statistics; or permission of instructor) **Class 3, Credit 3 (F, S, Su)**

**BUSI-411** **Advanced Project Management**  
Course covers the advanced project management topics necessary for implementation of and excellence in project management. It deals with turning the principles and theory of project management into practice. Addresses the best practices for project management in the world; project portfolio management and ROI; the project office and Six Sigma; project risk management and integrated projects; corporate cultures, behavior, and cultural failures; informal, adaptive, and extreme project management; and critical chain project management. Integrates aspects of *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. This course may not be substituted for BUSI-711 in the Advanced Certificate in Project Management. (BUSI-410 Project Management or permission of the instructor) **Class 3, Credit 3 (F, S, Su)**

**BUSI-412** **International Project Management**  
With the increasing frequency of globalization, mergers, and acquisitions, international projects are becoming more prevalent and approaching the norm for many organizations. This course addresses a wide range of international projects—based in different industries and multiple countries. It deals with cultural and social differences within firms; cultural and social differences among countries and within countries; languages and dialect variations; different management practices and structures; religious practices; legal, regulatory, and reporting requirements; technology and infrastructure differences in different regions; and time zone differences. Incorporates aspects of *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. (Advanced Project Management This course may not be substituted for BUSI-712 in the Advanced Certificate in Project Management. (BUSI-411 or permission of the instructor) **Class 3, Credit 3 (F, S, Su)**

**BUSI-425** **Strategic Logistics Management**  
The course provides follow-on instruction to the pre-requisite course affording the student a balance of theory, practical application, along with the appreciation of state-of-the-art logistical information and technology with a global basis. Introduces the skills required to move materials in support of the logistics functions internationally. Includes discussions of duties, customs regulations, and the various instruments used to facilitate international trade. (BUSI-324 Introduction to Logistics and Transportation or permission of the instructor) **Class 3, Credit 3 (F, S)**

**BUSI-426** **Logistics Law and Economics**  
The course introduces the role of both the market and government in the logistics of the transportation industry. Topics include determinants of transportation demand, costs, and supply. The economic role of transportation and the management of transportation systems are explored in the context of policy, law, and economic development. (BUSI-324 Introduction to Logistics and Transportation or permission of the instructor) **Class 3, Credit 3 (F, S)**

## Interdisciplinary Studies

**CMDS-205** **Practicing and Assessing Personal Leadership Skills**  
By integrating course concepts of leadership styles and theories with a leadership field experience, students will be able to assess their skills as a leader and create a plan for growth and development for future success. Each student will be required to create a leadership learning agenda and development plan at the beginning of the semester based on their current leadership experience. The learning agenda will identify goals for achievement and strategies for assessing and improving upon their effectiveness as a leader. (Second-year status or first-year, second-semester student in a leadership role) **Class 3 Credit 3 (F, S)**

**CMDS-211** **Exploring Innovation**  
Innovation of some type occurs in all fields and disciplines. This course, which helps students develop an innovative mind set, discusses the nature of innovation, including what innovation is, the goals and objectives of innovation, how innovation happens, and reasons that innovations succeed or fail. Case studies in a variety of disciplines are explored to further understanding of innovation (Second-year standing or permission of instructor). **Class 3, Credit 3 (F, S)**

**CMDS-233** **Teams and Team Development**  
This course focuses on the development of the essential skills needed to be an effective team member and understand the characteristics of high-performing teams in the workplace. Students develop a strong framework for building effective teams through topics that include group and team theory research, individual behavior styles and their functions in a team and team leadership, evaluation of team effectiveness, and understanding of negotiation, persuasion and conflict resolution. This course is highly interactive, with projects that require the student to participate in a team to evaluate cross-functional work teams, self-directed teams, and integrated work teams. Learning takes place through lectures, case studies, simulations, and group projects that develop strategies to build strong teams. **Class 3, Credits 3 (S)**

**CMDS-298** **Independent Study**  
Independent study. (Permission of faculty) **Class 3, Credit 3**

**CMDS-299** **Special Topics**  
Special topics are experimental courses offered per semester. See course catalog for current titles. **Class 3, Credit 3 (Other)**

**CMDS-333** **Wicked Problems**  
This course will expose students to approaching and working on “wicked” problems—unstructured, multidisciplinary issues lacking clear “right or wrong” answers. The course will introduce key skills for handling unstructured problems such as whole systems thinking, estimation and assumptions, valuation, and problem-solving techniques, with the majority of the semester focused on a specific topic (wicked problem) and team case study. Students will work in teams to research and address one aspect or subset of the “wicked” problem at hand to join collectively with the results of all teams for form a more complete overall solution to the wicked problems (Third-year standing) **Workshop 4, Credit 3 (F, S)**

**CMDS-335** **Global Forces and Trends**  
This course focuses on the understanding of the global forces and trends that impact countries, organizations, and people across many dimensions. Student will learn concepts about global issues and examine the financial, cultural, political, environmental, military, technical, economic and demographic trends and forces affecting today’s and tomorrow’s organizations. Students learn to use critical thinking, analytical, and problem solving skills to envision the future and challenge thinking patterns. Readings, discussions, written assignments, and tests are part of the class. (Second-year status or with permission of instructor) **Class 3, Credit 3 (F)**

**CMDS-362** **High Performance Leadership**  
Leadership today is challenging at best when considering all the complexities of the 21st century work environment. In this course students will explore, discuss and practice effective strategies and behaviors to lead others, teams and organizations for high performance. Areas of focus include: leadership roles, theories and styles, creating a shared vision, coaching skills, teamwork and group dynamics, cultural communication and influence, and ethical decision making. Course work will include extensive readings, case studies, written reports, small group projects, presentations and reflections. (PSYC-210 Intro to Psychology, CMDS-205 Practicing and Assessing Personal Leadership Skills, or second year status) **Class 3, Credit 3 (F)**

**CMDS-411** **The Practice of Innovation and Invention**  
This course comprehensively examines how innovation translates new ideas or inventions into practical use in the form of products, markets or services, concepts or systems. The practice of innovation requires understanding different innovation paradigms; the role of creativity, discovery and invention; entrepreneurialism as an implementation strategy; intellectual property issues; team building and collaboration; and experience. Selected case studies and exemplary problems are explored to illustrate the principles and to acquire the skills of innovation. (CMDS-211 Exploring Innovation or permission of instructor) **Class 3, Credit 3 (F, S)**

**CMDS-431** **Understanding Organizational Culture**  
Organizational culture exists in all kinds of organizations including profit-seeking firms, non-profit organizations and government agencies. It is a primary determinate for how well employees function together and like working in the place they do. Ultimately organizational effectiveness and success depends on a healthy organizational culture. This course introduces organizational culture and methods of analyzing it. The course takes an interdisciplinary functionalist view of organizational culture and subcultures as being: (a) things observed, felt, heard and expressed by employees; (b) organizational values espoused in mission statements, goals, ideals, norms, standards, and moral principles; and (c) underlying assumptions of employees about their roles, responsibilities and relationships given available resources relative to client/constituency performance expectations, applicable labor-management agreements and regulatory/safety compliance issues. Methods for analyzing the health of organizational culture and subcultures are related to various kinds of circumstances faced by firms, organizations and agencies. (Third-year standing or permission of instructor) **Class 3, Credit 3 (F)**

**CMDS-432** **Managing Organizational Change**  
Sooner or later all organizations change in certain to many respects and for several reasons. This is true for organizations in profit, non-profit and government sectors which all have many things common. Ongoing organizational success frequently depends on how well change is managed given new opportunities, challenges or threats faced by organizations. Managing organizational change requires knowledge of things in an organization that may need to be changed including an organization’s mission, goals, fiscal health, budget, operations and/or production/service capabilities, facilities, unit structure, personnel, culture, technology and other resources. Effective management of organizational change also requires knowledge of and skills in ways to introduce, guide, support, monitor and evaluate changes once they are implemented. This course takes an interdisciplinary applied approach to managing organizational change teaching SOAR-based strategic planning, SWOT analysis, total quality management (TQM) and continuous quality improvement (CQI) among other change models and methods. (Third-year standing or permission of instructor) **Class 3, Credit 3 (S)**

**CMDS-441** **Creative Critical Thinking and Problem Solving**  
An interdisciplinary approach to the generation and evaluation of ideas and solutions. Includes analysis of the conditions limiting creativity and the development of a “toolkit” of strategies and techniques for discovering, inventing and assessing new, unique and useful ideas, applications and solutions. Applicable to a range of life and work situations, from complex environmental concerns to competitive business challenges to family disputes. (Third-year standing or permission of instructor) **Class 3, Credits 3 (S, Su)**

**CMDS-442** **Learning Organization**  
This interdisciplinary course focuses on theory and techniques for building and sustaining an efficient, creative organization that promotes problem solving and collaborative learning. Learning organization principles of systems thinking, personal mastery, mental models, shared vision, and team learning are studied. Included is an analysis of the conditions limiting an organization’s capacity to learn and remediation of organizational learning disabilities. (MGMT-150 The World of Business or MGMT-260- Ideas and Creativity and MGMT-215 Organizational Behavior; or one co-op; or instructor’s permission) **Class 3, Credit 3 (F, S)**

**CMDS-461** **Leading in a Global Environment**  
The ability to communicate successfully, demonstrate leadership and navigate cultural complexities rank among the most critical competencies for professionals who work in global environment. In this course, students will explore the impact of globalization, both positive and negative. In addition, they will examine the process of adapting to a new culture and will develop skills for interacting successfully across culture. By looking closely at their own and others values, perspectives and decision-making processes, students will have an opportunity to consider how differing approaches can benefit idea generation, communication and problem solving. The course will also introduce them to the traits that successful global leaders possess, which students will then apply to a variety of situations, including conflict resolution, as well as to other current topics that are of concern in the global arena. (CMDS-205 Practicing and Assessing Personal Leadership Skills or CMDS-362 High Performance Leadership or by permission of instructor) **Class 3, Credit 3 (S)**

**CMDS-499** **Special Topics**  
Special topics are experimental courses offered per semester. See course catalog for current titles. (Third-year standing or higher) **Class 3, Credit 3 (Other)**

**CMDS-498** **Independent Study**  
Independent study. (Third-year standing or higher and permission of faculty) **Class 3, Credit 3 (Other)**

**CMDS-499** **Co-op for Applied Arts and Sciences**  
One semester or summer block of paid work experience in a position commensurate with the student’s approved plan of study. **Credit 0 (F, S, Su)**

**CMDS-510** **Multidisciplinary Life**  
A capstone class for students in the applied arts and sciences bachelor of science degree program. Course provides students an opportunity to reflect upon and enhance the many aspects of their individualized educational programs and focus on future goals. Senior status is required. Students should consult their adviser before registering. **Class 3, Credit 3 (F, Su)**

**CMDS-511****Innovation Lab**

This course builds on the skills and knowledge gained in CMDS-211 Exploring Innovation and CMDS-411 The Practice of Innovation and Invention. In the course students engage as members of an interdisciplinary project team exploring a complex, non-trivial problem for which an innovation in science, technology, design, business, artistic expression, etc., could be significant for working toward a resolution of the problem. Problems may be proposed by students or by faculty mentors, or derived from external sources. After selecting a problem, each team works throughout the semester designing a solution, culminating in a formal written report and oral presentation at the conclusion of the project. (CMDS-411 The Practice of Innovation and Invention or permission of instructor) **Workshop format Class 4, Credit 4 (F, S)**

## Math and Science

**MTSC-111****Interdisciplinary Math I**

A foundation course covering the basic mathematical and algebraic skills required to analyze and interpret a variety of real-life applications. Skills covered include: signed numbers, fractions, algebraic manipulations, graphic relationships, linear functions, linear systems, linear programming, non-linear functions (polynomial, rational, exponential and logarithmic), and the basic mathematics of finance. (Three years of high school math or equivalent.) **Class 3, Credit 3 (F, S)**

**MTSC-112****Interdisciplinary Math II**

A course covering the manipulative skills of differential and integral calculus that are required to analyze and interpret a variety of real-life applications. Skills covered include: limits, derivatives, applications of derivatives, integrals, and applications of integrals. (MTSC-111 Interdisciplinary Math I or an equivalent college algebra class) **Class 3, Credit 3, (F, S)**

**MTSC-211****Introduction to Statistics I**

This is a first semester introductory course in statistics. Students will learn how to use statistics in a variety of application areas across many disciplines including business, science and the social sciences. Topics include descriptive statistics for qualitative and quantitative data, discrete (binomial, Poisson) and continuous (uniform, normal) probability distributions, sampling and sampling distributions of sample means and proportions. Computer technology and report writing will be utilized throughout the course, for both simulations and computations. (MTSC-112 Interdisciplinary Math II or equivalent) **Class 3, Credit 3 (F)**

**MTSC-212****Introduction to Statistics II**

This is a second semester introductory course in statistics. Students will learn how to use statistics in a variety of application areas across many disciplines including business, science and the social sciences. Topics include the Central Limit Theorem, confidence intervals and hypothesis testing, (one and two sample proportions and means, variation), correlation and regression (simple and multiple), goodness-of-fit, contingency tables, one and two-way analysis of variance, nonparametric statistics, and statistical process control. Computer technology and report writing will be utilized throughout the course, for both simulations and computations. (MTSC-211 Introduction to Statistics I or equivalent) **Class 3, Credit 3 (S, Su)**

**MTSC-231****Contemporary Science: Biology**

An introduction to the fundamental principles of biology for non-science majors and the application of these concepts to areas of compelling interest in our contemporary, technological society. Topics include cells, genes, evolution, and ecology with specific attention to stem cells, cancer, DNA technology and other contemporary issues. Students apply biology concepts using a laboratory kit. **Class 3, Credit 3 (F, S)**

**MTSC-232****Contemporary Science: Chemistry**

An introduction to the fundamental principles of chemistry for non-science majors and the application of these concepts to areas of compelling interest in our contemporary, technological society. Topics discussed include: environmental chemistry, water and air purity, chemistry of prescription drugs, old and new energy sources, green gases, atomic theory, chemical compounds and reactions, nutrition, biological chemistry, plastic and macromolecular chemistry. This course includes an online lab component. **Class 3, Credit 3 (F, S)**

**MTSC-233****Contemporary Science: Physics**

An introduction to the fundamental principles of physics for non-science majors, and the application of these concepts to areas of interest and concern in our contemporary technological society. The conceptual basis for the phenomena of heat, light, sound, mechanics, electricity and magnetism is discussed and related to such topics as astronomy, space exploration, lasers and environmental concerns. This course includes an online lab component. (MTSC-112 Interdisciplinary Math II or equivalent) **Class 3, Credit 3 (F, S)**

**MTSC-234****Contemporary Science: Oceanus**

An introduction to the fundamental principles of oceanography for non-science majors and the application of these concepts to areas of compelling interest in our contemporary, technological society. Topics include chemistry, geology, meteorology, physics, ecology, taxonomy, and scientific history, with specific attention to ecology and other contemporary issues. Students apply oceanographic concepts using a laboratory kit. **Class 3, Credit 3 (F, S)**

**MTSC-240****History and Manufacture of Siege Weapons**

In this course, students will learn the history of sieges and the development of siege weapons throughout the ages, from early Sumeria to the mid-1900s. Technologies used in the manufacture of siege weapons will be demonstrated in hands-on projects and assignments. Students will then use this historical and technological knowledge to construct prototypes and design their own siege weapons. (Third-year standing or permission of instructor) **Class 3, Credit 3 (S)**

## Quality Management

**QLTM-310****Introduction to Quality**

This course provides an introduction to the fundamental concepts of quality management. It includes an overview of the competitive environment, the cost of poor quality, and the history of quality; a systematic examination of the leading definitions of quality and models of quality management; and an exploration of the implication of quality management concepts for organizational structure and roles, decision making and interpersonal relations. (Third-year standing or permission of instructor) **Class 3, Credit 3 (F, S)**

**QLTM-340****Quality Data Analysis**

This course is an introduction to statistics and probability that provides students with techniques to analyze and interpret quality control data. Topics include problem solving techniques such as the fishbone and flowcharting; descriptive statistics (statistical tables and graphs, measures of central tendency and dispersion); hypothesis testing; distributions commonly used in quality management; and one-way ANOVA. (Third year standing or permission of instructor) **Class 3, Credit 3 (S)**

**QLTM-410****Lean Six Sigma**

Six Sigma techniques, introduced to industry in the late 1980s, use data-driven decisions to reduce defects, drive down costs and increase efficiency. This methodology focuses on minimizing process variation, thereby enabling the process to operate more smoothly and efficiently. Lean is a process that focuses on eliminating waste and streamlining operations. Lean Six Sigma combines the two processes, providing a powerful tool to make improvements in any process or business. In this course, students learn the history, context, and tools of Lean/Six Sigma and apply the process in a course project. (QLTM-310 Introduction to Quality; QLTM-340 Quality Data Analysis; or permission of instructor) **Class 3, Credit 3 (F)**

**QLTM-420****Statistical Quality Tools**

An introductory course in statistical quality control techniques used in determining operating quality levels and recognizing degrees of process control and capability in a service industry or a manufacturing process. Topics include sources of variation; construction and interpretation of charts for variables and attributes; process capability; acceptance sampling; and design of experiments (DOE) concepts. (QLTM-340 Quality Data Analysis or permission of instructor) **Class 3, Credit 3 (F)**

**QLTM-430****Management for Quality**

Successful companies integrate quality techniques and concepts throughout their operations. This course addresses issues in developing and managing an effective organization, including defining a quality philosophy, delighting the customer, the role of strategic planning, enhancing the employee involvement, and sustaining quality initiatives. Additional topics include evaluating quality standards and systems, benchmarking, and vendor and supplier assurance. (QLTM-310 or permission of instructor) **Class 3, Credit 3 (S)**

**QLTM-480****Introduction to Asset Management**

Unscheduled downtime costs businesses millions of dollars each year, but asset management and maintenance is often the last area to attract the attention of managers trying to lower costs. Usually thought of as non-value-added, maintenance and asset management policies can have significant impact on a company's profit. This course introduces the student to the wide range of policies and practices, including capital budget issues related to asset acquisition, cost of ownership, and depreciation; inventory/procurement; maintenance policies such as run-to-failure, preventive maintenance, and reliability centered maintenance; training issues; and developing performance indicators for asset management programs. (QLTM-340 Quality Data Analysis or an equivalent statistics course; fourth-year standing or permission of instructor) **Class 3, Credit 3 (S)**

## Technical Communication

### TCOM-270

#### Effective Web Design I

This course introduces students to the fundamentals of static Web design using XHTML, style sheets, and Web graphics. After completing this course students will be able to comprehend appropriate application of manual code, gather and organize Web content, construct their own XHTML, analyze markup language, critique existing site designs, and use CSS, frames, tables, slices, and FTP to solve spatial, visual, and data problems. Students will utilize Adobe Dreamweaver, or other Web development software, and will learn the basic techniques, tools and processes used to construct a well-designed and effective website while keeping the site's users in mind. **Class 3, Credit 3 (F)**

### TCOM-271

#### Effective Web Design II

This course introduces students to user-centered Web graphics and design, with an emphasis on dynamic Web development. Students will learn to integrate imperatives of user-centered interface with principles of aesthetic design, to bring effective information architecture to the digital landscape. Current topics in Web development, such as XHTML, ActionScript, XML, PHP, ColdFusion, and JavaScript will be discussed. Students will demonstrate proficiency in Adobe Flash, or other current Web development software, through the creation of animated graphics and Web content. (TCOM-270: Effective Web Design I, equivalent experience, or permission of instructor) **Class 3, Credit 3 (S)**

### TCOM-320

#### Professional Presentations

People who are able to effectively present information to an audience are more likely to be successful in their careers. In this course, students learn to develop and present information to a variety of audiences. The course focuses on targeting specific audiences, using the beauty of language in writing speeches and other types of presentations, applying delivery techniques, using media, and overcoming the fear of public speaking. (ENGL-150 or permission of instructor) **Class 3, Credit 3 (S)**

### TCOM-325

#### Business Communication

This course focuses on the development of communication skills essential to functioning effectively in the business world. Students learn the process of analyzing communication situations and responding to them. Topics include an overview of business communication, writing well, delivering business communications, tools for talking in crucial conversations, oral and interpersonal communication including listening skills, public speaking, cross-cultural communication, communicating in the digital age, teamwork and accepting change. (Second-year status or with permission of instructor) **Class 3, Credit 3 (F, S)**

### TCOM-327

#### Environmental, Health and Safety Professional Communication

Communication of environmental, health and safety information and issues is critical for awareness, information, and action. Students develop skill in reporting and conveying environmental and scientific information as well as an understanding of the role of the media and public relations in the environmental communication process. Course participants also learn strategies and formats for communicating safety information, especially in procedures and instructional materials. Writing and speaking skills are sharpened for successful business, media and crisis communication. (ENGL-150 or equivalent) **Class 3, Credit 3 (S)**

### TCOM-333

#### Technical Writing and Editing

Introduces students to reports, proposals, instructions and other documents employed in the contemporary technical workplace and develops the skills needed to create them successfully. Includes adapting content and language for audience and purpose and integrating visuals to support and enhance communication. Editing projects build skill in evaluating writing strategies and effectiveness. The various roles, as well as the ethics, of technical communication in the modern technical are covered. (ENGL-150 or equivalent) **Class 3, Credit 3 (F, S)**

### TCOM-356

#### Strategic Communication

This course uses a case study approach to introduce students to the techniques and process needed to solve organizational communication problems. Students study and analyze a variety of cases wherein strategic communication played critical roles and develop skill in planning effective communication plans and campaigns. (Third-year standing or permission of instructor) **Class 3, Credit 3 (S)**

### TCOM-361

#### Research Techniques

This course offers exposure to and experience with electronic and traditional resources for information generation. Student assignments include fact-finding assignments and culminate in an extended research project of the student's choice. Students use problem-solving strategies, assess project requirements, collect data, report periodically on their progress, and formally present their results. A variety of research methodologies are introduced, including accessing digital databases, interviewing skills, developing and using questionnaires, and review and use of literature. (ENGL-150 or permission of instructor.) **Class 3, Credit 3 (F, S)**

### TCOM-380

#### Design for Print and Web

Students use vector and bit-map imaging software to design a range of graphic projects suited to Web and print formats. Projects include photographic imaging, layout, vector editing, digital painting and retouching, typography, Internet graphics, and collaboration. Class discussions cover current professional design topics. (Second-year standing or permission of instructor) **Class 3, Credit 3 (S)**

### TCOM-381

#### Photo Imaging I

Students will use photographic imaging software to create, combine, and modify graphic imagery. Topics will include retouching, tonal adjustments, custom brushes and pattern, raster text, spatial illusion, masking techniques, animation, and compositing. Students will research and discuss professional design, effective visual communication, copyrights, and photographic illustration. (TCOM-380 Design for Print and Web) **Class 3, Credit 3 (F)**

### TCOM-382

#### Photo Imaging II

Students will use photographic imaging techniques to produce illustrations, web graphics, composited photographic imagery, and corrected photographs. Techniques learned in previous courses will combine to bring new results. Topics include image correction, duotones, channels, photographic illustration, path shapes, concept presentation, digital asset management, and advanced layer techniques. Students will explore and discuss design and professional issues and innovations. Bit-mapped imaging (in Adobe Photoshop) is presented in a hands-on, two-term sequence. (TCOM-381 Photo Imaging I) **Class 3, Credit 3 (S)**

### TCOM-383

#### Designing Vector Graphics

Students will use vector graphic software (Adobe Illustrator) and basic design principles to prepare graphic materials. Students will design illustrations for print, web, devices, and distribution, developing technical skill and design sensibility in creating object-oriented graphics through line and node editing using vector graphic software (Adobe Illustrator.) Students will analyze professional illustration, research trending topics, understand output consequences including color management, file size efficiency. (TCOM-380 Design for Print and Web) **Class 3, Credit 3 (S)**

### TCOM-410

#### Technical Information Design

Intensive practice in the creation of content for online and multimedia documents with emphasis on the presentation of technical and scientific concepts, products, and processes. A survey of graphic methods for the display of complex technical relationships and ideas. Students will also explore contemporary topics (international technical communication, the future of online documentation, ethical considerations in technical information design, etc.) and applications (legal, medical, electronics, environmental, etc.) in Technical Information Design. (ENGL-150 or equivalent) **Class 3, Credit 3 (S)**

### TCOM-414

#### Proposal Writing

Proposal Writing focuses on the elements of proposal responses and practicing creating those elements. Students learn the process of evaluating and responding to RFIs and RFPs with concentration on making bid decisions, organizing teams, identifying strategies, establishing credibility, ensuring technical clarity, and writing persuasively. Topics include the proposal process that is practiced by government, industry, and grant-funding agencies. Co-listed with TCOM-621. (First year writing seminar or equivalent and ability to write concisely and use proper grammar and punctuation; third-year status or permission of instructor.) **Class 3, Credit 3 (F)**

### TCOM-435

#### Promotional Writing

This course introduces students to the techniques and approaches needed to create promotional materials used in marketing, sales, publicity and establishing organizational identity. The advantages, uses and guidelines of creating print media applications; including direct mail, catalogs, brochures, and other publicity and identity pieces; website materials; and film and video pieces are presented. Students will create a short script and pieces for print and Web distribution. (ENGL-150 or equivalent and third-year standing or permission of instructor) **Class 3, Credit 3 (S)**

**TCOM-444****Science Writing**

Course introduces students to the writing process for describing scientific and technological subject matter for presentation to general audiences. Students will learn to gather needed source material and organize, write and edit articles that cover developments in the scientific and technological communities. Various article formats used in professional, in-house, trade and popular publications are presented. This course is cross-listed with TCOM-644. (ENG-150 or equivalent) **Class 3, Credit 3 (F)**

**TCOM-476****Instructional Design Principles**

This course presents an overview of the process of designing instructional packages from need and task analysis through identifying goals and objectives, media selection, program development and validation testing. Additional focus is given to managing the development process and making a business cases to justify the cost/value of such projects to decision makers within an organization. (Basic writing class and third-year standing or permission of instructor). **Class 3, Credit 3 (S)**

# National Technical Institute for the Deaf

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Course numbering: RIT courses are generally referred to by their seven-digit registration number. The first two digits refer to the college offering the course. The third and fourth digits identify the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099); lower division (100–399); upper division (400–699); or graduate level (700 and above).

All NTID associate degree four-letter course subject codes begin with the letter “N”.

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester’s schedule of courses, published by the Office of the Registrar. Prerequisites and/or corequisites are noted in parentheses near the end of the course description.

## American Sign Language & Interpreting Education

### American Sign Language-Evening Courses

**ASLC-211 Introduction to American Sign Language and Deaf Culture I**  
Students are introduced to approximately 300 basic conversational signs and linguistic features needed to engage in survival-level conversations with Deaf people. Fingerspelling and background information on Deaf culture and community are included. Each class period will have small group, large group and pair interactions. **Class 2, Credit 2 (F, S)**

**ASLC-212 Introduction to American Sign Language and Deaf Culture II**  
This course continues the development of American Sign Language skills for students who have successfully completed Introduction to American Sign Language and Deaf Culture I. The course focuses on ASL vocabulary, linguistic features, and cultural protocols to enable students to function in survival level ASL conversations with a focus on work-related and social communication. Students learn to talk about when activities occur, make requests, and discuss weather conditions, daily routines, and health. (ASLC-211 Intro to ASL and Deaf Culture I or equivalent sign skill) **Class 2, Credit 2 (F, S)**

**ASLC-289 Special Topics: American Sign Language and Deaf Culture**  
The description for the special topics course will be specified in each course proposal. **Class 1–3, Credit 1–3 (F, S)**

## ASL-English Interpretation

**INTP-120 American Sign Language I**  
ASL I includes linguistic features, cultural protocols and core vocabulary for students to function in basic ASL conversations that include ASL grammar for asking and answering questions while introducing oneself, exchanging personal information, talking about family, friends and surroundings, and discussing activities. This course is designed for students who have no knowledge of American Sign Language. To progress to the next ASL course in the series (INTP-125), students must complete the course with a minimum grade of C. **Class 3, Lab 2, Credit 4 (F)**

**INTP-125 American Sign Language II**  
This course expands the basic principles presented in ASL I. ASL II teaches students to use linguistic features, cultural protocols and core vocabulary to function in basic ASL conversations that include ASL grammar for giving directions, describing, making request, talking about family, occupations and routines, and attributing qualities to others. To progress to the next course in the series (INTP-126), students must complete the course with a minimum grade of C. (Skill equivalent to INTP-120 with a minimum grade of C). **Class 3, Lab 2, Credit 4 (F, S)**

**INTP-126 American Sign Language III**  
This course builds upon information taught in ASL I-II and introduces expanded grammatical features of ASL and specialized vocabulary, while continuing to increase fingerspelling and numbers receptive and expressive skills. In addition, some basic features of ASL discourse are taught in organizing and explaining contextual information. To progress to the next course in the series (INTP-225), students must complete the course with a minimum grade of C. (INTP-125 with a minimum grade of C or equivalent skill). **Class 3, Lab 2, Credit 4 (F, S, Su)**

**INTP-200 Deaf Expressions**  
Students will explore the historical, philosophical, linguistic, social, cultural, educational, medical and artistic past, present, and future of deaf/Deaf/hard-of-hearing people. This course uses an on-line format to discuss concepts and perspectives found in the assigned book(s) and visual media (e.g. film, television programs, etc.). Each time the course is offered the book and visual media will be different so students may take this course multiple times. Books/media will be chosen from areas with relevance to Deaf Culture and community, such as D/deaf literature and the Arts, D/deaf history, D/deaf issues, significant D/deaf people, and ASL. For students unfamiliar with Ideatools software, an optional face-to-face orientation meeting with the instructor is offered during the first week of class. This course is repeatable for credit. **Class 2, Credit 1 (F, S)**

**INTP-210 Introduction to the Field of Interpreting**  
This survey course is the introduction to the profession of sign language interpreting, with a focus on the role, function, and responsibilities of an interpreter. Information about the history of the profession, professional organizations, and settings where interpreters work is presented. Additional topics include the function of assessing as part of the interpreting process, with a focus on Demand/Control Schema. To progress to INTP-220 students must complete course with a minimum grade of C. **Class 3, Credit 3 (F)**

**INTP-215 Processing Skills Development**  
This course is an introduction to the mental processing skills (pre-interpreting skills) of consecutive and simultaneous interpretation. This course includes an overview of the theoretical models of interpretation, provides skill development activities for isolated interpreting sub-tasks and practice activities for the integration of these tasks in translation and consecutive interpreting activities. Course content includes interpreting theory, message analysis, text analysis, visualization, listening and comprehension, shadowing, paraphrasing, dual task training, text analysis. To progress to (INTP-310) students must complete the course with a grade of C or better. (INTP-225 with a minimum grade of C or equivalent skill) **Class 3, Credit 3 (S)**

**INTP-220 Discourse Analysis**  
This course presents an introductory look at the interpreter as a bicultural/bilingual mediator, at the center of communicative activity. The interpreter’s success requires the analysis of how communication (spoken, written, signed) is structured so that it is socially appropriate and linguistically accurate. This course includes an introduction to significant linguistic features and the analysis of conversational exchanges in English and ASL, focusing on the practical application of analyzing discourse. (INTP-210; 225 with minimum grade of C or equivalent skill; corequisite INTP-226) **Class 3, Credit 3 (S)**

**INTP-225** **American Sign Language IV**  
This course builds upon information taught in ASL I-III. Students continue learning and using ASL vocabulary, grammatical principles and various intermediate-level discourse features in narratives and presentations in ASL. Students analyze multiple meaning English words and English idioms to express concepts in ASL. Issues related to Deaf culture continue to be introduced based on unit topics. To progress to the next courses in the series (INTP-215, 220 and 226), students must complete the course with a minimum grade of C. (Skill equivalent to INTP-126 with a minimum grade of C) **Class 2, Lab 2, Credit 3 (F)**

**INTP-226** **American Sign Language V**  
This course builds upon information taught in ASL I-IV. Students continue learning and using ASL vocabulary, grammatical principles and various intermediate-level discourse features in narratives and presentations in ASL. Students continue to analyze multiple meaning English words and English idioms to express concepts in ASL. Issues related to Deaf culture continue to be introduced based on unit topics. To progress to the next courses in the series (INTP-325, 310), students must complete the course with a minimum grade of C. (INTP-225 with a minimum grade of C or equivalent skill) **Class 2, Lab 2, Credit 3 (S)**

**INTP-310** **Interpreting I**  
This course introduces the English to ASL and ASL to English interpreting process with a focus on text analysis and consecutive production of an equivalent message in the target language. Compression and expansion strategies are introduced. Students develop interpreting management strategies and diagnostic assessment skills. Students will interpret inquiry and narrative texts in monologue and dialogue formats. Warm-up exercises will be performed as part of the self-care regimen recommended for sign language interpreters. To progress to INTP-335 and 336, students must complete this course with a minimum grade of C. (INTP-215, 226 with minimum grades of C or equivalent skill) **Class 3, Credit 3 (F)**

**INTP-315** **Practical and Ethical Applications**  
This course presents the underlying principles of the Registry of Interpreters for the Deaf, Code of Professional Conduct and applies the Code to the various situations and settings. Students will explore how professional interpreters apply these principles in their daily work and how consumers perceive the ethical role and function of interpreters. In addition, etiquette and protocol for each setting will be discussed. Settings include: K-12, post-secondary, religious, healthcare, mental health, deaf-blind, performing arts, and business and industry. To progress to INTP-350, students must complete course with a minimum grade of C. (INTP-210) **Class 3, Credit 3 (F)**

**INTP-325** **American Sign Language VI**  
This course builds upon information taught in ASL I-V. Students continue learning and using ASL vocabulary, grammatical principles and various advanced-level discourse features in narratives and presentations in ASL. Students analyze different components in storytelling. ASL Literature will be introduced in this level. Students identify controversial issues in various works of ASL Literature. To progress to the next courses in the series (INTP-326, 335 and 336), students must complete course with minimum grade of C. (INTP-226 with a minimum grade of C or equivalent skill) **Class 2, Lab 2, Credit 3 (F)**

**INTP-326** **American Sign Language VII**  
This course builds upon information taught in ASL I-VI. This is the last series of ASL courses. Students continue learning and using ASL vocabulary, grammatical principles and various advanced-level discourse features in debate and public speaking in ASL. Students analyze different components in debate and public speaking. Students identify and discuss various controversial issues via debate and presentation. To progress to the next courses in the sequence (INTP-435, 436), students must complete course with a minimum grade of C. (INTP-325 with a minimum grade of C or equivalent skill) **Class 2, Lab 2, Credit 3 (S)**

**INTP-335** **Interpreting II: English to ASL**  
Students develop the ability to produce an equivalent simultaneous ASL message from a spoken English source message. This course integrates inquiry and expository texts in both dialogic and monologic formats. Specific discipline areas include healthcare, employment and finance. Students will continue to develop text analysis skills applying them to simultaneous interpreting. Biomechanics and self-care issues will be discussed. To progress to the next courses in the sequence (INTP-350, 435) students must complete course with a minimum grade of C. (INTP-310, 325 with minimum grades of C, or equivalent skill) **Class 3, Credit 3 (S)**

**INTP-336** **Interpreting II: ASL to English**  
Students will develop the ability to produce an equivalent English message from ASL source messages. This course integrates inquiry and expository texts in both dialogic and monologic formats. Specific content areas include healthcare, employment and finances. Students continue to develop text analysis skills, applying them to simultaneous interpreting. To progress to the next courses in the sequence (INTP-350 and 436) students must complete course with minimum grade of C. (INTP-310, 325 with a minimum grade of C, or equivalent skill) **Class 3, Credit 3 (S)**

**INTP-340** **Interpreting Frozen and Literary Texts**  
This course will focus on skills and techniques for the interpretation of frozen and literary texts. Work includes translation and interpretation between English and ASL. Source English texts used in this course are the: National Anthems of USA and Canada; Lord's Prayer; Pledge of Allegiance; children's songs and poetry; patriotic songs; religious songs and prayer; AA 12 steps and 12 traditions; holiday songs; and selected poetry. (INTP-310) **Class 3, Credit 3 (S)**

**INTP-350** **Practicum and Seminar I**  
The student experiences a practicum placement under the immediate supervision of a professional interpreter, who functions as the student's mentor, and the seminar instructor who functions as the students' supervising instructor. The practicum will involve such activities as: observing the mentor and a variety of other interpreters at work; preparing videotapes for mentor critique; interpreting under the supervision of the mentor; and meeting weekly with the mentor to discuss the practicum experience. Additionally, practicum students will meet together, weekly, to share observations and experiences gained from the practicum placement. Class discussions focus on language issues in interpretation, application of the Code of Professional Conduct, situational concerns and protocols, and problem solving related to D-C Schema. Course requires a minimum of 135 hours of field experiences. Students must complete this course with a minimum grade of C. (For students completing the AAS degree: permission of the instructor, cumulative GPA 2.5, and in good standing; INTP-315 with a minimum grade of C; corequisites INTP-335, 336) (For students completing the BS degree: permission of the instructor, cumulative GPA 2.5, and in good standing; INTP-315, 335 and 336 with minimum grades of C) **Class 2, Credit 3 (F, S)**

**INTP-360** **Introduction to K-12 Interpreting**  
This course includes an overview of the history and current status of educational interpreting throughout the United States. Content includes the role, practices, and skills of educational interpreters in K-12 settings; communication systems; pertinent laws and regulations; resources, information, and strategies for consumer awareness and education; administrative practices and personnel structure of school systems; assessment and management of educational interpreters; and topics that concern educational interpreters. (Third-year status) **Class 3, Credit 3 (F)**

**INTP-361** **Educational Interpreting: Elementary Settings**  
This course is designed to prepare students to interpret in elementary school settings. Content will include an orientation to activities, elementary level content, sign vocabulary, language development, psycho-social development, and interpreting issues that are pertinent to elementary students. The course addresses strategies for interpreting classroom discourse and various content areas. Vocabulary for various elementary content areas will be introduced. Students will simultaneously interpret English-to-ASL and ASL-to-English, elementary-level texts. (INTP-360) **Class 3, Credit 3 (S)**

**INTP-362** **Educational Interpreting: Middle/Secondary Settings**  
This course is designed to prepare students to interpret in middle and secondary school settings. Content will include orientation to the activities, middle/secondary school curriculum, sign vocabulary, language development, psycho-social development and issues pertinent to middle and secondary school students. The course also includes information about teaching methodologies and strategies for interpreting classroom discourse and various content areas. Students will learn how to prepare the middle/secondary students to request and work with interpreters. Vocabulary for various middle and secondary school content areas will be introduced. Students will also learn about interpreting for foreign language courses. Students will simultaneously interpret English-to-ASL and ASL-to-English, middle and secondary level texts. (INTP-360) **Class 3, Credit 3 (S)**



**INTP-363 Educational Interpreting: Post-Secondary Settings**  
This course prepares students to interpret in the post-secondary setting. Students will learn preparation strategies for English-to-ASL and ASL-to-English interpreting for the following topics: computer science, advanced science and mathematics, selected liberal arts, physical education, and the instruction of a foreign language. In addition, students will become familiar with current issues facing interpreters in post-secondary settings. As part of this course, students will observe interpreters working in several types of college classrooms, (e.g., lectures, seminars, labs, and studios). (INTP-435, 436) **Class 3, Credit 3 (S)**

**INTP-399 Independent Study: ASL-English Interpretation**  
The description for each independent study request will be specified in each student proposal. **Credit 1-3 (F, S)**

**INTP-435 Interpreting III: English to ASL**  
In this course students advance their skills in simultaneously producing equivalent ASL messages from spoken English source messages. Monologic, expository texts on specific topic areas will be the focus of this course. The bulk of the interpretation work in this course will take place utilizing actual speakers and audience members. Students will continue to develop their English vocabulary, ASL vocabulary, interpreting analysis skills, develop team interpreting skills and increase stamina. To progress to the next course in the sequence (INTP-450) students must complete course with a minimum grade of C. (INTP-335, 326 with minimum grades of C) **Class 3, Credit 3 (F)**

**INTP-436 Interpreting III: ASL to English**  
In this course students advance their skills in simultaneously producing equivalent spoken English messages from ASL source messages. Monologic, expository texts on specific topic areas will be the focus of this course. Students will continue to develop their English vocabulary, ASL vocabulary, interpreting analysis skills, develop team interpreting skills and increase stamina. To progress to the next course in the sequence (INTP-450) students must complete course with a minimum grade of C. (INTP-336, 326 with minimum grades of C) **Class 3, Credit 3 (F)**

**INTP-440 Transliteration**  
This course introduces the skill of transliterating simultaneously from a spoken English message into an equivalent signed message incorporating an appropriate combination of ASL and English features. The focus of the course will be the analysis of the macro- and microstructures of the source language and the production of a target language this is sensitive to contact language situations. Topics include language variation within the deaf community, role and function of a designated interpreter, the features and process of transliteration and transliteration skill development including work with frozen texts. (INTP-435, 436 with minimum grades of C) **Class 3, Credit 3 (S)**

**INTP-441 Health Care Interpreting**  
This course is designed to introduce students to sign language interpreting in health care settings through the analytical construct of Demand-Control Schema for interpreting work. The course content includes medical terminology in English and ASL. Students will learn tools and techniques to utilize while interpreting in health care environments with an emphasis on interactive learning including direct exposure to health care settings, deaf and hard-of-hearing health care professionals and professional health care interpreters. (Third-year status in the program) **Class 3, Credit 3, (F)**

**INTP-450 Practicum and Seminar II**  
This course is a continuation of the field experience for interpreting students. This course provides the student with in-depth experiential education under the supervision of a professional interpreter who functions as the student's mentor. The 10-week practicum consists of a minimum of 100 hours and will focus on gaining experience interpreting. The student may select a practicum placement in the post-secondary, K-12, or community setting. Additionally, students will meet two hours weekly in seminar, with other practicum students, to share observations and experiences gained from the practicum placement. Seminar discussions will focus on advanced language issues in interpretation, application of professional and business ethics, situational concerns and problem solving. The seminar instructor will be the practicum student's supervising instructor. Course requires a minimum of 135 hours of field experiences. Students must complete this course with a minimum grade of C. (Permission of instructor, cumulative GPA of 2.5 and in good standing, INTP-350, 435 and 436 with minimum grades of C) **Class 2, Credit 3 (F, S)**

**INTP-451 Mental Health Interpreting**  
This course is designed to introduce students to the field of mental health interpreting. Students will become familiar with the DSM-IV and common types of mental illness as well as psychiatric terminology in both English and ASL. Students will examine the role, function, ethics, and challenges of interpreting in mental health settings through the analytical construct of Demand-Control Schema for interpreting work. Students will also learn tools and techniques to utilize while interpreting in psychiatric environments and will have opportunities to interact with mental health professionals. (Third-year status in the program). **Class 3, Credit 3 (S)**

**INTP-460 Issues in Interpreting**  
This course offers students an opportunity to integrate content areas in the curriculum through the examination and discussion of issues in the field of interpreting. While the course content and focus will vary depending on current issues and student interest, it will direct attention toward an important issue facing the interpreting profession and will provide an advanced experience of problem solving and value clarification. Students will develop and demonstrate their ability to define a research topic, gather and evaluate scholarly evidence, and present their findings in a paper and presentation. (INTP-435, 436) **Class 3, Credit 3 (S)**

**INTP-461 Introduction to Legal Interpreting**  
This course will introduce students to the field of legal interpreting. Students will learn about the legal and judicial systems while examining the role, function, ethics, safeguards and challenges of interpreting in legal and courtroom settings. Students will employ a multidisciplinary approach to learning about legal interpreting through legal research and writing, observation, guest lecturers and interpreting practice. (Third-year status in the program) **Class 2, Lab 2, Credit 3 (S)**

**INTP-471 Introduction to Cued Speech Transliterating**  
This course is an introduction to the Cued Speech system of representing spoken English, its history, and application. Students will increase their awareness of spoken English and the pronunciation of words in conversation. They will also understand and describe the purpose of Cued Speech, why parents choose this system for their child who is deaf as well as identify other populations and uses for Cued Speech. Students will understand the language learning benefits of Cued Speech. Upon completion of the course students will be able to accurately cue spoken English. (Third-year status in the program) **Class 3, Credit 3 (S)**

**INTP-489 Special Topics: ASL-English Interpretation**  
The description for the special topics course will be specified in each course proposal. **Class 1-3, Credit 1-3 (F, S)**

### **American Sign Language**

**NASL-190 American Sign Language I**  
This course is designed for deaf and hard-of-hearing students who have no previous knowledge of American Sign Language. ASL I includes the linguistic features, Deaf cultural protocols and core vocabulary for students to function in basic ASL conversations that include ASL grammar for asking and answering questions while introducing oneself; exchanging personal information; telling where they are from and living; talking about family, friends; class schedules and routines, discussing college related topics; giving directions, and describing surroundings. Classroom and homework activities include practicing conversations, learning about Deaf Culture and Deaf Community, working with digital media, viewing sign language on digital media, and being recorded. (LCBQ 1 or 2/SIPI 1 or 2) **Class 3, Credit 3 (F, S)**

**NASL-199 Independent Study: American Sign Language**  
**Credit 1-3 (F, S)**

**NASL-200 American Sign Language II**  
This course is designed for deaf and hard-of-hearing students who have completed ASL I (or the equivalent) and can participate in a basic conversation in American Sign Language. ASL II includes the linguistic features, Deaf cultural protocols and core vocabulary for students to function in ASL conversations that include ASL grammar for asking and answering questions and relaying short narratives while describing people and objects; attributing qualities to others; discussing hobbies; explaining procedures; spending money; discussing weather; and discussing important life events. Classroom and homework activities include practicing conversations, learning about Deaf Culture and Deaf Community, working with DVDs, viewing sign language on film, and being filmed. (NASL-190 or LCBQ 3/SIPI 3) **Class 3, Credit 3 (F, S)**

**NASL-275** **Structure of American Sign Language**  
This course provides students with basic knowledge about the linguistic structure of American Sign Language (ASL). Through an introduction to language features, students will examine the phonology, morphology, syntax, semantics and discourse of ASL. Information regarding historical and cultural aspects of ASL is also introduced and discussed. (LCBQ 4 or 5; OR SIPI 4 or 5) **Class 3, Credit 3 (F, S)**

**NASL-280** **Strategies for Teaching Basic American Sign Language**  
This course provides an overview of how second languages have traditionally been taught, what the current methods and theories are, and their applications to the teaching of American Sign Language. Students are provided opportunities to practice basic teaching techniques, selection of appropriate materials, design lesson plans, and use of evaluation techniques, current technology, including how to teach Deaf culture and ASL grammatical features in lessons. Students learn about resources to support their efforts to teach American Sign Language. (NASL-275) **Class 3, Credit 3 (S)**

**NASL-289** **Special Topics-American Sign Language**  
The description for each special topics request will be specified in each course proposal. **Class 1-3, Credit 1-3 (F, S)**

## **Arts & Imaging Studies**

### **General Arts & Imaging**

**NAIS-120** **Principles of Design and Color**  
Students will be introduced to the basic elements of two-dimensional monochromatic and color design, compositional principles, and approaches to analysis of design problems. Students will develop techniques for gathering resources to work toward possible design solutions and visualization of design concepts through the use of idea sketches to final comprehensive layouts. Color theory will be introduced. Students will also utilize basic design vocabulary to participate in critiques for the purpose of analyzing their own and other students' work. This course provides students in non-creative technical majors as well as those pursuing more creative endeavors within the graphic arts field with a fundamental overview and understanding of the design process to expand critical awareness of the importance of good design. **Class 2, Lab 3, Credit 3 (F, S)**

**NAIS-130** **Raster and Vector Graphics**  
This course introduces students to the skills needed for the successful production and manipulation of raster and vector images using image creation and production software. Students will work in bitmap and vector applications, producing and editing with the tools and techniques offered by the software programs such as selection techniques, basic layer controls, digital masking, image correction and enhancement. Additional topics will include the relevance of image size, resolution and file format specifications when working with raster and vector images. Comprehension and correct usage of terminology and concepts are emphasized. **Class 2, Lab 3, Credit 3 (F, S)**

**NAIS-140** **Graphic Design and Typography I**  
Students will learn how to work through steps of the graphic design process, starting with the identification and research of design problems, and the intended message and the target audience, to development of basic graphic design solutions presented visually through clear, well-executed layouts created by both traditional and electronic means. Fundamental graphic design and typographic principles, elements, techniques and vocabulary used in design problem solving will be introduced. Students in this course will also learn about areas/categories of graphic design, creating examples such as posters, book/CD covers and logos. Topics covering selecting appropriate printing papers, professional practices, psychology of color, and critique methods will also be introduced. (NAIS-120, 130) **Class 2, Lab 3, Credit 3 (F, S)**

**NAIS-150** **Page Layout I**  
Students will use page layout (desktop publishing) applications to design and produce pages and documents to given specifications. Skill development will include importing and placing text and graphic files, the application of style sheets, templates, snippets, libraries, and color specifications. The application of design and typographic principles, industry terminology, measurement systems, font management, and file management are also covered. **Class 2, Lab 3, Credit 3 (F, S)**

**NAIS-160** **Web Design I**  
This course introduces students to the fundamental skills needed to create designs that work on the World Wide Web. Students are introduced to the Internet, learn basic HTML programming for graphics, and legal issues of the Internet. Text-based technology is used to separate design from content using templates and cascading style sheets (CSS). Topics such as image preparation, page design, site graphic design, navigation and linking, content, usability, speed, originality and audience are discussed. Students are expected to create Web pages that demonstrate their understanding and use of basic application of the above topics. **Class 2, Lab 3, Credit 3 (F, S)**

**NAIS-199** **Independent Study-Arts and Imaging Studies**  
The description for each independent study request will be specified in each student proposal. **Credit 1-3 (F, S)**

**NAIS-201** **Employment Seminar**  
Provides students with an opportunity to prepare for co-op and permanent employment through activities including developing and revising resumes, cover letters and portfolios, completing forms, interviewing, developing strategies for finding job opportunities, and researching targeted companies. Discussions relating to personal finance, communication strategies, adapting to the workplace, tips for job success, and workplace expectations will be included. (Second-year program status) **Class 3, Credit 3 (F, S)**

**NAIS-289** **Special Topics: Arts and Imaging Studies**  
The description for each special topics request will be specified in each course proposal. **Class 1-5, Credit 1-5 (F, S)**

**NAIS-291** **Production Workshop**  
This course reinforces the students' skills learned in their Arts and Imaging Studies technical courses. Students are introduced to procedures that are used in an actual graphic communications production environment, including the cost of doing business, estimating procedures, and production and quality control requirements. This course enables the student to develop and apply individual and team-building problem-solving skills as they are guided through integrated activities from creation to final product in both print and non-print media production workflows. Students work in a simulated design and production environment where they can develop their technical skills, work habits, and customer relations. **Class 2, Lab 3, Credit 3 (F, S)**

**NAIS-292** **Portfolio Workshop**  
This course will give students from all areas of study in the arts and imaging studies department an opportunity to prepare and submit portfolios of their work for final review by a jury composed of department faculty members and professionals. The course will emphasize professional procedures, work habits, and demonstration of creative and technical skills, depending on the students' areas of expertise, as well as appropriate communication with clients, presentation techniques, and ability to work as a fully contributing member of a team. (NAIS-299) **Class 2, Lab 3, Credit 3 (F, S)**

**NAIS-299** **Co-op: Arts and Imaging Studies**  
This course provides a ten-week (350 hours) work experience in the field. (NAIS-201) **Credit 0 (F, S, Su)**

### **Graphic Design Concentration**

**NGRD-111** **Drawing I**  
This course is an introduction to freehand drawing of basic forms, with an emphasis on perspective, including one-point and two-point techniques, still life studies and figure drawing. Drawing principles, materials and techniques will be introduced. Still life study will be applied using perspective concepts, and composition, including tonal values and textures. Figure drawing will be focused on the study of line, gesture, contour, construction, proportion and tonal values. **Class 2, Lab 3, Credit 3 (F, S)**

**NGRD-115** **Visual Idea Development**  
This course gives students the opportunity to see themselves, their experiences and their environment as sources of creativity, through a variety of activities which will include classroom discussions; videos of artists; visiting a gallery; keeping documented written and illustrated journals, sketchbooks; and working with a team to do a project. Students learn strategies for developing concepts and organization of thought processes as well as systems to formulate solutions to design problems. The library is used for development of research skills for written and visual content. **Class 2, Lab 3, Credit 3 (F)**

**NGRD-221**

This course continues the principles and skills developed in Drawing I, with special emphasis on the human form, including proportion, shading, light and dark, head/facial features, sustained study, and the use of figure within a composition. This course extends the various applications learned in the previous drawing and applies them to still life, drapery studies, and the human form within various environments. The use of the sketchbook will be emphasized for development of composition skills; students will use the library and other resources and will further explore various kinds of drawing materials. (NGRD-111) **Class 2, Lab 3, Credit 3 (S)**

**NGRD-221****History of Graphic Design**

This course includes the study of a survey of art and design movements, designers, and typographers who have made significant contributions to the field of graphic design. **Class 3, Credit 3 (F)**

**NGRD-222****Art History**

This course is a survey of major historical developments in the visual arts from prehistoric time to current movements in the fine arts. **Class 3, Credit 3 (S)**

**NGRD-230****Digital Illustration**

This course will provide students with skills and techniques used in areas of digital illustration, including comparison of techniques and functions of vector and bitmap software programs to create professional-quality renderings. Various kinds of illustration will be introduced, including editorial, book, and information illustration (illustrated charts and graphs). Students will have the opportunity to create professional quality illustrations for various audiences and media. (NAIS-140) **Class 2, Lab 3, Credit 3 (F)**

**NGRD-240****Graphic Design and Typography II**

Students will practice working through steps of the graphic design process learned in Graphic Design and Typography I to develop more complex design solutions presented visually through clear, well executed layouts created by both traditional and electronic means. More advanced design and typography principles will be discussed. Students in this course will learn about and will create examples of various areas/categories of graphic design, including corporate graphic design, information design, advertising design, editorial design and packaging design. Topics such as using creative briefs, folding/finishing/binding methods, professional graphic design business practices and self-promotion will also be covered. (NAIS-140) **Class 2, Lab 3, Credit 3 (F)**

**NGRD-255****Publication Design**

In this course, focus will be placed on design of multi-paged printed graphics including brochures, booklets, catalogs, menus and editorial designs using grids to organize information. Issues such as page sequencing and pagination, readability, design flow, consistency and preparing documents to meet industry standards will be addressed. Assignments will be completed using page layout software consistent with industry standards. (NAIS-140, 150) **Class 2, Lab 3, Credit 3 (S)**

**NGRD-256****Identity Design**

In this course, students will learn about various classifications and areas of identity design and will develop identity symbols and systems of identification and branding for businesses and organizations as well as individuals, including components such as business cards, letterheads, envelopes and invoices. Focus will be on identifying client need, budget and target audience in order to develop appropriate identity design solutions with components that are compatible, consistent, and practical to use. In addition, students will be familiarized with current brand identification system designers and current design trends in identity design. Students are expected to find a real client for at least one of the assignments for this course. (NGRD-240) **Class 2, Lab 3, Credit 3 (S)**

**NGRD-257****Animation**

In this course, students will learn how to create illustrations, create animation, and develop animated elements for web-based and stand-alone interactive media. Course content includes concepts of staging, timelines, frame rates, keyframes, transitions, and object attributes. Writing and storyboarding for animation will be addressed. Both vector and raster animation applications will be used. (NAIS-120 and 130, NGRD-111) **Class 2, Lab 3, Credit 3 (S)**

**NGRD-258****Cartooning**

In this course, students will learn how to create cartoons, apply storytelling techniques to develop sequential graphic narratives, and develop multi page, multi-strip, or single panel cartoons. Course content includes understanding the history of cartooning, drawing techniques (both traditional and digital methods), character creation and development, story writing, plot breakdowns, panel to panel sequencing, cartooning, and creating final output in the form of a printed comic book or an online Web comic. Writing and breakdowns for cartooning will also be taught. Drawing techniques and software applications are taught and used in the course. **Class 2, Lab 3, Credit 3 (offered biannually)**

**Graphic Production Concentration****NGRP-110****Digital Photography I**

This course gives students an introduction to the tools, techniques and terminology of digital photographic imaging through a series of hands-on activities that will permit each student to investigate the applications of digital photography. Students will be expected to capture images using digital cameras, process digital images using the appropriate software, create quality picture files and prints, and participate in project-related critiques. **Class 2, Lab 3, Credit 3 (F, S)**

**NGRP-210****Digital Photography II**

Aesthetic/composition considerations will be emphasized. Various genres and markets will be discussed such as photo journalism, portraiture, fine art, advertising and marketing, sports and still life. This course will also address various technologies for the capturing and converting of multiple static images into more dynamic presentations of environments, and objects. Topics will include panoramic stitching, creating virtual tours, creating 360 degree views of 3D objects, and creating dynamic slide shows. Students will be taught basic techniques for studio lighting and will be asked to produce photographs to match an art director sketch or layout. (NGRP-110) **Class 2, Lab 3, Credit 3 (S)**

**NGRP-220****Videography**

This course provides an overview of videography for the Web. This is a basic digital video course that introduces the process and procedures involved in digital video production from start to finish. Students will be introduced to videography production techniques, camera operation and formats, digital non-linear editing, titling and lighting for video. Emphasis is on development of ideas, proper operation of video and computer equipment for productions and post-production of digital non-linear edited sequences and their adaptation to different presentation formats for online delivery. **Class 2, Lab 3, Credit 3 (F)**

**NGRP-231****Image Preparation**

Students will build on the skills previously learned in Raster and Vector Graphics. This course includes specialized image preparation techniques used to acquire, optimize, correct, reconstruct, restore, and enhance images for placement in print and digital media layouts. Topics include: determining and applying resolution and magnification settings appropriate to the characteristics of the specified purpose of an image, setting highlight and shadow points, removing color cast, sharpening, and tone-adjustment of acquired images; the use of desk-top scanners hardware/software; the use of appropriate color settings/modes and file formats. (NAIS-130, 150, 160) **Class 2, Lab 3, Credit 3 (F)**

**NGRP-232****Image Manipulation**

This course emphasizes the procedures and skill development required for the efficient and effective manipulation and compositing of digital images in a production environment building on the skills previously learned in Raster and Vector Graphics. This is a production-oriented course with a focus on the non-destructive editing of (primarily raster) digital images. This course includes specialized image manipulation methods such as advanced selection and masking techniques for producing images that blend together into a single composite image. Additional topics include applying production planning techniques to image manipulation, production quality standards, advanced methods and quality criteria for image manipulation, and legal and ethical issues. (NAIS-130) **Class 2, Lab 3, Credit 3 (S)**

**NGRP-245****Color Theory and Management**

This course includes the study and management of color for design, printing, Web, and photographic imaging systems and procedures. Students will use and apply correct technical vocabulary, and various concepts and procedures related to the perception, specification, evaluation, correction, and management of color in various graphic arts. (NAIS-120, 130) **Class 2, Lab 2, Credit 3 (F)**

**NGRP-250****Page Layout II**

This course builds on topics presented in Page Layout I. Students will define and apply techniques and procedures for optimizing document design and production efficiency. Topics include defining paragraph, character, and object styles; making and using templates; saving and accessing object snippets and libraries; accessing and using database information to create documents, recognizing and applying proofreaders marks and notations; defining and applying advanced typographic techniques, advanced page layout procedures, object transparency and other image effects; building and editing tables; and, defining and applying color specifications and effects; and using document output procedures. Students will continue to develop knowledge and skills in the industry leading page layout software applications. (NAIS-150) **Class 2, Lab 3, Credit 3 (S)**

**NGRP-251****Publication Production**

The students will study the use of page layout applications to produce book, magazine, and long format publications. Topics include techniques for specifying and applying publication templates; font management and selection; page formats; page and section numbering; headers and footers; text editing; graphics creation, preparation, and placement; color specification and usage; automating a table of contents; using a colophon and other features typical for book and long document publishing formats. Students are introduced to the repurposing of documents for interactive digital media and XML-based document production. (NGRP-250) **Class 2, Lab 3, Credit 3 (F)**

**NGRP-252****PDF Production and Workflow**

The students will study the Portable Document Format (PDF) file format including defining and applying specifications for color management, file optimization and file security; recognizing and editing PDF documents; and using PDF files in a variety of print and non-print media production workflows. Topics include procedures for making PDF files, and adding interactive features including bookmarks, action button, hyperlinks to internal anchors, and hyperlinks to other documents and Web content. Emphasis is given to file optimization for interactive display size formats, color, and resolution. (NAIS-130, 150) **Class 2, Lab 3, Credit 3 (S)**

**NGRP-260****Web Design II**

This course provides an overview of designing multi-page websites and being sure they are accessible to audiences with special needs. Students will continue to learn how to use website concepts and design elements learned in Web Design I to successfully create a multi-page website. Effective use of color, typography, and design will be applied to website design. Students will continue the study and application of Web design concepts, site navigation, interactivity, and the management of a multi-page website. Students will develop a website that combines the advantages of text-based production techniques and graphics-based design with content management systems, with a focus on usability and accessibility. (NAIS-160) **Class 2, Lab 3, Credit 3 (S)**

**NGRP-261****Interactive Digital Media**

This course provides an overview of designing interactive digital media. In this course, students will continue to learn how to use design elements successfully to create a multi-page website and DVD interactive media disks. Students will be introduced to the concepts of designing and developing interactive digital media, user interface theories, and the management and development of an interactive digital media file. Students will also create and prepare digital elements for network use. Issues of file size, quality, format, and client/server interaction are covered. 2D/3D vector and raster graphics will be used along with animation, video and presentation applications. (NGRP-260) **Class 2, Lab 3, Credit 3 (F)**

**NGRP-270****Specialty Graphics Imaging**

This course provides students with a unique set of knowledge and skills required for the preparation, production, finishing, material handling, mounting and displaying of wide format products. Students will study procedures used to create products that include large display signage and decals, vehicle wraps, packaging mock-ups, point-of-purchase display elements, vinyl appliqué, magnetic and tieback signage, and large-scale presentation displays, and other large-scale signage. (NAIS-130, 140; NGRP-110, 231) **Class 2, Lab 3, Credit 3 (F)**

**NGRP-275****Digital Printing Systems**

This course will focus on the operating features of the black and white and color digital production printing systems. Students will learn the job and market capability of the various systems, xerography concepts in monochrome printing, image and paper quality considerations, creation of electronic files and file transfer, and operating procedures. Additional topics include the digital workflow for on-demand book printing and small-format binding. (NAIS-130, 150) **Class 2, Lab 3, Credit 3 (S)**

**Business Studies****Accounting Technology****NACC-130****Personal Finance**

This course provides students with information and resources needed to understand the creation and implementation of a budget, use of credit and borrowing money responsibly, financial rights and ways to safeguard their money, and factors used to determine their readiness to buy a home or make other major purchases. Information on financial institutions such as banks, credit unions, and savings and loan organizations will also be covered. This course will provide students with basic financial literacy so they can develop sound financial management of their personal income as well as an understanding of the economic events that can influence their financial well-being and society as a whole. **Class 2, Lab 3, Credit 3 (F, S)**

**NACC-199****Independent Study:****Accounting Technology/Business Technology**

The description for each independent study request will be specified in each student's proposal. **Credit 1-3 (F, S, Su)**

**NACC-201****Accounting 1**

Introduction to accounting principles for both accounting and nonaccounting students. Both service and merchandising (retail/wholesale) businesses are introduced. Areas covered include: analyzing and recording of business transactions using the double-entry accounting system; end-of-period adjustments; worksheet; financial statements; closing entries; and post-closing trial balance. Students complete a comprehensive "accounting cycle" project. Computerized spreadsheet applications are required. (NAST-160) **Class 2, Lab 3, Credit 3 (F, S)**

**NACC-202****Accounting 2**

This course is a continuation from Accounting 1. Topics covered include: accounting principles and procedures related to notes payable and receivable, the valuation of receivables, inventories, fixed assets, partnerships, capital stock, retained earnings, taxes, dividends, bonds, the statement of cash flow, and the analysis of financial statements. A comprehensive capstone project is completed. Computerized spreadsheet applications are required. (NACC-201) **Class 2, Lab 3, Credit 3 (F, S)**

**NACC-203****Accounting 3**

Cost accounting is the focus of this course. Coverage includes manufacturing statements, cost theory, integration of materials, labor and overhead, average and FIFO process costing methods, equivalent units, multiple products, changes in units, budgeting, cost classification and computerized applications. Students complete a comprehensive project. Computerized spreadsheet applications are required. (NACC-202) **Class 2, Lab 2, Credit 3 (F, S)**

**NACC-204****Accounting Capstone**

This capstone experience gives students an opportunity to reinforce and apply accounting skills previously studied. Students will apply skills using a variety of approaches including case studies, simulations, projects, teamwork, and presentations. Students will research, review and interpret financial data and its impact on managerial decisions. The course will also discuss the workplace as it relates to communication, interpersonal skills, decision-making, ethics and lifelong learning skills in a professional accounting environment. (NACC-203) **Class 2, Lab 2, Credit 3 (F, S)**

**NACC-205****Financial Accounting**

Introduction to accounting principles for both accounting and non-accounting students. Both service and merchandising (retail/wholesale) businesses are introduced. Areas covered include: analyzing and recording of business transactions using the double-entry accounting system; adjusting and closing entries and financial statement preparation. Generally accepted accounting principles, accounting ethics and analytical tools help students become informed users of financial statements. **Class 2, Lab 2, Credit 3 (F, S)**

**NACC-206****Managerial Accounting**

Introduction to the use of cost accounting information by managers within a business. This course includes development of manufacturing statements, cost theory, integration of materials, labor and overhead, job order and process costing, flexible budgeting and evaluating the performance of managers and divisions through variance analysis. (NACC-205) **Class 2, Lab 2, Credit 3 (F, S)**

**NACC-289 Special Topics: Accounting Technology/Business Technology**

The description for each special topics request will be specified in each course proposal. **Class 1-3, Credit 1-3 (F, S, Su)**

**NACC-299 Co-op: Accounting Technology/Business Technology**  
Designed to give the student an opportunity to gain work experience, to apply what has been learned and to self-evaluate personal communication skills. Placement assistance is provided to help the student find a job related to his/her field of study. One co-op experience is required for graduation. **Credit 0 (F, S, Su)**

### **Administrative Support Technology**

**NAST-140 Essential Document Production**  
This course is for students with little or no knowledge of word processing software, limited keyboarding experience, and those that have a minimum of 20 net words per minute. Emphasis is on keyboarding skill development as well as an introduction to basic word processing skills. Students key and format business correspondence, reports, and tables. The expectation is to exit this course with a 30 net words per minute typing proficiency for five minutes. **Class 2, Lab 3, Credit 3 (F, S)**

**NAST-150 Advanced Document Production**  
This course focuses on effective management of document production activities by selecting an appropriate format or template, applying graphic enhancements as needed, and saving the document in an appropriate business format. Business correspondence, newsletters, tables, forms and reports will be produced using word processing software. Emphasis is on the mastery of basic skills and their application to a variety of realistic office document production projects. Typing skill development continues with an expected exit speed to 40+ net words per minute for five minutes. (NAST-140) **Class 2, Lab 3, Credit 3 (F, S)**

**NAST-160 Spreadsheet Applications for Business**  
Emphasis will be on creating, formatting, and enhancing worksheets; creating and applying formulas and functions; building and formatting charts; using What-If analysis and creating templates. Upon completion, students will be able to design and enhance basic spreadsheets. **Class 2, Lab 3, Credit 3 (F, S)**

**NAST-199 Independent Study:**  
**Administrative Support Technology/Business Technology**  
The description for each independent study request will be specified in each student's proposal. **Credit 1-3 (F, S, Su)**

**NAST-210 Essentials of Business Communication**  
This is a course in the essentials of business communication for today's fast-paced global environment. Emphasis will be on the message and the modes of communication used in the business environment. Participants will engage in effective communication skills through writings (traditional and electronic), face-to-face interactions, and team presentations. Course content will also include emphasis on non-grammar language applications in business communication. **Class 2, Lab 2, Credit 3 (F, S)**

**NAST-215 Integrated Document Production**  
The course further develops student skills in integrated document formatting and applications using various types of word processing, spreadsheets, databases, slide presentations, and electronic office procedures. Through business simulations, students will have an opportunity to incorporate their speed/accuracy and production skills with communication, information and file management skills. The expectation is to exit this course with a 50 net words per minute proficiency for a five-minute timing. (NAST-150), **Class 2, Lab 2, Credit 3 (F, S)**

**NAST-220 Database Applications for Business**  
This course introduces the fundamental concepts of a database management system for creating, maintaining, manipulating, retrieving, and printing business data. Students will learn to create various forms and design reports for storing and displaying data. In addition, the student will create switchboard systems and allow users to view data in multiple dimensions. Students will also learn to save database objects in HTML format so they can be viewed by a browser and imported or exported in XML format. **Class 2, Lab 2, Credit 3 (F, S)**

**NAST-225 Business Graphics**  
This course provides students with a basic knowledge of business graphics on a windows platform. Students will be introduced to basic design principles and develop the ability to choose, modify and effectively use appropriate graphics for a variety of business communication formats. Students will be required to produce an e-portfolio to document the skills learned in the AST program. (NAST-215) **Class 2, Lab 2, Credit 3 (F, S)**

**NAST-230 Desktop Publishing for Business**  
This course focuses on conceptual and technical approaches to desktop publishing and graphic design as applied to business communications. Emphasis is placed on the use of design principles related to color, space, text and images in preparation of digital design layouts. Students will be required to enhance their AST e-portfolio using desktop publishing and web design skills acquired in this course. (NAST-225) **Class 2, Lab 2, Credit 3 (F, S)**

**NAST-240 Administrative Support Technology Seminar**  
This course provides students with an opportunity to prepare for employment through a formal mentoring experience, team presentation, and guest presentations. Topics for discussion are project management, assertiveness training, leadership styles, effective one-on-one interpersonal and electronic communication, protocol for working with an interpreter, and lifelong learning as necessary for job success. Through weekly meetings with their mentors, students will share responsibility for interactions, establish a learning relationship, increase self-direction, and gain a greater understanding of the workplace. (NAST-210) **Class 2, Lab 2, Credit 3 (S)**

**NAST-241 Preparation for Microsoft Word Certification**  
This course is intended to prepare students to take a certification exam for Microsoft Word. The exam tests proficiency through hands-on assessment in simulated Microsoft Office Word applications. Skill sets include creating and customizing documents, formatting content, working with visual content, organizing content, reviewing documents, and sharing and securing content. (NAST-150) **Lab 2, Credit 1 (F, S)**

**NAST-242 Preparation for Microsoft PowerPoint Certification**  
This course is intended to prepare students to take a certification exam for Microsoft PowerPoint. The exam tests proficiency through hands-on assessment in simulated Microsoft Office PowerPoint applications. Skill sets include: Creating and formatting presentations, creating and formatting slide content, working with visual content, and collaborating on and delivering presentations. (NAST-225) **Lab 2, Credit 1 (F, S)**

**NAST-243 Preparation for Microsoft Excel Certification**  
This course is intended to prepare students for Microsoft Excel certification. The exam tests proficiency through hands-on assessment in simulated Microsoft Office Excel applications. Skill sets include: structuring and manipulating data, formatting data and content, creating and modifying formulas, presenting data visually, and collaborating and securing data. (NAST-215) **Lab 2, Credit 1 (F, S)**

**NAST-244 Preparation for Microsoft Access Certification**  
This course is intended to prepare students to take a certification exam for Microsoft Access. The exam tests proficiency through hands-on assessment in simulated Microsoft Office Access applications. Skill sets include: structuring a database, creating and formatting database elements, entering and modifying data, creating and modifying queries, presenting and sharing data, and managing and maintaining databases. (NAST-220) **Lab 2, Credit 1 (F, S)**

**NAST-289 Special Topics:**  
**Administrative Support Technology/Business Technology**  
The description for each special topics request will be specified in each course proposal. **Credit 1-3 (F, S, Su)**

**NAST-299 Co-op: Administrative Support Technology/Business Technology**  
Designed to give the student an opportunity to gain work experience, to apply what has been learned and to self-evaluate personal and communication skills. Placement assistance is provided to help the student find a job related to his/her field of study. One co-op experience is required for graduation. **Credit 0 (F, S, Su)**

### **General Business**

**NBUS-200 Orientation to Business**  
This course introduces students to a broad overview of the form and structure of multinational organizations. It provides students with a basic knowledge of the history, organization and operation of business and its particular vocabulary. **Class 2, Lab 2, Credit 3 (F, S)**

**NBUS-211 World of Business and Innovation**  
This course is an overview of the functions and processes of business organizations. Topics include the roles and responsibilities of the manager, managing business ethics and social responsibility, competing in a global environment, organizational structure and authority, and managing diversity, change, communication and innovation. **Class 3, Credit 3 (F, S)**

**NBUS-213** **Applied Ethics for Business**  
This course introduces ethical issues facing the business community. Students will learn about common work-related ethical issues, and evaluate problems concerning professional conduct and moral conflict. Students will also learn about ethical behavior, how to recognize ethical behavior, and how to model ethical behavior in the workplace. Individual, organizational and societal needs will be taken into consideration during the students' decision-making process. **Class 2, Lab 2, Credit 3 (F, S)**

**NBUS-217** **Fundamentals of Management**  
This course focuses on the management aspect of organizations. Students will learn a variety of methods management uses to stay organized, lead and motivate employees as well as how controls are established to ensure company goals are met. Emphasis will be placed on understanding the multi-faceted roles of leaders and managers in the workplace. (NBUS-200) **Class 2, Lab 2, Credit 3 (F, S)**

**NBUS-221** **Essentials of Human Resource Management**  
This course acquaints Administrative Support Technology (AST) students with the basic concepts of Human Resource Management. Exposure to the changing nature of Human Resources relates to employee retention, legality, EEO/Diversity, job analysis, recruitment, selection, training and development as well as performance management, compensation, benefits, employee relations and labor relations. An overview of the range of duties and levels of responsibilities found in this sector of the business environment will allow students to identify similarities between job function required of an administrative assistant and of a human resources assistant. (NBUS-217) **Class 2, Lab 2, Credit 3 (F, S)**

**NBUS-223** **Fundamentals of Marketing**  
This course introduces the field of marketing and its focus on how consumer behavior effects in the marketplace (domestically and internationally). Emphasis will be placed on understanding the marketing mix and its impact on the external market environment. (NBUS-200) **Class 2, Lab 2, Credit 3 (F, S)**

**NBUS-225** **Introduction to Entrepreneurship**  
This course introduces the role of the entrepreneur in identifying opportunities, seeking funding and other resources, and managing the formation and sustainability of the new venture. Emphasis will be placed on understanding the development process from idea generation to realization of a product or service by creating a business plan. (NBUS-211) **Class 3, Credit 3 (F, S)**

**NBUS-227** **Principles of Marketing**  
This course introduces the field of marketing and its focus on how consumer purchasing behavior impacts the marketplace (domestically and internationally). Emphasis will be placed on understanding the customers' needs and wants, marketing mix and its impact on the external market environment. Students will demonstrate the marketing concepts, principles and strategies through the development of a marketing plan. (NBUS-225) **Class 3, Credit 3 (F, S)**

## **Career Development**

**NCAR-100** **Freshman Seminar**  
The course provides entering NTID students with opportunities to develop/enhance academic skills, personal awareness, and community involvement in order to maximize their college experience. Students have opportunities to explore and navigate the college environment, develop/reinforce academic skills and participate in service learning opportunities. Students are encouraged to establish meaningful connections with faculty, staff and peers. The course promotes the development of plans for ongoing growth and involvement in class and in the RIT/NTID and/or broader community. **Class 1, Lab 1, Credit 1 (F, S)**

**NCAR-110** **Wide World of Technology**  
This survey course introduces students who are undecided about their major to the evolution of technology, its current day uses, and its impact on our global society. Through the exploration of the relationship between individual value systems, interests, and skills, students will begin to envision how they might fit into a specific technological career area. In addition, students will begin to develop academic skills in critical thinking, problem solving, communication, interpersonal relationships, and team work needed for success in the academic environment. **Class 1, Lab 1, Credit 2 (F)**

**NCAR-115** **Career Decision Making**  
This course provides information and experiences regarding career exploration, career options, workforce trends, and educational requirements. Students acquire career information from relevant resources and select an appropriate career using a decision-making model. Students develop a career plan after completing a self-assessment, gathering information on his/her specific career option, and participating in a program sampling experience of NTID/RIT academic disciplines. **Class 1, Lab 2, Credit 2 (F, S)**

**NCAR-201T** **Employment Seminar**  
Provides the student with an opportunity to synthesize a work experience with knowledge gained in technical and liberal arts courses in order to prepare for permanent employment. Experiences will include résumé revisions, further research into potential permanent employment, including accessing professional journals, electronic networks and interviewing for permanent employment. Discussions relating to financial considerations to be used in evaluating employment opportunities and individual roles with the organization will also be included. **Class 1, Credit 1 (F, S)**

## **Communication Studies**

**NCOM-101** **Problem Solving**  
This course sharpens students' ability to think clearly, logically and creatively and to communicate knowledge effectively in an academic setting. Critical thinking strategies are learned for examining issues and solving problems. Course topics include problem solving using a five-step model; classifying and sequencing information; identifying multiple perspectives on an issue; analyzing arguments used to support a position; and creating visual representations of problems and solutions. The importance of thinking critically and effectively during communication regardless of modality (writing, reading, signing, speaking, listening) is stressed. (Corequisite enrollment in NENG-102, 103, 112 or 113) **Class 3, Credit 3 (F, S)**

**NCOM-199** **Independent Study: Communication Studies and Services**  
The description for each independent study request will be specified in each course proposal. **Credit 1-4 (F, S)**

**NCOM-201** **Interpersonal Relationships**  
This course examines the role of communication as it relates to establishing, maintaining, and ending relationships. Topics include: relationship development; self-concept; perceptions and first impressions; stereotyping, prejudice and discrimination; conflict resolution; active and passive listening; personal and social values; self-disclosure; gender-related communication; intercultural competence; and social networking. **Class 3, Credit 3 (F, S)**

**NCOM-202** **Intercultural Communication**  
This course is intended to provide students with an introduction to the concepts of culture, communication, and intercultural communication as they relate to face-to-face communication. The students will learn about the relationship between culture and communication and how to reduce potential conflict. Knowledge gained and skills learned in this course will apply to communication in everyday situations, a diversified workplace and interactions in a global society. **Class 3, Credit 3 (S)**

**NCOM-204** **Dialogue on Black Perspectives**  
This course will challenge students to analyze and compare various perceptions about Black American life in the 21st century. This course includes but is not limited to racial, economic, and ideological shifts and their impact on past and current events. Cultural influences will be traced from early Western Africa to the United States. Viewpoints on identity, language, relationships, and generational differences will be explored through assigned readings and interviews. Students will lead the class in open dialogues associated with their researched topics. In addition, varying perspectives will be presented through lectures, guest speakers and personal experiences from individuals with diverse cultural backgrounds. Upon completion of this course, it is anticipated that students will have broader knowledge of the multidimensional aspects of the Black experience. **Class 3, Credit 3 (S)**

**NCOM-206** **Effective Teams**  
This course focuses on the information and skills needed to be a knowledgeable, effective participant in small groups and teams. Topics related to group dynamics and team-building are addressed at the practical and theoretical levels. These topics include characteristics of effective teams, stages of group development, how groups operate for different outcomes, group vs. personal goals, the role of diversity, and group decision-making and problem-solving techniques. **Class 3, Credit 3 (F, S)**

**NCOM-207 Organizational Communication and the Deaf Employee**  
This course examines interpersonal and small group communications in organizational settings in today's global, corporate climate, with emphasis on important aspects of communication for deaf individuals entering a professional career. Students become familiar with the business environments of large and small companies and the implication of company size regarding personnel decisions. Case studies from selected corporations provide insights into elements of communication processes such as networks (electronic and non-electronic), organizational structures, managerial decision-making, interviewing, organizational development, and conflict resolution. Companies' perspectives on hiring culturally and ethnically diverse individuals and Deaf individuals are discussed. Laws, such as Americans with Disabilities Act (ADA), related to the hiring and support of disabled workers are addressed. Additionally, processes to effectively communicate and market entrepreneurial business plans as a strategy for employment in an evolving world economy will be reviewed. Activities will focus on improving professional face-to-face communication, e-mail, and presentation skills. **Class 3, Credit 3 (F, S)**

**NCOM-208 Critical Thinking**  
This course sharpens students' ability to think clearly, logically and creatively in order to establish well-supported solutions and conclusions in a variety of situations. Critical thinking and reasoning strategies are learned and applied. Course topics include problem solving, the types and general rules of arguments, the analysis of arguments and rhetoric found in contemporary life, and argumentative writing and presentation. The importance of thinking critically and effectively during communication regardless of modality (writing, reading, signing, speaking, listening) is stressed. **Class 3, Credit 3 (F, S)**

**NCOM-289 Special Topics: Communication Studies and Services**  
The description for each special topics request will be specified in each course proposal. **Class 1-4, Credit 1-4 (F, S)**

## Engineering Studies

### Applied Mechanical Technology

**NETS-101 Fundamentals of Engineering**  
This course will introduce students to the field of mechanical engineering technology through an exposition of its disciplines, including basic mechanics, fluid power, and energy. Students will be introduced to design and engineering problem solving methods that will be applied to problems in the aforementioned topic areas. Students will analyze data, perform design calculations, solve equations, and program devices. Project reports are generated through the integration of these tools with word processing and presentation software. The application of software tools to the engineering design process will be emphasized throughout. **Class 1, Lab 4, Credit 3 (F, S)**

**NETS-110 Foundations of Materials**  
This course introduces students to the commonly used families of materials. It focuses on the fundamental principles of properties of materials utilized in the practice of engineering. Metals, ceramics, polymeric materials and composites are studied, with a particular emphasis in steels and non-ferrous metals. Material selection is also discussed. (Corequisite NETS-111) **Class 2, Credit 2 (F)**

**NETS-111 Foundations of Materials Lab**  
A required laboratory course taken concurrent with Foundations of Materials (NETS-110). Properties of materials will be determined through experimentation and use of reference sources. (Corequisite NETS-110) **Lab 2, Credit 1 (F)**

**NETS-120 Manufacturing Processes**  
This introductory course investigates the four major categories of traditional manufacturing processes as well as newly developed non-traditional techniques. This course focuses on understanding the concepts of past and current manufacturing processes. Students will learn how typical industrial piece parts and assemblies are manufactured. Topics focus on processes and related theory for the traditional manufacturing processes of material removal, metal forming, joining, casting and molding, as well as more recently developed processes such as powder metallurgy, rapid prototyping, EDM, chemical machining, water jet, LASER and plasma cutting. **Class 2, Lab 3, Credit 3 (S)**

**NETS-150 Mechanical Design and Fabrication**  
This introductory course investigates basic engineering concepts and how they relate to traditional manufacturing processes and techniques. Topics will emphasize the design of components through the use of solid modeling, dimensioning, tolerancing, geometric dimensioning and tolerancing, and statistics. In a related laboratory course, students will be expected to build, inspect, and integrate their designs. (Corequisite NETS-151) **Class 3, Credit 3 (S)**

**NETS-151 Mechanical Design and Fabrication Lab**  
This lab course integrates basic manufacturing techniques with engineering design concepts. Traditional machine shop tools and precision measuring instruments will be used by the students as they create the objects that they designed in the related classroom course. (Corequisite NETS-150) **Lab 2, Credit 1 (S)**

### Computer-Aided Drafting Technology

**NCAD-108 Data Collection and Analysis**  
Students develop hands-on experience with basic measuring instruments used by the A/E/C industry through lab and field activities. Students develop a methodology for recording field measurements that can be accurately converted into digital documentation. Students also develop the ability to interpret industry standard construction documentation produced by others. **Class 2, Lab 3, Credit 3 (S)**

**NCAD-112 Computing Tools for Engineering Technology**  
This course provides a foundation of computer skills common to classroom and work environments in engineering related fields. These include skills with using operating systems, networks, the Internet, common office productivity tools, and graphics tools. Assignments will include engineering communication and problem solving components. Effective communication strategies will be explored in giving a presentation. Students will also develop a basic website which will be used as a basis for the student's electronic portfolio. **Class 2, Lab 3, Credit 3 (F)**

**NCAD-150 Engineering Graphics in AEC**  
The objective of this course is to introduce students to engineering graphics as a means of communication in the technical fields of architecture, engineering and construction (A/E/C). The course is laboratory-oriented and provides the student with basic skills to create professional 2D drawings with this comprehensive first course in the use of AutoCAD software for mechanical, architectural and civil drawings. The course assumes no prior knowledge of engineering drawing or CAD. **Class 2, Lab 3, Credit 3 (F)**

**NCAD-170 Construction CAD I**  
The objective of this course is to learn the fundamental concepts of building information modeling (BIM) and how computer aided drafting (CAD) is used to produce basic construction documents. Students will learn to create a basic BIM project as well as learn basic AEC concepts and terms. Students will also develop effective time management skills and file management strategies. **Lab 9, Credit 3 (S)**

**NCAD-180 Civil Technology Graphics**  
The objective of this course is to develop an understanding of drawings and practices used in the civil drafting field. Students engage in sketching exercises as well as use computer aided drafting tools to create plans and drawings for civil engineering projects. Students are introduced to mapping, surveying, GIS, plot plans, contour lines, highway layout, profiles and earthwork drawings. Students develop an understanding of the technical and legal purpose of these drawings and how to assemble them. No official prerequisites are required, but students should have basic computer literacy skills. **Class 2, Lab 3, Credit 3 (S)**

**NCAD-199 Independent Study: CADD**  
The description for each independent study request will be specified in each student proposal. **Credit 1-5 (F, S)**

**NCAD-201 Job Search Process for CADD**  
Course goals are to prepare students to secure a cooperative or professional work experience in the student's major and to assist the student in acquiring the skills for accessing information, networking, developing resumes and letters, completing various employment-related forms, interviewing, and using various communication techniques in preparing students for the job search process. This course also includes a lab where students will design and create a hard-copy and a web-based electronic portfolio, and students will engage in practice interviews to effectively communicate the contents of their portfolio. **Class 2, Lab 2, Credit 3 (F)**

**NCAD-220 Construction CAD II**  
The objective of this course is to learn how Building Information Modeling (BIM) can bring different disciplines together in a coordinated way to facilitate the design of a building. The course will build on the CAD skills learned in Construction CAD I to develop a more complex commercial BIM project that includes Architecture, MEP services and structural systems. Students will learn various AEC concepts and terms as well as how to organize a set of construction documents. (NCAD-108, 170) **Lab 9, Credit 3 (F)**

**NCAD-230** **Construction CAD III**  
Students learn to apply 3-D CAD techniques to a multi-level construction project situated on a site with significant topographic features. Students will function as a team to create a total project model. Structural systems will be integrated into the construction of the building model. Students will extract and refine a series of orthographic views of the site and building models such that a comprehensive set of working drawings is produced. (NCAD-220, 255) **Lab 9, Credit 3 (S)**

**NCAD-240** **Advanced Construction CAD**  
Students develop CAD and BIM skills gained in previous courses by adding skills in design development. The project, a building of two or more stories, requires the synthesis of information and principles both from previous courses and from reference sources. Students will create a BIM project from preliminary drawings. Some design work will be required as students will incorporate information from building codes, specifications and data for mechanical, electrical and plumbing (MEP) services and structural systems. (NCAD-230, 265, 275, 285; corequisite NCAD-250) **Lab 9, Credit 3 (F)**

**NCAD-250** **Presentation Graphics**  
Students gain specialized skills and knowledge in production of presentation graphics using CAD and visualization software. Using general CAD skills as a starting point, students learn to setup and render various types of images and animations for presentation of construction projects to clients, agencies, boards, and the public. Students will engage in a team design project which will culminate with a final presentation. (Corequisite NCAD-240) **Class 2, Lab 3, Credit 3 (F)**

**NCAD-255** **Construction Material and Methods I**  
Students study soil, aggregate, Portland cement concrete, asphalt cement concrete and wood products used for construction. Laboratory work focuses on testing soil, aggregates and Portland cement concrete. ASTM standards are used in all testing. Students also test mortar using ASTM standards and follow building codes for framing construction. Students will engage in hands-on lab activities. (NCAD-108, 170) **Class 2, Lab 3, Credit 3 (F)**

**NCAD-265** **Construction Materials and Methods II**  
This course is a continuation of the Construction Materials and Methods I course. Students learn standard technical vocabulary related to common construction materials, basic building science concepts related to thermal insulation and moisture protection, and various construction framing methods. Students will also learn the aesthetic, economic and performance characteristics of a wide variety of non-structural materials and finish products associated with the construction industry. Hands-on lab activities are used to learn how many common products are installed. (NCAD-255) **Class 2, Lab 3, Credit 3 (S)**

**NCAD-275** **Principles of Structural Systems**  
In this course, students learn the basic concepts of loads and stresses and how the structural members of a construction project support and distribute loads. The overview includes the practical aspects of how structural elements as assembled and incorporated into construction projects and the influence of building codes on the selection of structural systems. (NCAD-108, 170) **Class 3, Credit 3 (F)**

**NCAD-280** **GIS Fundamentals**  
Students develop basic skills in applications of geographic information systems (GIS). Through hands-on projects, students will learn how to use GIS software, plan a project, create a database, conduct spatial analysis and create presentation graphics. No official prerequisites are required, but students should have basic computer literacy skills. **Class 2, Lab 3, Credit 3 (S)**

**NCAD-285** **MEP Systems**  
Students learn to identify the basic components and operation of the mechanical, electrical and plumbing (MEP) systems for a construction project. These systems include water supply, sanitary sewer and waste water treatment, storm drainage, solid waste handling, power supply generation, indoor climate control, lighting and communication systems. Students will learn the advantages of specifying sustainable solutions for these systems. Students will become acquainted with the graphic representation of these systems on construction documentation. (NCAD-220) **Class 3, Credit 3 (S)**

**NCAD-289** **Special Topics: CADT**  
The description for each special topics request will be specified in each course proposal. **Credit 1-5 (F, S)**

**NCAD-299** **Co-op: CADT**  
Designed to give the student an opportunity to gain experience on the job, to apply what they have learned and to self-evaluate personal and communication skills. Placement assistance is provided to help the student find a relevant work experience. (NCAD-201) **Credit 0 (F, S, Su)**

### **Computer Integrated Machining Technology**

**NCIM-101** **Blueprint Reading I**  
Students develop the basic skills necessary to read and interpret fundamental engineering drawings of details, subassemblies and assemblies. **Class 2, Lab 2, Credit 3 (F)**

**NCIM-102** **Blueprint Reading II**  
In this second blueprint reading course, students continue to develop the skills necessary to read and interpret prints of engineering drawings of details and assemblies. More emphasis is placed on Metric drawings and Geometric Tolerances as applied to engineering drawings and part inspection. (NCIM-101) **Class 2, Lab 2, Credit 3 (S)**

**NCIM-121** **Precision Measurement I**  
Students develop the skills necessary to measure to the highest tolerances commonly used in industry. They measure parts or groups of parts using industrial methods and equipment. Analysis of measurements and problem solving are stressed. **Class 2, Lab 2, Credit 3 (S)**

**NCIM-131** **Computer Integrated Machining Technology I**  
In this first course of a six course sequence, students develop basic skills for operating manual and computer controlled machine tools. Laboratory instruction simulates introductory level work in an industrial environment; student work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated, and industrial safety rules are highly stressed during this course. (Corequisite NCIM-101) **Class 1, Lab 5, Credit 3 (F)**

**NCIM-132** **Computer Integrated Machining Technology II**  
In this second course in a six course sequence, students continue to develop basic skills for operating manual and computer controlled machine tools. Laboratory instruction simulates moderate level work in an industrial environment; student work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated, and industrial safety rules are continually stressed during this course. (NCIM-131; corequisite NCIM-102, 121 and NMTH-206) **Class 1, Lab 5, Credit 3 (S)**

**NCIM-199** **Independent Study: CIMT**  
Students develop in-depth knowledge and industrial skills in a topic of their choice under the supervision of CIMT faculty. (Permission of department chairperson) **Credit 1-4 (F, S)**

**NCIM-201** **Job Search Process for CIMT**  
Course goals are to prepare students to secure a cooperative or professional work experience in the student's major and to assist the student in acquiring the skills for accessing information, networking, developing resumes and letters, completing various employment-related forms, interviewing, and using various communication techniques in preparing students for the job search process. **Class 2, Credit 2 (F)**

**NCIM-207** **Industrial Materials**  
Introduction to the many materials used in industry and the reasons why the final cost of producing a part is influenced by material selection. Metals, plastics and ceramics are covered from the perspective of physical, mechanical and dimensional properties. (NCIM-131) **Class 3, Credit 3 (S)**

**NCIM-222** **Precision Measurement II**  
Students refine the measurement skills learned in NCIM-121. The emphasis of this course will be on using the principals of geometric dimensioning and tolerancing to inspect machine parts. Emphasis will be placed on developing appropriate and repeatable inspection setups. Hands on experience with optical comparators and coordinate measuring machines will be included. (NCIM-131, 121) **Class 2, Lab 2, Credit 3 (S)**



**NCIM-233 Computer Integrated Machining Technology III**  
In this third course of a six course sequence, students continue to develop basic skills for operating manual and computer controlled machine tools. Laboratory instruction simulates moderate level work in an industrial environment; student work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated, and industrial safety rules are continually stressed during this course. (NCIM-132; corequisite NCIM-251) **Class 1, Lab 5, Credit 3 (F)**

**NCIM-234 Computer Integrated Machining Technology IV**  
In this fourth course of a six course sequence, students continue to develop basic skills for operating manual and computer controlled machine tools. Laboratory instruction simulates moderate level work in an industrial environment; student work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated, and industrial safety rules are continually stressed during this course. (NCIM-233) **Class 1, Lab 5, Credit 3 (S)**

**NCIM-235 Computer Integrated Machining Technology V**  
This fifth course of a six course sequence is the capstone for the students' program. After selecting a unique project, students control all aspects of its creation. Together with the laboratory section of this course, (corequisite NCIM-236 CINT V Lab), students discuss and perform all tasks associated with the manufacturing process. Tasks include innovative concepts and design, planning, procurement, scheduling, documenting, manufacturing, assembling, and presentation. Students must develop and deliver this project on-time and within budget. (NCIM-234; corequisite NCIM-236) **Class 3, Credit 3 (F)**

**NCIM-236 Computer Integrated Machining Technology V Lab**  
This sixth course of a six course sequence is the capstone for the students' program. After selecting a unique project, students control all aspects of its creation. Together with the classroom section of this course, (corequisite NCIM-235 CINT V), students perform all tasks associated with the manufacturing process. Taking designs and decisions made in the classroom, students use industrial machine tools to create and assemble the final project. Lab activities include machining and assembling. Students must deliver this project on-time and within budget. (NCIM-234; corequisite NCIM-235) **Lab 9, Credit 3 (F)**

**NCIM-237 Precision Grinding**  
Students develop basic skills for precision grinding techniques. Students learn about abrasives and grinding operations, with special focus on surface and center type cylindrical grinding. Laboratory exercises simulate moderately difficult precision work produced and inspected in an industrial environment. Students' work is held to ANSI and ISO referenced standards for dimensional and geometric accuracy. Safe work habits are cultivated, and industrial safety rules are continually stressed during this course. (NCIM-234) **Class 1, Lab 5, Credit 3 (F)**

**NCIM-241 Precision Optics Manufacturing I**  
In this course students learn and apply basic optical principles used in conventional manufacturing of precision optical flat elements. Procedures and techniques include blocking, vertical rotary grinding, rough bench grinding, double-sided lapping/grinding, polishing, deblocking and centering. Students practice and apply appropriate handling, cleaning and visual inspection techniques. A brief introduction to spherical grinding will be included. (NCIM-101, 121) **Class 1, Lab 5, Credit 3 (F)**

**NCIM-242 Precision Optics Manufacturing II**  
This course is the second in a sequence of courses in which students learn to apply basic principles of conventional and CNC manufacturing of optical elements. The emphasis in this course will be on the production of simple convex and concave spherical elements. Procedures and techniques include curve generating, blocking, rough and fine grinding, stick polishing, deblocking and centering. Students practice and apply appropriate handling and visual inspection techniques. (NCIM-241) **Lab 9, Credit 3 (S)**

**NCIM-243 Optical Testing**  
In this course students learn techniques used for testing spherical surfaces, flats and prisms. Topics include measurement of surface quality, focal length, power, irregularity, angle of deviation, basic interferometry, fringe analysis and lens aberrations. Specific measuring techniques and instruments include auto collimation, distance object method, laser two-beam method, spherometers, micrometers, Ronchi testers and test plating. (NCIM-121) **Class 2, Lab 2, Credit 3 (S)**

**NCIM-251 Computer Numerical Control I**  
Students develop basic skills in programming CNC machine tools. Laboratory instruction simulates industrial environments in both the precision machining industry and the precision optics industry; student work is held to ISO referenced standards for dimensional and geometric accuracy. Safety in the operation of automated machines is an integral part of the course. (NCIM-132) **Class 1, Lab 5, Credit 3 (F)**

**NCIM-252 Computer Numerical Control II**  
Students develop basic skills in programming CNC machine tools. Laboratory instruction simulates industrial environments in both the precision machining industry and the precision optics industry; student work is held to ISO referenced standards for dimensional and geometric accuracy. Safety in the operation of automated machines is an integral part of the course. (NCIM-251) **Class 1, Lab 5, Credit 3 (S)**

**NCIM-289 Special Topics: CINT**  
The description for each special topics request will be specified in each course proposal. **Credit 1-5 (F, S)**

**NCIM-299 Co-op Study: CINT**  
Students develop machining skills with on the job training at actual industrial facilities. This experience must contain a minimum of 350 hours of related work experience. (Permission of department chairperson) **Credit 0 (Su)**

## English (NTID)

**NENG-102 Introductory Reading and Writing I**  
This is a developmental English language course at the first level offered at NTID in which students begin developing the skills necessary for understanding and using written English in AOS degree programs at NTID. World knowledge topics are presented in various media and provide the context in which students learn to comprehend and use the basic constituents of English sentences, develop a content word vocabulary of about 4000 words, and practice strategies for improving reading comprehension and written expression. Upon completion of this course, students continue their reading and writing skill development in Intermediate Reading and Writing I, NENG-112. (NTID Reading Test score below 80 and NTID Writing Test score below 50) **Class 6, Credit 6 (F)**

**NENG-103 Introductory Reading and Writing II**  
This is a developmental English language course at the first level offered at NTID for students who begin with reading skills higher than those in NENG-102 or have received an E grade in NENG-102. Students continue developing the skills necessary for understanding and using written English in AOS degree programs at NTID. World knowledge topics are presented in various media and provide the context in which students learn to comprehend and use more of the basic constituents of English sentences, develop a content word vocabulary of about 4000 words, and practice strategies for improving reading comprehension and written expression. Upon successful completion of this course, students continue their reading and writing skill development in Intermediate Reading and Writing courses. (NTID Writing Test score below 40 and NTID Reading Test score 80 to 97) **Class 3, Credit 3 (F, S)**

**NENG-112 Intermediate Reading and Writing I**  
This is the first course in a two-course developmental English language sequence at the second level offered at NTID in which students work on reading and writing skills necessary for AOS programs at NTID. General topics in science and humanities provide the context in which students review the basic constituents of English sentences, begin to develop skills for comprehending and using complex sentence elements, increase their English content word vocabulary to about 5000 words, learn to use independent reading strategies, and develop skills for writing paragraphs and longer compositions. Upon successful completion of this course, students will continue their reading and writing skill development in Intermediate Reading and Writing II, NENG-113. (NENG-102 or 103; or NTID Reading Test score from 80 to 97 and NTID Writing Test score from 40 to 59) **Class 3, Credit 3 (F, S)**

**NENG-113** **Intermediate Reading and Writing II**  
This is the second course in a two-course developmental English language sequence at the second level offered at NTID for students who have completed Intermediate Reading and Writing I. Students continue to work on reading and writing skills necessary for AOS programs at NTID. General topics in science and humanities provide the context in which students use the skills included in Intermediate Reading and Writing I, develop skills for comprehending and using additional complex English sentence elements, increase their content word vocabulary to about 6000 words, begin to evaluate reading tasks to select appropriate reading strategies, and expand their skills for writing paragraphs and longer compositions. Upon successful completion of this course, AOS students will continue their reading and writing skill development in Career English courses. (NENG-112 or NTID Writing Test score from 40 to 49 and NTID Reading Test score from 98 to 124) **Class 3, Credit 3 (F, S)**

**NENG-199** **Independent Study: English**  
The description for each independent study request will be specified in each course proposal. **Credit 1-6 (F, S)**

**NENG-212** **Career English I**  
This is the first course in a two-course sequence. It is designed to develop reading, writing, grammar, and vocabulary skills that students need for AOS course work and for the work environment. The reading and writing components are thoroughly integrated with approximately equal time being devoted to each. Grammar and vocabulary are thoroughly integrated into the reading and writing components. Course content includes general and technical articles, memorandums, letters, electronic communication, directions, work-related forms, and short reports. (NENG-113 or permission of department) **Class 3, Credit 3 (F, S)**

**NENG-213** **Career English II**  
This is the second course in a two-course sequence. It is designed to advance and refine reading, writing, grammar, and vocabulary skills that students need for AOS course work and for the work environment. The reading and writing components are thoroughly integrated with approximately equal time being devoted to each. Grammar and vocabulary are thoroughly integrated into the reading and writing components. Course content includes general and technical articles, memorandums, letters, electronic communication, directions, work-related forms, and short reports. (NENG-212) **Class 3, Credit 3 (F, S)**

**NENG-221** **Analytical Reading and Writing I**  
This is the first course in a four-course intensive English sequence. In this course, selected shorter readings give students the opportunity to strengthen their reading comprehension skills and world knowledge. Readings will include nonfiction, fiction, and theme-based articles from library databases. The readings also serve as prompts for writing at both the paragraph and essay levels. While developing their expository writing skills, students learn to recognize and apply the traditional rhetorical modes used in writing. Students also will develop skills in summary writing. Other components of the course include grammar and vocabulary instruction, along with editing and proof-reading strategies. Vocabulary is taught both incidentally as it appears in readings and formally using a vocabulary text. The readings follow a specific theme and also will serve as models for examining style, organization and grammar. (NTID Reading Test score 98-124 and NTID Writing Test score 50-59; corequisite NENG-222) **Class 3, Credit 3 (F, S)**

**NENG-222** **Analytical Reading and Writing II**  
This second course in the four-course intensive English sequence continues to strengthen students' reading comprehension skills and world knowledge, with an added emphasis on critical reading, thinking, and writing. Readings will include nonfiction, fiction, and theme-based articles from library databases. Students identify and examine an author's purpose and tone, bias, assumptions, opinions, facts, examples, evidence, patterns of organization, and audience. Students also develop inference and deduction skills while learning to recognize and avoid overgeneralization and oversimplification in their writing. This course, which follows a specific theme, includes a short novel or novelette—fiction or non-fiction—as part of the required reading. (NTID Reading Test score 98-124 and NTID Writing Test score 50-59; corequisite NENG-221) **Class 3, Credit 3 (F, S)**

**NENG-231** **Bridge to College English I**  
This is the first of two Bridge to College English courses that also serve as the final two courses in the four-course intensive English sequence. This course exposes students to a variety of reading material, including nonfiction, fiction, and theme-based articles from library databases. It includes a reading of a full-length novel, either fiction or non-fiction, and it offers strategies for reading comprehension and interpretation beyond prior courses where applicable. Students will engage in a variety of writing activities related to the readings. Vocabulary is taught both incidentally as it appears in readings and formally using a vocabulary text. (NENG-221 and 222 with grades of C or better; or NTID Reading Test score 125-144 and NTID Writing Test score 50 or greater; corequisite NENG-232) **Class 3, Credit 3 (F, S)**

**NENG-232** **Bridge to College English II**  
This is the second of two designated Bridge to College English courses that also serve as the final two courses in the four-course intensive English sequence: This course provides advanced instruction on expository writing with a focus on refining writing skills introduced in earlier courses where applicable. This course also provides instruction on responding to multiple-part writing prompts. Students taking this as a stand-alone course will use readings from textbooks and online and database sources as the basis for their writing. The course provides further instruction in integrating sources into writing. Some writing assignments may be managed through journal entries. (NENG-221 and 222 with grades of C or better; or NTID Reading Test score 136-144 and NTID Writing Test score 50 or greater) **Class 3, Credit 3 (F, S)**

**NENG-241** **Written Communication**  
Written Communication is a composition course that enhances students' reading, writing, and critical thinking skills in preparation for Critical Reading and Writing (UWRT-099) and First Year Writing: Writing Seminar (UWRT-150) or equivalent. The course engages students in the deliberate practice of writing and learning when and how to apply specific expository modes in academic essays. While strengthening their reading comprehension, students begin to develop an understanding of how writers use rhetorical strategies to reach a particular audience and achieve their intended purpose in writing. Students also identify and analyze thesis statements and distinguish between main points and supporting details. Students write summaries and analyses of the readings along with well-developed expository essays using a combination of rhetorical modes such as definition, classification, comparison and contrast, and cause and effect. The course also emphasizes strategies for the appropriate incorporation of material summarized, quoted, and paraphrased from various sources as well as the protocol of documentation. Students revise in substantive ways with the assistance of required teacher conferences and university-supported tutorial services as they continue the process of becoming more independent writers. (NENG-231 or 232 or departmental recommendation) **Class 3, Credit 3 (F, S)**

**NENG-289** **Special Topics: English**  
The description for each special topics request will be specified in each course proposal. **Class 1-6, Credit 1-6 (F, S)**

## Humanities and Social Sciences

**NHSS-110** **Perspectives on Literature and the Arts**  
Students are introduced to basic concepts and terminology in the study of the humanities (visual and performing arts, history, and philosophy) through a variety of literary works presented in English and/or American Sign Language (short story, storytelling, novel excerpts, drama, film, poetry, and ASL literature). Students will learn about intellectual/academic inquiry and issues studied within these disciplines. **Class 3, Credit 3 (F, S)**

**NHSS-111** **The Changing American Family**  
Students are introduced to basic concepts and terminology in the study of the evolving American family from its Judeo-Christian roots to its multi-cultural reality in the 21st century. Students will learn about the nature of the family unit, the contributions of its members to the family organization, the family's contribution to society, and the current trends in the American family. **Class 3, Credit 3 (F, S)**

**NHSS-120** **Introduction to Performing Arts**  
Studies the characteristics and elements of theatre and the performing arts, emphasizing the principles and conventions that have guided theatre productions through history. The course examines the ways that theatre influences and is influenced by cultures and by individual life experience. Particular attention is paid to the development of scripts, visual theatre, theatre vocabulary, and the emergence of Deaf and multicultural theatre. **Class 3, Credit 3 (F, S)**

**NHSS-122 Introduction to Stagecraft**  
Introduces the technical and design processes of theatre, including scenery, costume, lighting, make-up, and prop craft. Students experience the range of skills needed to create successful productions, and identify their own areas of interest and strength for future theatre participation. **Class 3, Credit 3 (F)**

**NHSS-130 Acting I**  
An introduction to the actor's craft, process, and technique. Major performance methods are introduced in both physical approaches to acting (Grotowski, Delsarte, Alexander technique, multi-cultural methods from African Griot to Japanese Noh) and psychological approaches (Stanislavsky, Meisner, Hagan, Strasberg). Strategies for script analysis, translation, memorization, stage combat, mask, and mime prepare the student for Acting II. **Class 3, Credit 3 (F, S)**

**NHSS-132 Sign Mime, Creative Movement and Visual Theatre**  
Expands students' understanding of the use of physical space through creative movement strategies. These are supplemented by images, gesture, and sign representation of story elements. Techniques developed from visual theatre practices are studied. Through active participation, students learn the language of movement, mime and visual theatre. Ensemble work based on performance standards, character creation, and theme development is emphasized. **Class 3, Credit 3 (F)**

**NHSS-134 Dance I: Jazz and Hip-Hop**  
Provides students with a wide range of dance movement and dance vocabulary, which is created from jazz dance, hip-hop and other contemporary dance idioms. Students will experience a variety of dance form through physical movement including the styles of Bob Fosse, Michael Bennett and Frank Hatchett as well as elements of street dance, including the styles of Laurie Ann Gibson and Shane Sparks. **Class 3, Credit 3 (F)**

**NHSS-150 Deaf Perspectives on Contemporary Civilization**  
This course introduces students to the study of culture, society, language, communication, the arts and humanities. Topics covered include cultural and linguistic diversity in Hearing and Deaf communities; social groups distinguished on the basis of race, ethnicity, gender, class and disability; and artistic works as expressions of cultural values. The course addresses moral, ethical, and personal questions pertaining to fundamental human rights and responsibilities and is intended to prepare students for further study in the arts, humanities and social sciences, including the emerging field of Deaf cultural studies. **Class 3, Credit 3 (F, S)**

**NHSS-159 Deaf Community in the Modern World**  
Introduces students to American and international aspects of Deaf culture and community. Students learn about the language, norms of behavior, values and traditions, of Deaf people. Analysis of historical and sociological perspectives and cross-cultural issues related to the hearing and Deaf communities. The formation of the Deaf community and Deaf culture will be studied to illustrate the meaning of Deaf Heritage and how art, sports, organizations, and technology have combined to impact the lives of Deaf people. The achievements of many Deaf people in a variety of fields will be reviewed to underscore self-identity and self-advocacy issues. The study of cultural, economic and political history will be used to broaden understanding of current events. **Class 3, Credit 3 (F, S)**

**NHSS-180 Introduction to Social Sciences**  
This course is intended to explore the understanding of human behavior and everyday life using important concept from social sciences. The course covers the fields of psychology, sociology, and political science. Materials from anthropology and economics may be used as well. The course focuses on the application of the social sciences to the study of business, art, education, government, and other areas of interest. **Class 3, Credit 3 (F, S)**

**NHSS-199 Independent Study: Humanities and Social Sciences**  
The description for each independent study course will be specified in each course proposal. **Credit 1-4 (F, S)**

**NHSS-219 Dramatic Literature and Performance**  
Students will study dramatic literature with a special emphasis on analyzing the interpersonal communication among characters in written texts and engaging in presentations, performances, and role playing. Students will apply their insights to real life situations. They will also present their analyses to an audience and/or perform scenes from plays. The course will enable students to gain important insights into their own patterns of communication and develop effective strategies for presenting information to audiences and engaging in interpersonal communication. **Class 3, Credit 3 (S)**

**NHSS-223 Scenic and Lighting Technology**  
Provides hands-on exploration of basic scenic and lighting techniques utilized in theatre productions. Students gain an understanding of scenic construction methods and technology and lighting practice, as well as the safe and proper use of tools and equipment. This course prepares students for Theatre Practicum and running crew responsibilities. **Class 3, Credit 3 (S)**

**NHSS-224 Scenic Painting and Props**  
An introduction to the methods and materials of theatrical painting and props through a project-oriented class. Techniques, communication, and use of appropriate materials and tools are emphasized. Students apply the skills learned to individual and group projects. This course prepares students for more specialized work in Theatre Practicum. **Class 3, Credit 3 (F, S)**

**NHSS-225 Costume, Mask, and Stage Makeup**  
Explores basic stage makeup, mask and costume construction techniques. Students will gain an understanding of the visual ways to develop and present a character on stage. Student actors and technicians will create makeup designs, masks, and small costume pieces as a hands-on expression of the research and development of a character concept. This course prepares students for Theatre Practicum and running crew responsibilities. **Class 3, Credit 3 (F)**

**NHSS-231 Acting II**  
A second-level course in the development of college student actors. This course covers advanced acting techniques and vocabulary, both for developing the actor's craft and for understanding the practical theatrical jargon used by professionals. Particular attention is paid to the physical, emotional, and mental actions an actor reveals to his/her audience. Development of script translation technique related to character development is also emphasized. Practical attention is given in preparing the student actor to enter the entertainment industry or community theatre with viable working skills. (NHSS-130) **Class 3, Credit 3 (S)**

**NHSS-235 Dance II: Modern Dance and Ballet**  
Introduces the two important languages of dance: Ballet and Modern Dance. Through Ballet's vocabulary (French, Sign, and English), discipline base, protocols, and specific movements, students perform floor, center, and barre work. This course also provides an introduction to dance that gives students access to the language as well as the fundamental movements of Modern Dance. The styles and technique of Martha Graham (contraction) and Jose Limon (fall and rebound) are explored. Ensemble work, performance standards and creation of character and theme are stressed. **Class 3, Credit 3 (S)**

**NHSS-240 Theatre History Through Deaf Eyes**  
Examines theater from its earliest origins to contemporary types of theater and issues in dramatic presentation. The role of theater in society and in a variety of cultures is examined with particular attention to the role of Deaf performers, directors and play creators in specific historical periods. **Class 3, Credit 3 (S)**

**NHSS-248 Theatre Practicum**  
Applies technical, performing, script analysis, stage management, and other skills to an actual theatrical production. Students contract with a faculty mentor for responsibilities and the appropriate credit expectations. In addition to production responsibilities, students are expected to complete reading and writing assignments connected to the production. This course is repeatable for credit. **Class 1-3, Credit 1-3 (F, S)**

**NHSS-249 Seminar in Performing Arts**  
Using seminar and workshop approaches, this course gives students the opportunity for focused, in-depth study of a selected advanced topic in theatre. Specific topics vary from semester to semester, and address such areas as methods of acting, playwriting, production design, systems of analysis, genres of dance, translation, and historical influences on theatre art. This course is repeatable for credit. **Class 3, Credit 3 (F, S)**

**NHSS-260 Deaf People and Civil Rights**  
Students will learn the history and achievements of Deaf civil rights, as well as current challenges and future directions of Deaf culture and civil rights. Students will learn the basic history of disenfranchised groups in the United States, how the civil rights process is begun and its ultimate impact on the mainstream society. The course places special emphasis on research and analysis of the Americans with Disabilities Act and involvement in a civil rights project. **Class 3, Credit 3 (F, S)**

**NHSS-269****Visual Expressions of Deafhood**

In this course, students will study how stories about the Deaf experience are communicated visually through various types of artistic expression. The course includes fine arts, performing arts, film, ASL literature and English literature. Attention will be given to historical context, Deaf cultural values, and the themes and symbols used to tell these visual stories. The course will address the role of artistic expression for recording collective cultural memories, for preserving cultural norms/values, and for promoting social justice. **Class 3, Credit 3 (F, S)**

**NHSS-270****Multiculturalism in the Deaf Community**

Introduces students to multiculturalism in the Deaf community. Students learn about facts and stereotypes related to race, ethnicity, gender, sexuality and physical challenges. The cycle and internalization of biases (attitudes) and discrimination (action) will be studied. Recognition of similarities and differences related to disability, medical, racial, ethnic, social-minority, and cultural models will be explored to understand perceptions of disabled vs. able bodied individuals. **Class 3, Credit 3 (F, S)**

**NHSS-279****Seminar in Deaf Cultural Studies**

Using a seminar approach, this course gives students the opportunity for focused, in-depth study of a specialized topic in the field of Deaf Cultural Studies. Specific topics vary from semester to semester, and address such areas as language and communication, the arts in Deaf culture, identity and diversity in the Deaf community, and political, social and legal issues. This course is repeatable for credit. **Class 3, Credit 3 (F, S)**

**NHSS-281****Civic Engagement**

This course will provide students with opportunities to engage in community service with Deaf and hearing, socially responsible and sustainability focused organizations. Some examples of service learning opportunities might include working with Rochester School for the Deaf to establish an edible schoolyard, Habitat for Humanity to help build low cost, energy efficient, sustainable homes, or working with organizations such as Foodlink or Rochester Roots who partner with local farmers to provide people in need with healthy food while creating strong ties to farmers, working to provide sustainably produced local food. Students will undertake a civic engagement project where their individual contributions will be amplified through purposeful involvement with local and global organizations. Students will research social, political, economic and environmental issues that affect individuals, local and global communities, and become actively involved in seeking, proposing, and acting on solutions to selected problems. Students will explore ways in which change is an individual and collective responsibility, driven by the interconnectivity of self, local community and global society. **Class 3, Credit 3 (F, S)**

**NHSS-289****Special Topics: Humanities and Social Sciences**

The description for each special topics request will be specified in each course proposal. **Credit 1-4 (F, S)**

## Information & Computing

### *Applied Computer Technology-AS Degree*

**NACA-150****Network and Security Fundamentals**

This course introduces students to fundamental concepts and concerns in the networking and security fields. Issues of privacy, vulnerability, and tools for intrusion prevention will be key topics addressed as they relate to personal computer, network and data security. Concepts and terminology of wired and wireless networks, including networking hardware, media, communication technologies, protocols and basic network administration will be covered. Lab activities will develop skills in installing, configuring, securing, managing, and troubleshooting a basic LAN network. **Class 2, Lab 3, Credit 3 (F, S)**

**NACA-160****Programming Fundamentals I**

This course will provide students with a study of the fundamental concepts, logical structures, and algorithms inherent to computer programming. Students will learn how to write basic object-oriented programs in a contemporary programming language. **Class 2, Lab 3, Credit 3 (F, S)**

**NACA-161****Programming Fundamentals II**

This course builds upon the programming skills developed in Programming Fundamentals I and will cover more advanced object-oriented programming concepts, logical structures, and algorithms. Visual information system modeling, graphical user interfaces and software testing topics will be covered. (NACA-160) **Class 2, Lab 3, Credit 3 (F, S)**

**NACA-172****Website Development**

This course introduces students to web page and small-scale website development. Through hands-on laboratory experiences, students will learn the fundamental concepts needed to construct web pages that follow appropriate coding standards as well as basic design principles to present content in an attractive and organized manner. Topics include HTML, CSS, graphical elements, website publishing, and transfer protocols. **Class 2, Lab 2, Credit 3 (F, S)**

**NACA-174****Website Implementation**

This course builds upon the concepts of Website Development to provide students with a strong foundation in designing and implementing complex websites. Topics covered include usability, multimedia, design principles, client-side scripting, SSI, access control, and interactive pages using forms and validation. (NACA-172) **Class 2, Lab 2, Credit 3 (F, S)**

### *Applied Computer Technology-Technical Computing*

**NACT-120****Intro to Computer Applications**

This course is an introduction to using general-purpose software tools. The tools to be covered include word processing, spreadsheet, database, and presentation software as well as an email client. Students will do hands-on work in each application. **Class 3, Credit 3 (F, S)**

**NACT-150****Intro to PC Hardware**

This course introduces the fundamental hardware concepts of Windows-based computers. The skills required to install, upgrade and maintain computers are presented. The course provides students with methodologies and hands-on activities related to the configuration, diagnosis, repair, upgrade, and preventive maintenance of computer hardware, input/output devices and data communications. Topics include the basic functions and use of test equipment, logical troubleshooting of internal system conflicts and faulty peripherals, and electrical safety. **Class 2, Lab 2, Credit 3 (F)**

**NACT-151****Windows Operating Systems**

This course is designed to acquaint students with the structure and function of windows-based operating systems and to provide the skills required to install, configure and maintain them. Topics include system concepts, system level commands, and commands relating to program, file and applications management. Students perform a variety of functions, including OS installation and configuration, application program installation and management, creation and management of directories and file structures, and partitioning and preparation of storage media. (NACT-150, corequisite NACT-155) **Class 2, Lab 2, Credit 3 (S)**

**NACT-155****Non-Windows Operating Systems**

This course exposes students to Unix and other Unix-based operating systems such as Linux and Macintosh systems. It acquaints them with system services that are of interest to normal users, power users, and administrators. Students learn basic commands, scripting, and navigation from a terminal window and experience management of their user environment, files, and directories. Students are also exposed to administering some common aspects of the operating environments such as groups, users, privileges, and process management. There is also some exposure to the operating system's GUI interface. (NACT-150; corequisite NACT-151) **Class 2, Lab 3, Credit 3 (S)**

**NACT-160****Networking Essentials**

This course introduces students to the basics of user security on their computers as well as the basics of computer networking. Students will learn the importance of user security and some of the tools and procedures needed to protect and secure their information, computers and networks against attack. Basic concepts and terminology of wired and wireless networking including networking hardware, media, communication technologies and protocols, and network management will be covered. Lab activities will develop skills in installing, configuring, managing, and troubleshooting a basic network. **Class 2, Lab 3, Credit 3 (F)**

**NACT-161****Client-Server Networks**

This course continues the concepts of computer networking with an emphasis on the networking client/server model. Various networking operating systems (NOS) will be examined as well as both peer-to-peer and client/server network applications. NOS hardware and software security tools are investigated and students learn how to install, configure, update/maintain and troubleshoot both the client/server hardware devices as well as the appropriate security tools. (NACT-160) **Class 2, Lab 3, Credit 3 (S)**

**NACT-170** **Introduction to Web Development**  
This course introduces students to designing and coding a multipage website. Topics include an overview of the Internet and web addressing, coding valid HTML and CSS, design principles, implementation on a server, and use of Web development software. The use of hyperlinks, graphics, and multimedia in Web pages will be covered. **Class 2, Lab 2, Credit 3 (F)**

**NACT-199** **Independent Study**  
The description for each independent study will be specified in each course proposal. **Credit 1–4 (F, S, Su)**

**NACT-200** **Help Desk Support**  
This course focuses on key information and proficiencies needed to support users, including troubleshooting, problem solving, successful communication, determining a client's needs, and using appropriate people skills. (NACT-151, 161) **Class 2, Lab 2, Credit 3 (F)**

**NACT-230** **Introduction to Programming**  
This course introduces students to the fundamental concepts and terminology of computer programming. Emphasis will be placed on developing problem-solving skills in designing and writing simple computer programs. The course covers such topics as developing flowcharts, algorithms and pseudocode, and introduces students to variables, operators, conditional statements, looping statements, data structures, error-handling and debugging, and user interface design. The course assumes no programming background. (NACT-170, NMTH-120 or above) **Class 2, Lab 2, Credit 3 (F)**

**NACT-235** **Introduction to Database Applications**  
In this course students will learn to create database tables, queries, forms and reports using a leading database software product for personal computers. Students will also learn how to design a database from user specifications, and to form basic SQL commands. **Class 2, Lab 2, Credit 3 (S)**

**NACT-240** **The World of Work**  
The goal of the course is to provide students with the business-related skills to acquire a cooperative or permanent job, and the personal and social skills to succeed on the job. Topics related to workplace communication and relationships, as well as financial management, employer expectations, and personal goal setting will also be covered. The course will also include the development of job search skills, resume writing and interviewing, along with skills in word processing, spreadsheets and presentation software as needed in the workplace. **Class 3, Credit 3 (F)**

**NACT-250** **Computer and Data Security**  
This course will explore the unique computer and data security issues encountered by computer technicians. Using current computer security tools and procedures, students will develop more advanced skills in finding and eliminating security weaknesses, breaches, and malware programs. Computer security incident response procedures will also be introduced in this course. Hands-on lab activities will be used to reinforce concepts and to provide real-life situations that give students experience in handling suspected security breaches. (NACT-151, 161) **Class 2, Lab 3, Credit 3 (F)**

**NACT-251** **Digital Systems Integration**  
This course explores the technologies that are integrated as part of larger control/automated systems. Some of these technologies include, but are not limited to, the control and management of audio and video systems, security and surveillance systems, lighting control systems, access control systems, communication systems, assistive technologies and other automated business features. This course will introduce some of these integratable technologies and provide a basis for connecting, configuring, testing, controlling, monitoring and maintaining these systems. (NACT-155, 160, 230) **Class 2, Lab 3, Credit 3 (S)**

**NACT-252** **Server Management and Security**  
Students taking the course will learn to implement and administer network servers by managing server devices, file systems, users and groups, and application software. Students will also learn how to monitor and fine-tune server security and performance and to implement backup and fault tolerance. (NACT-151, 161) **Class 2, Lab 3, Credit 3 (S)**

**NACT-255** **A+ Certification Prep**  
This course will prepare students to pass the two certification tests necessary to earn CompTIA's A+ Certification. Students will review material from previous courses and complete practice exams and troubleshooting exercises in preparation for the exam. In addition to text book(s), students will be required to purchase two certification exam vouchers for this course. To pass the course, students must pass both certification exams. (NACT-151, 160) **Class 2, Lab 3, Credit 3 (F)**

**NACT-260** **LAN WAN Design**  
This course is designed to provide students with hands-on experience with multi-protocol routers and multi-switched networks. The class includes basic router operations, architecture, and configuration; switched Ethernet networks; virtual LAN technology; configuration of switching devices; and troubleshooting. Students set up, wire, and configure expansion technologies in an internet work environment. (NACT-161) **Class 2, Lab 3, Credit 3 (F)**

**NACT-261** **Network Security**  
This course will provide students with a deeper understanding of computer and data network security. Students will examine an infrastructure design process for securing computer systems and data networks, as well as methodologies and best practices for implementing security, security policies, security testing, and incident response. The underlying principles used to secure networks including security technologies, intrusion detection, authentication, and cryptography basics will be discussed. This course will also introduce students to network security planning, technology, and organization, and the legal and ethical issues associated with network security. (NACT-161; corequisite NACT-262) **Class 2, Lab 3, Credit 3 (S)**

**NACT-262** **Fundamentals of Systems Administration**  
This course extends students' skills at securing and managing networks and servers. Students taking the course will practice implementing and administering networked servers in multiple operating systems by managing server devices, file system, users and groups, and application software. Students will design and test custom LAN environments, using both physical and virtual computers and servers. Students will also learn to secure shared data across platforms, securing both the physical/virtual network environment and the operating systems' shared resources. (NACT-155, 260; corequisite NACT-261) **Class 2, Lab 3, Credit 3 (S)**

**NACT-265** **Network+ Certification Prep**  
The course will prepare students to take and pass the CompTIA's Network+ Certification exam. Students will review material from previous courses and complete practice exams and troubleshooting exercises in preparation for the exam. In addition to text book(s), students will be required to purchase a certification exam voucher for this course. Students must pass the certification exam to pass the course. (NACT-161) **Class 2, Lab 3, Credit 3 (S)**

**NACT-266** **Network Defense Technologies**  
This course will provide students with a deeper understanding of the technologies used to defend a network against security attacks. Students will be introduced to the concepts, principles, types, and topologies of current and future defense technologies. Various defense methodologies associated with various Intrusion Detection Systems (IDS), Intrusion Prevention Systems (IPS), and future technologies will be covered. Students will also learn best practices associated with remotely securing and accessing business resources. (NACT-260, 261) **Class 2, Lab 3, Credit 3 (S)**

**NACT-270** **Web Applications**  
This course continues to build students' skills in developing well-designed Web pages using the most current Web development tools. By creating server-side scripts combined with embedded SQL students will be able to build professional-quality, database-driven websites. Accessibility issues related to website development will also be emphasized. Only limited programming experience is required. (NACT-170, 230, 235) **Class 2, Lab 2, Credit 3 (S)**

**NACT-271** **Client-Side Scripting**  
This course is an introduction to client-side scripting for the Internet using a common scripting language. Students will be introduced to the syntax of the scripting language, and then learn to build practical and interactive client-side applications. (NACT-170, 230) **Class 2, Lab 3, Credit 3 (F)**

**NACT-289** **Special Topics: ACT**  
The description for each special topics course will be specified in each course proposal. **Class 1–4, Credit 1–4 (F, S)**

**NACT-295** **ACT Technical Capstone**  
This course provides an opportunity for students to work on technical projects that integrate the skills they have developed in earlier Applied Computer Technology courses. Students will work both independently and in teams to solve "real world" networking and computer support problems in a professional manner. (NACT-170, 200 and [NACT-251 and 252] or [NACT-262]) **Class 1, Lab 4, Credit 3 (F)**

**NACT-299****Co-op: Applied Computer Tech**

This course provides students with a 350-hour work experience in the computer field. Students have an opportunity to gain experience on the job, to apply what they have learned in their course work, and to evaluate their own technical, communication, and interpersonal skills. Placement assistance is provided to help students find a relevant work experience. (NACT-240 and [NACT-251 and 252] or NACT-262) **Credit 0 (F, S, Su)**

## Laboratory Science Technology

**NLST-120****Laboratory Tools**

This course introduces students to the Laboratory Science Technology (LST) program's curriculum and the laboratory tools required for success in the program and as professionals in the laboratory science field. Topics will include an introduction to historical and current issues in the field, concepts of analytical testing, basic laboratory applications, fundamental technical skills used in the laboratory, laboratory safety, laboratory notebooks and information management, scientific reference and information sources, the identification and use of laboratory equipment, maintaining a laboratory environment, concepts of quality control, and the analytical process. Students begin to organize a Laboratory Science Technology portfolio. **Class 2, Lab 2, Credit 3 (F)**

**NLST-171****Fundamentals of Chemistry I**

This course is an introduction to the fundamental theories and principles of chemistry governing the structure and behavior of matter at the atomic and molecular levels. The language of chemistry including nomenclature and symbolic representation is presented. Computational strategies applied to stoichiometry, reaction analysis and solution preparation are practiced. Laboratory activities focus on precision and accuracy in the collection of data. Chemical hygiene and safety procedures in the laboratory are emphasized. **Class 2, Lab 3, Credit 3 (F)**

**NLST-172****Fundamentals of Chemistry II**

This course is an introduction to the concepts of kinetics and thermodynamics. Chemical equilibrium and rate constants will be presented and quantified. The ideal gas law will be explored. Mathematical models will be developed and computational strategies will be applied and practiced. Laboratory activities will supplement course themes. Chemical hygiene and safety procedures in the laboratory are emphasized. (NLST-171) **Class 2, Lab 3, Credit 3 (S)**

**NLST-199****Independent Study: LST**

The description for each independent study request will be specified in each student/faculty proposal. **Credit 1-4 (F, S)**

**NLST-220****Analytical Chemistry**

This course introduces quantitative analysis utilizing both gravimetric and volumetric techniques. Topics include volumetric preparation and analytical procedures, acid/base and electron transfer titrations and related computational methods, and gravimetric procedures and analyses. Standard laboratory notebook protocol will be introduced and practiced. Chemical hygiene protocol and safety procedures in the laboratory are emphasized. (NLST-120, 171) **Class 3, Lab 3, Credit 4 (S)**

**NLST-225****Laboratory Applications**

This course continues a focus on the application of laboratory tools, techniques, procedures, and scientific theory. Course topics include study of written technical procedures, technical writing, the reporting and presentation of scientific information, and topics related to the job search process and working as a professional in the field. Students synthesize information learned in previous and concurrent courses by participating in job related simulations. A Laboratory Science Technology portfolio will continue to be developed. (NLST-220) **Class 2, Lab 2, Credit 3 (F)**

**NLST-230****Principles of Organic Chemistry**

This course provides an introduction to the principles of organic chemistry. Topics include structure, nomenclature, and properties of carbon-containing molecules according to the various functional groups that are central to organic chemistry. Investigations involving chemical reactions, data collection, and qualitative and quantitative analyses provide a framework for laboratory activities. Chemical hygiene and safety procedures in the laboratory are emphasized. (NSCI-162, NLST-172) **Class 3, Lab 3, Credit 4 (F)**

**NLST-232****Laboratory Mathematics**

This course addresses classic laboratory calculations and elementary descriptive statistics in the context of modern information technology and computing methods. Use of hand-held calculators and computer software to exchange, analyze and chart electronically-stored data is a central focus of this course. Study is closely coordinated with student experiences in Laboratory Science Technology courses. Topics include basic descriptive statistics with quality control applications, capture and analysis of real laboratory data, exponential and logarithmic modeling, and applications of scientific concepts. (NMTH-212) **Class 2, Lab 2, Credit 3 (F)**

**NLST-235****Principles of Biochemistry**

This course provides an introduction to the principles of biochemistry through a study of carbohydrates, lipids, amino acids, proteins, enzymes, and nucleic acids. The metabolic pathways that involve these systems will also be explored. Principles of general and organic chemistry will be emphasized through an examination of the structures, concepts, and reactions that are central to biologically important molecules. (NLST-230) **Class 3, Credit 3 (S)**

**NLST-240****Biotechnology I**

This course prepares students to perform biotechnical applications in industry-specific fields of analysis. Standard methods, operating procedures, equipment/instrumentation, and protocols are introduced and reinforced. Topics include ethical issues in biotechnology, DNA manipulation, protein analysis, tissue culture, and molecular diagnosis. Sampling, testing, and reporting in the field of biotechnology are covered. (NSCI-162) **Class 2, Lab 3, Credit 3 (F)**

**NLST-245****Biotechnology II**

This course prepares students to perform biotechnology applications in industry, specifically as they relate to microorganisms, proteomics, and genomics. Topics include bacterial expression systems for production, purification and characterization of recombinant proteins. Study will include concepts of DNA manipulation/analysis and enzymology. Standard methods, operating procedures, and protocols are introduced and reinforced. Sampling, testing, and reporting in the fields of biotechnology, microbiology and molecular biology are covered. (NLST-240) **Class 2, Lab 3, Credit 3 (S)**

**NLST-250****Quantitative Instrumental Analysis**

In this course students learn and apply concepts and principles of analytical testing using laboratory instruments, instrumentation theory, and procedures. Concepts surrounding spectroscopy, electroanalytical methods, advanced and automated methods of instrumental analysis are presented. Techniques including sample preparation, instrumentation set-up and maintenance, calibration, precision measurement, safety, and data collection/analysis are introduced. Selected instrumentation presented in this course includes electroanalytical meters/probes, atomic and molecular spectrophotometers, and automated instrumentation. (NLST-220, 172) **Class 3, Lab 3, Credit 4 (F)**

**NLST-255****Chemical Separations and Chromatography**

In this course students learn and apply advanced concepts and principles in analytical testing using laboratory instruments/equipment, theory, and procedures as they relate to chemical separations and chromatographic methods of analysis. Techniques including sample preparation, instrumentation set-up and maintenance, calibration, precision measurement, safety, and data collection/analysis are studied. Selected techniques/instrumentation presented in this course includes solid and liquid phase separations/extractions, liquid and gas chromatography, mass spectrometry, and capillary electrophoresis. (NLST-230, 250) **Class 3, Lab 3, Credit 4 (S)**

**NLST-260****Laboratory Methods**

This course is a capstone to the program's focus on the application of laboratory tools, techniques, procedures, and scientific theory. Professional and ethical behavior standards in the science laboratory environment and current trends in performing analyses from advanced standard methods are central to this course. Students synthesize information learned in previous and concurrent technical courses by participating in job-related simulations. This course also serves as a final mechanism for co-op preparation. Students finalize a laboratory science technology portfolio. (NLST-225) **Class 2, Lab 2, Credit 3 (S)**

**NLST-270****Chemical Technology**

This course prepares students to perform industry-specific applications of chemical analysis. Standard methods, operating procedures, and protocols are introduced and reinforced. Sampling, testing, and reporting in the fields of environmental, industrial, forensic, pharmaceutical, and food testing are covered. Instrumental, volumetric, and gravimetric techniques are practiced, as they relate to the fields of chemical technology. (NLST-220, 250) **Class 2, Lab 3, Credit 3 (F)**

**NLST-289**

The description for each special topics request will be specified in each course proposal. **Class 1-4, Credit 1-4 (F, S)**

**NLST-299****Co-op: Laboratory Science Technology**

This cooperative work experience gives students matriculated in the laboratory science technology major a practical sampling of working in the field of laboratory sciences. Students will work under the supervision of qualified professionals while performing a variety of tasks pertaining to the field. (NLST-255) **Credit 0 (F, S, Su)**

**Liberal Studies****NDLS-280****International Studies Seminar**

The International Studies Seminar provides students with the opportunity to learn about the unique historical, geographical, economic, social, and political circumstances of a country other than the United States, and consider those factors that shaped the relationship between the country being studied and its Deaf community. The course will foster a connection between NTID students and the country being studied by introducing students to the spoken and signed languages of the selected country as well as to members of the Deaf community in the country via videoconferencing. The country to be studied, and the specific course topics for that country, will vary by instructor. This course will also serve as preparation for participation in a NTID faculty-led experience and/or project in the country that is the focus of the Seminar. Specific knowledge and skills required for this experience and/or project abroad will also be taught. This course is required for students participating in the NTID faculty-led experience and/or project abroad, but participation in the experience/project abroad is optional. (Second-year status and department permission.) **Class 3, Credit 3 (F, S)**

**Mathematics (NTID)****NMTH-110****Prealgebra**

Improves students' fundamental understanding of and skills in mathematics. Concepts covered include fractions, decimals, percents and ratios. Students are introduced to signed numbers, variables, algebraic expressions and equations, simple geometric formulas, and graphing. Instruction emphasizes the use of English and ASL as they relate to basic mathematical operations. **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-140****Mathematics in Society**

This project-based course is intended for students interested in the exploration of mathematical thinking and procedures. It includes applications to real world situations and uses problem solving skills. Topics include number sense, consumer mathematics, introduction to statistics, basic geometry, number representation, and units of measurement including conversion in English and metric systems. (NMTH-110 or appropriate placement score) **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-180****Foundations of Algebra**

An introductory algebra course consisting of a blended lecture/lab component in which the basics of evaluating algebraic expressions, solving linear equations and inequalities and graphing linear functions are studied. The Pythagorean Theorem and systems of linear equations are also studied. Technology, in particular the graphing calculator, is an integral part of the learning and problem solving in this course. To progress to NMTH-210 or 212, students must pass NMTH-180 with a grade of C or better. (NMTH-110 or appropriate placement score) **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-199****Independent Study**

The description for each independent study request will be specified in each student/faculty proposal. **Credit 1-4 (F, S)**

**NMTH-206****Trigonometry for Coordinate Analysis**

Students will study right triangle trigonometry with an emphasis on concepts and applications related to computer integrated machining technology (CIMT). Topics include trigonometric ratios in right triangles, coordinate geometry calculations, circle properties, simple and complex machine applications, and 3-D coordinate geometry. (NMTH-180 or appropriate placement score) **Class 2, Lab 2, Credit 3 (S)**

**NMTH-207T****Trigonometry for Coordinate Analysis II**

This course is a continuation of Trigonometry for Coordinate Analysis I and, continues the development of problem-solving using right angle trigonometry, with an emphasis on concepts and applications related to computer integrated machining technology (CIMT). Topics include complex machine applications, compound angles, slots and pockets, irregular-shape grooves, Law of Sines, Law of Cosines, and 3-D coordinate geometry. (0884-205) **Class 2, Lab 1, Credit 3 (F)**

**NMTH-210****Applications of Algebra**

An intermediate algebra course consisting of a lecture and a lab component in which exponents, rational expressions, polynomials, roots and radicals, and non-linear functions are studied. Technology, in particular the graphing calculator, is an integral part of the learning and problem solving in this course. Students may not take both NMTH-210 and 212 for credit without permission of the department. To progress to NMTH-260, student must pass NMTH-210 with a grade of C or better. (NMTH-180 with grade of C or better, or appropriate placement score) **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-212****Integrated Algebra**

An intermediate algebra course consisting of a blended lecture/lab component in which non-linear functions and graphs, systems of linear equations, exponents, polynomials, roots, radicals and properties of the complex numbers are considered. There is significant emphasis on scientific and geometric models, as well as the use of graphing utilities. Students may not take both NMTH-210 and 212 for credit without permission of the department. To progress to NMTH-260 or 275, student must pass NMTH-212 with a grade of C or better. (NMTH-180, with a grade of C or better, or appropriate placement score) **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-220****Trigonometry**

This course includes topics from trigonometry with an emphasis on the study of right and oblique triangles, rotational angles, and trigonometric functions and their graphs. An introduction to trigonometric identities is also provided. (NMTH-212, or appropriate placement score) **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-245****Accelerated Algebra I**

The first of a two-course sequence of accelerated courses (NMTH-245 and 265 or NMTH-245 and 270) for students who are interested in acquiring the skills necessary for an introductory-level calculus course. The topics include a review of the fundamentals of algebra, and solving linear equations and inequalities in both 1- and 2-variables algebraically and graphically. Exponents, polynomial/quadratic functions and their graphs are also studied. To progress to NMTH-265 or 270, student must pass NMTH-245 with a grade of C or better. (NTID Reading Test Score of 125 or higher and appropriate math placement score) **Class 4, Lab 1, Credit 4 (F)**

**NMTH-250****Elementary Statistics**

An introductory statistics course utilizing a lecture/lab format in which statistics concepts, probability, probability distributions, and bivariate data are studied. Statistical concepts that are essential for an understanding of social and political issues of contemporary life will be emphasized. Statistical software and applications will be introduced. (NMTH-210 with a grade of C or better, UWRT-100) **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-260****Explorations in College Algebra**

Students will study topics from algebra with an emphasis on functions and graphs. Topics include the algebra of functions and the study of inverse functions. Rational, radical, exponential and logarithmic functions and systems of linear equations are also studied. Exploration of mathematical concepts through use of a graphing calculator is an integral feature of the course. Students may not take both NMTH-260 and 275 for credit without permission of the department. (NMTH-210 with a grade of C or better, or appropriate placement score) **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-265****Accelerated Algebra II for Business and Liberal Arts**

The second of a two-course sequence of accelerated courses. This course, focused on applications and skills related to business and liberal arts, is for students who are interested in taking a non-trigonometry, introductory-level calculus course. Students will study topics from algebra with an emphasis on functions and graphs. Topics include the algebra of functions and the study of inverse functions. Quadratic, rational, exponential and logarithmic functions and systems of linear equations are also studied. Students may not take both NMTH-265 and 270 for credit without permission of the department. (NTID Reading Score of 125 or higher AND appropriate math placement score or NMTH-245 with a grade of C or better) **Class 4, Lab 1, Credit 4 (F, S)**

**NMTH-270 Accelerated Algebra II for Science and Engineering**  
The second of a two-course sequence of accelerated courses. This course, focused on applications and skills related to science and engineering, is for students who are interested in taking an introductory-level calculus course. Students will study topics from precalculus mathematics (without trigonometry) with an emphasis on functions and graphs. Topics include the algebra of functions and the study of inverse functions. Quadratic, rational, radical, exponential and logarithmic functions and piecewise-defined functions are also studied. Students in the Engineering program can take Trigonometry (NMTH-220) and this course simultaneously. Students may not take both NMTH-265 and 270 for credit without permission of the department. (NTID Reading Score of 125 or higher AND NMTH-245 with a grade of C or better or appropriate math placement score) **Class 4, Lab 1, Credit 4 (F, S)**

**NMTH-275 Advanced Mathematics**  
Topics from precalculus mathematics are studied with an emphasis on functions and graphs. Topics include the algebra of functions and the study of inverse functions. Rational, exponential, logarithmic and piecewise-defined functions are among those studied. Exploration of mathematical concepts through the use of a graphing calculator is an integral feature of the course. Students may not take both NMTH-260 and 275 for credit without permission of the department. (NMTH-212 with a grade of C or better, or appropriate placement score) **Class 2, Lab 2, Credit 3 (F, S)**

**NMTH-289 Special Topics: Mathematics**  
The description for each special topics request will be specified in each proposal. **Class 1-4, Credit 1-4 (F, S)**

### Science (NTID)

**NSCI-153 Processes of Science: Environmental Studies**  
This course covers introductory science processes using the content of environmental studies as a vehicle to establish an appreciation of the scientific method, critical thinking and problem solving. The basic processes of observing, collecting data, classifying, comparing, analyzing and forming hypotheses will be addressed using the concepts of environmental studies. **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-154 Physics of Matter**  
This course focuses on introductory science processes using the content of physical properties of matter as a vehicle to establish an appreciation of the processes of science. The basic processes of observing, collecting data, classifying, comparing, analyzing and forming hypotheses will be addressed using physics concepts including mass, density, displacement and buoyancy. (NMTH-180) **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-155 Processes of Science: Biological Studies**  
This course covers introductory science processes using biology content as a vehicle to establish an appreciation of the scientific method, critical thinking and problem solving. The basic processes of observing, collecting data, classifying, comparing, analyzing and forming hypotheses will be addressed using selected concepts in biology. **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-156 Processes of Science: Forensics**  
This course covers introductory science processes using the content of forensics as a vehicle to establish an appreciation of the scientific method, critical thinking and problem solving. The basic processes of observing, collecting data, classifying, comparing, analyzing and forming hypotheses will be addressed using the concepts of forensics. **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-157 Processes of Science: Astronomy**  
This course covers introductory science processes using the content of astronomy as a vehicle to establish an introduction to the scientific method, critical thinking and problem solving. The basic processes of observing, collecting data, classifying, comparing, analyzing and forming hypotheses will be addressed using the concepts of astronomy. Topics will include stellar motions in the sky, the solar system, and important historical deaf-scientist contributions to astronomy. Contemporary astronomy issues will be explored including the discovery of planets outside our solar system and the search for non-Earth life. **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-161 Fundamentals of Biology I**  
This course provides students with fundamentals of cellular biology. Topics include chemical components of cells, cell structure and function, membrane transport, osmosis, cellular respiration and photosynthesis. Principles governing genetics, gene expression and reproduction are introduced. Laboratory methods used to make observations and collect data are practiced. Recording observations and analysis of data are emphasized in formal written laboratory reports. **Class 2, Lab 3, Credit 3 (F)**

**NSCI-162 Fundamentals of Biology II**  
This course provides students with fundamentals of biological concepts and processes. Topics include plant and animal form and function, nutritional and excretory requirements, and homeostatic mechanisms and their regulation in organisms. Principles governing the concept of biological evolution and genomic evolution are introduced. Laboratory methods used to make observations and collect data are practiced. Recording observations and analysis of data are emphasized in formal written laboratory reports. Laboratory activities complement classroom activities. (NSCI-161) **Class 2, Lab 3, Credit 3 (S)**

**NSCI-199 Independent Study**  
The description for each independent study request will be specified in each student/faculty proposal. **Credit 1-4 (F, S)**

**NSCI-200 Physics of Light**  
An introductory course in principles of physics related to light, reflection and refraction. These principles are applied to the behavior of spherical and plano mirrors, prisms and lenses. The usefulness and application of dioptric power, the lens maker's equation, image and object dimensions and focal length measurements are addressed. Also included is study of the electromagnetic spectrum. Emphasis is on geometrical (ray) optics. Includes a comprehensive laboratory experience that supplements and closely follows classroom instruction. (NMTH-180) **Class 2, Lab 2, Credit 3 (F)**

**NSCI-201 Principles of Physics**  
Principles of Physics is designed to provide a broad background in general physics. Students are provided with hands-on laboratory experience in a supervised setting. Topics, which are presented in a lecture/lab format, include motion, Newton's Laws of Motion, forces, and analysis of vectors. (NMTH-180) **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-270 Concepts of College Physics**  
This is an introductory algebra-based physics course focusing on mechanics. It is designed to develop and enhance knowledge and skills necessary for success in college-level physics courses. Topics covered will include uncertainty, propagation of error, significant figures, unit conversion, translational motion in one and two dimensions, circular motion, kinematics and dynamics (both translational and angular), torque, and angular motion. (NMTH-220, 275) **Class 2, Lab 3, Credit 3 (F, S)**

**NSCI-281 Human Genetics and Evolution**  
Introduces basic human genetics, basic human evolution and the relationship between 21st century discoveries in genetics and current human evolution dogma. The history of scientific discovery in both fields is paired with a study of current concepts in molecular biology and bridges between genetics and evolution are explored. This presentation/ discussion/laboratory course includes topics in human reproductive history, cytology, embryology, molecular biology of the gene, the origin of life, human origins, heredity, genetic variations, population genetics, biotechnology, and old world and new world evolutionary theory. (NTID Reading Test Score of 125 or above; or, NENG-222 or above; or, enrollment in or completion of UWRT-100 or above) **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-282 Scientific Basis of Social Responsibility**  
Interactive course designed to provide students with both tools and confidence to become more literate in the sciences. Students select and analyze contemporary social issues and/or problems that have a basis in science utilizing basic processes of scientific inquiry. Sample topics include the following: infectious disease processes; traditional vs. alternative medicine; biogenetics; life-style; euthanasia; environmental resources and management; world population trends; and, stem cell research. Following a definition of the issue/problem, students formulate research questions and share their collective findings. They then complete weekly topic summaries where positions are articulated. Topic-related laboratory exercises and community interactions provide hands-on lab opportunities to experience contemporary science and technology. (NTID Reading Test Score of 125 or above; or, NENG-222 or above; or, enrollment in or completion of UWRT-100 or above) **Class 2, Lab 2, Credit 3 (F, S)**



**NSCI-283****Developmental Human Anatomy and Physiology**

Introduces basic human development and maturation from a multi-disciplinary perspective. In this course, the fields of human anatomy and physiology are merged with developmental psychology for the purpose of examining the human life cycle from a holistic perspective. Changes that take place in the structure and function of the human body are studied over nine stages of the human life span. Concurrently, psychological and cognitive development are discussed, beginning with conception and ending with death processes. (NTID Reading Test Score of 125 or above; or, NENG-222 or above; or, enrollment in or completion of UWRT-100 or above.) **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-284****Principles of Modern Astronomy**

This course will provide students with a general overview of the fundamental concepts and principles of modern astronomy. Topics covered will include properties of stars, their birth, life cycle, and death, galaxies, black holes and the evolution of the universe. (NTID Reading Test Score of 125 or above; or, NENG-222 or above; or, enrollment in or completion of UWRT-100 or above.) **Class 2, Lab 2, Credit 3 (F, S)**

**NSCI-289****Special Topics**

The description for each special topics request will be specified in each proposal. **Class 1–4, Credit 1–4 (F, S)**

# College of Science

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Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).

Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.

## Biological Sciences

### BIOG-110

#### Field Biology

This course is a hands-on introduction to the ecology of individuals, populations, and communities. The dynamic interaction between organisms, including humans, and their environments will be stressed. This course is intended for students who want to learn about ecology from a citizen-scientist perspective. Included will be the concepts of evolution, life histories, energy flow in ecosystems, population dynamics, food webs, the causes of temporal and spatial changes in communities, and conservation. **Class 3, Lab 3, Credit 4 (S)**

### BIOG-140

#### Cell and Molecular Biology for Engineers I

This is the first course of a two-course sequence designed to introduce biomedical engineering students to the molecular and cellular basis of life with a particular emphasis on the integration of molecular systems that underscore human physiology. This course will start with the basic chemistry of biological macromolecules and then explore the cell starting from the nucleus and moving outward. Major topics will include: DNA replication; molecular basis of inheritance; the biology of RNA; gene expression; protein synthesis; the secretory pathways; and enzyme kinetics. (High school biology and chemistry required. Restricted to engineering majors or permission of instructor) **Class 2, Lab 3, Credit 3 (F)**

### BIOG-141

#### Cell and Molecular Biology for Engineers II

This is the second of a two-course sequence designed to introduce biomedical engineering students to the molecular and cellular basis of life with a particular emphasis on the integration of molecular systems in human physiology. This course will continue exploring sub-cellular systems by touring the function of each cellular organelle and describing the pathologic consequences that result from interruption of its normal function. Major topics will include: cellular energy production; the cytoskeleton; the lysosome; the plasma membrane; vesicle transport; cell-cell communication; signaling pathways; the cell cycle; and cell division. (BIOG-140 Cell and Molecular Biology for Engineers I) **Class 2, Lab 3, Credit 3 (S)**

### BIOG-142

#### Biocompatibility and the Immune System

This course combines a traditional basic immunology course with an introduction to principles of the human tissue response to biomaterial implantation. Information is presented in the context of common immune system pathologies to emphasize the relevance of immunology to biomedical engineering and human physiology. Major topics include the organization of the immune system and its myriad cells and cytokines, a review of bacterial and viral lifecycles, antibody/antigen specificity, inflammation, bacterial adhesion, biomaterial surface characterization and sterilization. Students explore biocompatibility testing, and learn the molecular basis for surface recognition and masking in implanted materials. The course emphasizes the interaction of various immune system components with engineered biological devices, implants, cells and tissues, and explores strategies and solutions for maximizing biocompatibility of engineered biomaterials with the immune system. (BIOG-141 Cell and Molecular Biology for Engineers II) **Class 3, Credit 3 (S)**

### BIOL-101

#### General Biology I

This course serves as an introduction to cellular, molecular, and evolutionary biology. Topics will include: a study of the basic principles of modern cellular biology, including cell structure and function; the chemical basis and functions of life, including enzyme systems and gene expression; and the origin of life and evolutionary patterns of organism development on Earth. **Class 3, Credit 3 (F, Su)**

### BIOL-102

#### General Biology II

This course serves as an introduction to animal and plant anatomy and physiology, in addition to the fundamentals of ecology. Topics will include: animal development; animal body systems; plant development; unique plant systems; Earth's terrestrial and aquatic environments; population and community ecology; animal behavior; and conservation biology. **Class 3, Credit 3 (S, Su)**

### BIOL-103

#### General Biology I Lab

This course provides laboratory work to complement the lecture material of General Biology I. The experiments are designed to illustrate concepts of basic cellular and molecular biology, develop laboratory skills and techniques for microscopy, and improve ability to make, record and interpret observations. (Corequisite BIOL-101 General Biology I) **Lab 3, Credit 1 (F, Su)**

### BIOL-104

#### General Biology II Lab

This course provides laboratory work to complement the material of General Biology II. The experiments are designed to illustrate concepts of animal and plant anatomy and physiology, develop laboratory skills and techniques for experimenting with live organisms, and improve ability to make, record, and interpret observations. (Corequisite BIOL-102 General Biology II) **Lab 3, Credit 1 (S, Su)**

### BIOL-111

#### Science in the Garden

This course will introduce students to the science behind how plants grow, and how to apply this knowledge in a garden setting. The rationale is to encourage sustainability in garden food production, with an emphasis on organic methods. The course will be part lecture and part practical, with some sessions being conducted in the greenhouse or community garden. **Class 3, Lab 3, Credit 4 (S)**

### BIOL-121

#### Introductory Biology I

This course serves as an introduction to molecular biology, cellular biology, genetics, developmental biology, and evolutionary biology. Topics will include: a study of the basic principles of modern cellular biology, including cell structure and function; the chemical basis and functions of life, including enzyme systems and gene expression; and both the processes and patterns of the organismal development (ontogeny) and the evolution of life on Earth (phylogeny). Laboratory experiments are designed to illustrate concepts of basic cellular, molecular, developmental, and evolutionary biology, develop laboratory skills and techniques for microscopy and biotechnology, and improve ability to make, record and interpret observations. **Class 3, Lab 3, Credit 4 (F)**

### BIOL-122

#### Introductory Biology II

This course serves as an introduction to the diversification of life, plant anatomy and physiology, animal anatomy and physiology, and ecology. Topics include a survey of the taxonomic diversity of the major groups of living organisms, the anatomical and physiological adaptations of both plants and animals, and the principles of the ecological relationships among organisms and environments. Laboratory exercises are designed to illustrate concepts of taxonomy, anatomical and physiological adaptation, and ecological relationships. Labs are also designed to help the development of laboratory skills and techniques for experiments with live organisms, and improve the ability to make, record and interpret observations. **Class 3, Lab 3, Credit 4 (S)**

**BIOL-130** **Introduction to Bioinformatics**  
This course will explore topics in the field of bioinformatics including tools and resources used by the discipline. Additionally, the Unix/Linux operating systems, which are commonly used in bioinformatics, will be introduced. **Class 3, Credit 3 (F)**

**BIOL-201** **Cellular and Molecular Biology**  
This course will address the fundamental concepts of Cellular and Molecular Biology. Lectures, assignments, and laboratory projects will explore the structure and function of molecules, organelles, and cells and the biological processes they are involved in. Students in this course will gain an understanding of various molecular mechanisms, structure/function relationships, and cellular processes as they relate to cellular and molecular biology. Students in this course will practice and carry out common laboratory techniques used by cellular and molecular biologists, including recombinant DNA technology, cell trafficking, and cloning techniques. (BIOL-102 General Biology II or BIOL-122 Introductory Biology II) **Class 3, Lab 3, Credit 4 (F, S)**

**BIOL-204** **Introduction to Microbiology**  
This course is an introduction to microorganisms and their importance. Principles of structure and function, metabolic diversity, taxonomy, environmental microbiology, bioremediation, and infectious diseases of bacteria are discussed. Basic laboratory techniques covered include: microscopy; staining, culturing, isolation, and identification of bacteria; isolation and identification of normal flora; identification of unknown bacteria; antibiotic resistance; metabolic tests; clinical and commercial testing protocols; and detection and counting of bacteria in environmental samples (foods, water, soils). (BIOL-102 General Biology II or BIOL-122 Introductory Biology II) **Class 3, Lab 3, Credit 4 (F)**

**BIOL-205** **Animal Behavior**  
This course is a comparative study of animal behavior from an evolutionary perspective. Lectures will examine the organization of behaviors including survival behaviors, social dynamics, and human behavior. Labs will demonstrate methods of gathering and interpreting behavioral data in the laboratory and in the field. (BIOL-122 Introductory Biology II) **Class 3, Lab 3 Credit 4 (S)**

**BIOL-211** **Invertebrate Zoology**  
A study of the biology of invertebrate animals with emphasis on phylogeny and functional morphology. (One year of introductory biology or equivalent or permission of instructor) **Class 3, Lab 3, Credit 4 (S)**

**BIOL-212** **Vertebrate Zoology**  
This course provides a synthesis of the ecological, behavioral, anatomical, and physiological characteristics of vertebrates in an evolutionary context. (BIOL-122 Introductory Biology II) **Class 3, Credit 3 (F)**

**BIOL-218** **Biology of Plants**  
This course will focus on aspects of plant anatomy and diversity and their impact on plant physiology. Adaptations to the environment and biotechnological approaches to unraveling the physiology of plants will be explored. A feature of this course will be discussion groups on plant topics from the popular scientific literature, e.g., *Biofuels*, *Bioengineered Plants*. The laboratory classes will follow the lectures closely, to give an opportunity to examine the structure and physiology of different plant genera. (BIOL-122 Introduction to Biology II or equivalent) **Class 2, Lab 3, Credit 3 (F, alternate years)**

**BIOL-230** **Bioinformatics Languages**  
This is an introductory course in scripting languages focusing on the Perl programming language, the R statistical analysis program, and their application to biological data. We will investigate the use of Perl and R for processing sequence and “-omics” data, managing a variety of biological data types, and providing effective Web and graphical interfaces to existing tools for analysis of these data. (CSCI-142 Computer Science II or equivalent) **Class 2, Lab 3, Credit 3 (S)**

**BIOL-240** **General Ecology**  
This course is an introduction to population, community and ecosystem ecology, stressing the dynamic interrelationships of plant and animal communities with their environments. The course includes such ecological concepts as energy flow and trophic levels in natural communities, population and community dynamics, biogeography and ecosystem ecology. (BIOL-102 General Biology II or BIOL-122 Introductory Biology II) **Class 3, Lab 3, Credit 4 (F)**

**BIOL-265** **Evolutionary Biology**  
This is a study of the historical framework of evolutionary biology, the meaning and nature of evidence pertinent to biological evolution. The topics include earth history, the evolution of proteins and the genetic code, cellular and metabolic evolution, molecular evolution, neutral theory vs. selection, genetic variation, natural selection, migration, mutation, genetic drift, fitness, population dynamics and genetics, species concepts and speciation, systematics and classification systems, molecular phylogenetics, the evolution of protozoans, plants, fungi, invertebrates and vertebrates, behavioral evolution, interactions among species, historical biogeography, human evolution and variation. (BIOL-102 General Biology II or BIOL-122 Introductory Biology II) **Class 3, Lab 3, Credit 4 (F)**

**BIOL-290** **Vertebrate Evolution**  
This course is a study of the major changes in vertebrate functional morphology through time. The course will begin with fossilized fish records. The vertebrate evolution will then be traced to the era of mammals and end with humans. Additionally fossil evidence depicting major transitions between the vertebrate classes, modern taxonomy, including cladistic analysis, geologic time and stratigraphy, and plate tectonics will be presented. (BIOL-122 or equivalent) **Class 3, Credit 3 (F, alternate years)**

**BIOL-293** **Evolution and Creationism**  
This course explores the current controversy over the teaching of evolution in the public schools. Topics covered include pre-Darwinian views of natural history, Natural Theology and the argument from design, pre-Darwinian views of evolution, *On The Origin of Species*, and the public and scientific reception of natural selection. The major 20th and 21st century court cases, beginning with Scopes, and the Creationist responses, will be presented. The social and philosophical implications of evolution will be a major underlying theme. (BIOL-102 General Biology II or equivalent) **Class 3, Credit 3 (F, alternate years)**

**BIOL-295** **Biology Research**  
This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their first three years of study. (Permission of instructor) **Credit 1-4 (F, S, Su)**

**BIOL-296** **Ethical Issues in Biology and Medicine**  
This course explores major ethical issues in medicine and biology via lecture, readings, films, and presentation and discussion of cases. Students report on current events in ethics as researched on the internet or other news media. The first portion of the course is in a lecture format. Students learn about various theories of ethical analysis that are in current use. Subsequent classes are devoted to particular ethical areas. Relevant cases are given to the students for presentation in both written and oral formats. Any additional background material that may be required to discuss the cases is presented by the instructor and the remainder of the period is discussion based on the philosophical foundation provided at the beginning of the course. (BIOL-122 Introductory Biology II or equivalent) **Class 3, Credit 3 (F, alternate years)**

**BIOL-298** **Biology Independent Study**  
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. (Permission of instructor) **Class variable, Credit 1-4 (F, S, Su)**

**BIOL-301** **Undergraduate Teaching Experience**  
This course allows students to assist in a class or laboratory for which they have previously earned credit. The student will assist the instructor in the operation of the course. Assistance by the student may include fielding questions, helping in workshops, and assisting in review sessions. In the case of labs, students may also be asked to help with supervising safety practices, waste manifestation, and instrumentation. (Permission of instructor) **Credit 1-4 (F, S, Su)**

**BIOL-303** **Cell Physiology**  
This course is a study of functional eukaryotic cellular physiology with an emphasis on the role of global gene expression in cellular function and disease. Nuclear and cytoplasmic regulation of macromolecular synthesis, regulation of cellular metabolism, control of cell growth, and the changes in cell physiology in disease are covered. This course also covers the technology used for studying changes in gene expression associated with cell differentiation and disease. The associated laboratory covers microarray techniques. This includes design and implementation of an experiment to acquire gene expression data, analyzing the acquired data using simple computer programs, such as MAGIC, and writing a research paper explaining findings. (BIOL-201 Cellular and Molecular Biology) **Class 2, Lab 3, Credit 3 (S)**

**BIOL-305** **Plants, Medicine, and Technology**  
Plants have played a significant role in the shaping of our world. This course will explore the utilization of plants for foods, fuels, materials, medicine, novel genetic information, and social aspects of different cultures. All cultures depend on about fifteen plant species, most of which have been changed by plant improvement methods to enhance human benefits. This course will explore these changes in important crops, plant constituents used in medicine, and the technology used to produce important plant-produced medicines. (BIOL-201 Cellular and Molecular Biology or consent of instructor) **Class 4, Credit 4, (F)**

**BIOL-306** **Food Microbiology**  
This course presents the microbiology of foods. Topics include microbial food spoilage, food borne pathogens, food preservation techniques, and environmental parameters found in foods important in the survival of food spoilage microbes and food borne pathogens. The lab will include exercises on isolating heterotrophs from all kinds of food, isolation of fungi from various foods, and the survival of various pathogens in food and beverages. (BIOL-204 Introduction to Microbiology or permission of instructor) **Class 3, Lab 3, Credit 4 (S, alternate years)**

**BIOL-307** **Microbiology of Wastewater**  
This is an advanced course in the microbiology of wastewater treatment, solids treatment, and the generation and maintenance of drinking water. Topics include activated sludge processes, clarification processes, disinfection processes, trickling filters, rotating biological contactors, waste stabilization ponds, sludge microbiology, anaerobic digestion of biosolids, microbial aspects of drinking water and drinking water distribution systems, and public health aspects of wastewater and biosolids disposal on land and in marine systems. (BIOL-204 Introduction to Microbiology or permission of instructor) **Class 3, Credit 3 (S, alternate years)**

**BIOL-308** **Biology of Cancer**  
This course will address the fundamental concepts of the molecular and cellular biology of cancer cells. Class discussions, reading and writing assignments will explore the function of tumor suppressor genes, oncogenes, growth factors, and signal transduction pathways in the context of cancer cell growth, organization, and communication. Students in this course will gain an understanding of the molecular mechanisms involved in the process of tumorigenesis, will become aware of landmark findings, current research, and practice how to communicate effectively through scientific writing. This is a designated writing intensive course. (BIOL-201 Cellular and Molecular Biology) **Class 3, Credit 3 (S)**

**BIOL-309** **Comparative Vertebrate Anatomy**  
This course is a comparative study of the evolution of organ systems among vertebrate animals with an emphasis on structural changes in homologous characters among representative vertebrate lineages. The course will explore the concepts of allometry, biomechanics, biophysics, ontogeny, phylogeny using examples from vertebrate integument, skeletal, muscular, respiratory, circulatory, digestive, urogenital, endocrine, nervous, and sensory systems. (BIOL-212 or BIOL-265) **Class 2, Lab 6, Credit 4 (S)**

**BIOL-310** **Bioenergy: Microbial Production**  
This course presents how microbial processes are used to produce various bio-fuels from renewable feedstocks. The topics presented include bioethanol production, biobutanol production, methane (biogas) production, biodiesel production, and the economics involved with the production of alternative fuels. (BIOL-204 or permission of instructor) **Class 3, Credit 3 (S, alternate years)**

**BIOL-312** **Human Genetics**  
The course provides an overview of concepts and applications in human genetics. Topics include classical and complex mechanisms of inheritance, the human genome, human origins and evolution, forensic applications, personalized medicine, and ethical issues. (BIOL-201 Cellular and Molecular Biology) **Class 3, Credit 3 (F, alternate years)**

**BIOL-313** **Comparative Animal Physiology**  
This course is a comparative study of fundamental physiological mechanisms. It covers a broad range of organisms studied from the standpoint of evolution of functional systems, the mechanisms and morphological variations that exist to deal with functional problems posed by the environment, and the special mechanisms used to cope with extreme environments. (BIOL-211 or BIOL-212) **Class 3, Lab 3, Credit 4 (F)**

**BIOL-314** **Tissue Culture**  
This course will present the techniques and applications of culturing eukaryotic cells, tissues, and organs in vitro. Emphasis will be placed on mammalian systems. Lectures will cover the historical background of tissue culture, how to authenticate cell lines, basic cell culture techniques; as well as stem cells, tissue engineering, and the role of cell culture in regenerative medicine. In the laboratory, students will be introduced to growth curves, cloning techniques, primary cell culture, and making a cell line; as well as detecting mycoplasma and other cell culture contaminants. (BIOL-201 Cellular and Molecular Biology) **Class 3, Lab 3, Credit 4 (S)**

**BIOL-321** **Genetics**  
Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (BIOL-201 Cellular and Molecular Biology) **Class 3, Credit 3 (F, S, Su)**

**BIOL-322** **Developmental Biology**  
This course is a study of the processes of growth, differentiation and development that lead to the mature form of an organism. The course will also address how developmental biology is integrated with other aspects of biology including disease, ecology, and evolution. (BIOL-201 Cellular and Molecular Biology) **Class 3, Lab 3, Credit 4 (S)**

**BIOL-325** **Bioinformatic Analysis of Macromolecules**  
This course addresses the fundamental concepts of bioinformatics, especially in regards to computational analysis of nucleic acids and proteins. The nature and extent of information available in bioinformatic databases will be presented. Discussion and utilization of computational programs for analysis of individual and multiple sequences for functional and evolutionary information will be discussed. The computational laboratory will highlight the multitude of Web-based applications available for analysis of molecular sequences. (BIOL-201 Cellular and Molecular Biology) **Class 2, Lab 2, Credit 3 (S)**

**BIOL-330** **Bioinformatics**  
Bioinformatics introduces students to the analysis of biological sequences: DNA, mRNA, and protein. Emphasis is placed on classical bioinformatics analyses such as gene prediction, sequence alignment, and phylogenetics. The methods are applicable to both human and model organism studies in medical, biotechnological, and classical biology research. (BIOL-201 Cellular and Molecular Biology) **Class 2, Lab 3, Credit 3 (F)**

**BIOL-340** **Genomics**  
This course introduces students to the analysis of complex genomes. Emphasis is placed on genetic information derived from the human genome project but advances with genomes of other model systems will be discussed. Lectures cover scientific techniques used to map and sequence the human genome, as well as strategies for identification of disease susceptibility genes. The laboratory utilizes an automated DNA sequencer to demonstrate the acquisition of genetic sequences. Laboratory sessions emphasize cycle sequencing of cloned DNA fragments using an automated fluorescent DNA sequencer. (BIOL-201 Cellular and Molecular Biology) **Class 3, Lab 3, Credit 4 (S)**

**BIOL-343** **Tropical Ecology**  
This course is designed to provide an introduction to the concepts of tropical ecology and ecosystems, including elements of structure and function. Both biotic and abiotic components will be considered. Following a survey of the major tropical ecosystem types, case studies of tropical rainforests and mangrove swamps will be covered in depth. (BIOL-240 General Ecology) **Class 3, Credit 3 (F, alternate years)**

**BIOL-365** **Introduction to Population Genetics**  
This course consists of a study of DNA, genes, inheritance, genetic variation, genetic architecture, and change within and among populations. Fundamental genetics topics include DNA, gene, and chromosomal structure and function along with, transmission genetics, Mendelian inheritance patterns, sex-linked inheritance, genetic linkage, and the Hardy-Weinberg Principle. Population based topics will include genetic variation, its importance, how it originates and is maintained as well as inbreeding, random mating, mutation, migration, selection, genetic drift, the effects of small population size, fitness, population subdivision, the shifting balance theory, inter-deme selection, kin selection, neutral theory, molecular evolution, molecular clocks, multi-gene families, gene conversion, artificial selection, the genetic basis of quantitative traits and the fundamental theorem of natural selection. (BIOL-265 Evolutionary Biology or BIOL-321 Genetics) **Class 3, Credit 3 (S)**

**BIOL-370 Environmental Microbiology**  
This course presents the microbiology of soils, freshwater, marine environments, and extreme environments. Topics include nutrient cycling in soils by microorganisms, the diversity of microorganisms in soils, the role of microorganisms in freshwater environments such as lakes, rivers, and wetlands and marine environments such as the open ocean, coastline environments, and salt marshes, and the diversity of microorganisms in extreme environments including highly acidic, highly alkaline, and highly saline environments. Laboratory experiments will explore the types of bacteria in different types of soils in western New York, types of bacteria in different freshwater environments in western New York, determining total and fecal coliform counts in freshwaters, determining the presence of antibiotic resistant coliforms in sediment samples, and examining the survival of various human pathogens in surface waters. (BIOL-204 Introduction to Microbiology or permission of instructor) **Class 3, Lab 3, Credit 4 (F, alternate years)**

**BIOL-371 Freshwater Ecology**  
This course will explore the ecology of freshwater ecosystems, including rivers, lakes, and wetlands; with an emphasis on ecosystems in western New York. The chemical and physical environment of each system and the resulting biological communities will be explored. Threats to the ecosystem services supplied by freshwater resources will also be investigated. (BIOL-240 General Ecology) **Class 3, Lab 3, Credit 4 (F, alternate years)**

**BIOL-375 Advanced Immunology**  
This course is an in-depth treatment of the molecular and cellular events associated with innate and adaptive immune responses. The response of the host to the environment of microbes and pathogens will be emphasized. Recognition and response of the host to the infectious agents and the resolution of the disease state will be examined at the cellular and molecular levels. The immune response to tumors will be treated and medical advances in treating neoplastic disease using immunological therapy will be presented. The laboratories will focus on the cellular and molecular techniques employed in the modern immunology laboratory. A laboratory module employing hybridoma techniques will provide an intensive experience with monoclonal antibodies and their use in diagnostics and disease treatment. (BIOL-201 Cellular and Molecular Biology) **Class 3, Laboratory 3, Credit 4 (F)**

**BIOL-380 Bioremediation**  
This course is an introduction to bioremediation focusing on the interactions between engineers, chemists, hydrologists, and microbiologists to develop, design, and implement strategies to remediate contaminated soils or water. Topics include microorganisms involved in bioremediation, types of chemical pollutants, economics of remediation, environmental factors important in bioremediation, in situ processes, and ex situ processes. The laboratory project involves the isolation of hydrocarbon degrading bacteria from soils and sediments and further characterization of the hydrocarbon degrading isolates with respect to types of hydrocarbons degraded and rate of degradation. (BIOL-204 Introduction to Microbiology or permission of instructor) **Class 3, Lab 3, Credit 4 (F alternate years)**

**BIOL-385 Seneca Park Zoo Internship**  
This course will combine in-class lecture from specialists in the zoological field with volunteering in a zoo. This course will require the use of knowledge gained to design an exhibit for a selected species as a group. Topics covered will include the purpose of zoos, the history of the Seneca Park Zoo, wildlife medicine, population (conservation) genetics, biological exhibit design, zoo research, animal behavior, zoo management, zoo community education, and zoo ethics. There will be an opportunity to develop an understanding of the biological basis of the zoo's activities. This course will provide an intensive hands-on experience by assisting zoo staff in one department area for eight hours, plus two hours of classroom work, per week over the semester. (BIOL-240 or BIOL-265 or permission of instructor) **Class 2, Lab 8, Credit 4 (F)**

**BIOL-401 Biological Separations: Principles and Practices**  
This is a laboratory-based course that teaches classic concepts and techniques to enable the use of these techniques to purify small molecules and macromolecules from whole organisms. Detection techniques will include the use of bacterial biosensors, coomassie-blue staining, silver staining, and immunoblot analysis. Separation techniques will include SDS Polyacrylamide gel electrophoresis (PAGE) analysis, thin layer chromatography, and paper electrophoresis. Purification techniques will include ammonium sulfate precipitation, affinity chromatography, and thin layer chromatography. (BIOL-321 Genetics and BIOL-325 Bioinformatic Analysis of Macromolecules) **Class 2, Lab 4, Credit 4, (S)**

**BIOL-403 Fundamentals of Plant Biochemistry and Pathology**  
This course is primarily focused on biochemical and pathological aspects of a plant's life. This course provides an understanding of why protein catalysts are important in the field of plant biochemistry and plant pathology. More specifically, the role enzymes play in the basic cellular processes of plant growth and development is presented. Topics related to plant pathology are presented; such as plant disease epidemics, plant diagnosis, plant diseases caused by fungi, bacteria, nematodes, viruses, and plant-pathogen interaction, at the ecological, physiological and genetic level. (BIOL-321 Genetics and BIOL-325 Bioinformatic Analysis of Macromolecules) **Class 3, Lab 3, Credit 4 (S)**

**BIOL-415 Virology**  
This course is an introduction to virology with specific emphasis on the molecular mechanisms of virus infection of eukaryotic cells and virus-cell interactions. Virus structure, genetics, the infectious cycle, replication strategies, pathogenesis, persistence, effects on host macromolecular synthesis, viral oncogenesis, viral vectors, emerging viral diseases, and strategies to protect against and combat viral infection will be discussed. (BIOL-321 Genetics) **Class 3, Credit 3 (S)**

**BIOL-416 Plant Biotechnology**  
In this course aspects of plant biotechnology will be investigated. Areas of concentration will include: tissue culture, genetic transformation of plant cells, regeneration of transgenic plants, and the construction and characterization of transgenic plants for food production, experimental biology investigations, and novel product development. The laboratory will provide experiences to complement the lecture information in plant cell culture and experiences in the use of *Agrobacterium* as the gene shuttle to introduce novel genetic information into plants. (BIOL-204 Intro to Microbiology, BIOL-321 Genetics, and BIOL-325 Bioinformatic Analysis of Macromolecules) **Class 2, Lab 4, Credit 4 (F)**

**BIOL-418 Plant Molecular Biology**  
The course will introduce molecular biology concepts and encourage the application of these concepts to the particular plant gene being studied. This upper-level elective course has a strong laboratory element. Small groups will study different plant genes during the semester. The laboratory element will be a self-paced group project to amplify, clone, sequence, and examine the expression profiles of plant genes. Gene databases such as TAIR and NCBI, as well as sequence analysis software, will be used throughout the course. The groups will be guided to make week-by-week project plans, to troubleshoot problems, and record results in laboratory notebooks. In addition, weekly results and progress will be shared via an interactive wiki. (BIOL-325 Bioinformatics Analysis of Macromolecules and BIOL-321 Genetics) **Class 3, Lab 3, Credit 4 (S)**

**BIOL-420 Bacterial-Host Interactions**  
This course focuses on the mechanisms bacteria use to interact with higher organisms (humans, plants and other eukaryotic organisms) during both pathogenesis and symbiosis. The emphasis is at the molecular level, drawing on the disciplines of genetics, biochemistry, molecular biology, and cell biology. Several agonistic and antagonistic interactions are used to illustrate broader principles and contribute to a fundamental understanding of biological processes. The results of these interactions have a strong impact on biological productivity, and so are also important in applied systems. (BIOL-321 Genetics) **Class 4, Credit 4, (S)**

**BIOL-425 Ethics in Bioinformatics**  
This course focuses on individual and organizational responsibilities in bioinformatics research, product development, product commercialization, and clinical and consumer genetic testing. (BIOL-201 Cellular and Molecular Biology or permission of the instructor) **Class 3, Credit 3 (F)**

**BIOL-427 Microbial and Viral Genetics**  
This course will examine bacterial and viral genetic systems. These systems will be studied with the idea that they are simple examples of the genetics systems found in higher organisms, and can also be used as biotechnological tools. This course will show how these prokaryotic systems have served as excellent model systems for studying the genetics of higher organisms. This course will examine how these systems can be genetically manipulated using transformation, transduction, transposition, and conjugation. Bacteria and viruses will be discussed as important tools for many of the greatest discoveries in biology; especially in molecular biology and genetics. In addition some of the primary research journal articles will be critiqued. (BIOL-321) **Class 3, Lab 3, Credit 4 (F)**

**BIOL-428 Eukaryotic Gene Regulation and Disease**

This course presents an overview of gene expression in eukaryotic systems, with an emphasis on how disease can result when gene regulation is disrupted. Points of control that are examined include: chromatin structure, transcription initiation, transcript processing, stability and modification, RNA transport, translation initiation, post-translational events, and protein stability. The mechanisms involved in regulating these control points are discussed by exploring specific well studied cases. The significance of these processes is highlighted by a discussion of several diseases that have been shown to be due to defects in gene regulation. (BIOL-321 Genetics) **Class 3, Credit 3 (F)**

**BIOL-430 Bioinformatics Algorithms**

Bioinformatics Algorithms will focus on the types of analyses, tools, and databases that are available and commonly used in bioinformatics. The labs will apply the lecture material in the analysis of real data. (BIOL-330 Bioinformatics, CSI-142) **Class 2, Lab 3, Credit 3 (F)**

**BIOL-450 Genetic Engineering**

This course is a laboratory-intensive introduction to the theoretical basis, laboratory techniques, and applications of gene manipulation. (BIOL-201 Cellular and Molecular Biology) **Class 2, Lab 8, Credit 5 (S)**

**BIOL-455 Biogeography**

This course is the study of the distribution of biodiversity on the earth. Patterns of past and present animal and plant distributions are used to help understand the mechanisms of basic biological processes including speciation, dispersal, divergence, and extinction. This course will cover the character and history of the science of biogeography, as well as its basic principles and applications. We will also examine the assumptions, methods, and conclusions of historically significant biogeographic studies. (BIOL-240 General Ecology or BIOL-265 Evolutionary Biology, or permission of instructor) **Class 3, Credit 3 (S)**

**BIOL-473 Marine Biology**

This course explores marine biology by focusing on the diversity of life and influence of oceanographic phenomena on the various ecosystems. Morphological and physiological adaptations along with environmental threats will also be investigated. (BIOL-240 General Ecology) **Class 3, Credit 3 (F, alternate years)**

**BIOL-475 Conservation Biology**

This course focuses on the application of ecological principles to conservation issues. Human impact on species diversity is emphasized as it relates to agricultural, forest, coastal and wetland ecosystems. Case studies of management practices used to manage and restore disturbed ecosystems are included. (BIOL-240) **Class 3, Credit 3 (S)**

**BIOL-489 Special Topics: Applied Animal Nutrition**

In this course, students will explore applied topics in companion, agriculture, and wildlife animal nutrition. Emphasis will be placed on an overview of nutrient classes and methods of nutrient analysis, biological nutrient requirements and common problems arising from nutrient deficiencies, comparative digestive strategies, and specialized adaptations of animal with different feeding strategies. Class discussions will focus on reading and interpretation of primary literature and investigating applied nutritional research questions. (BIOL-212, BIOL-313 or permission of instructor) **Class 3, Credit 3 (F)**

**BIOL-494 Molecular Modeling and Proteomics**

This course will explore two facets of protein molecules: their structure and their expression. The structure component will build upon information from earlier bioinformatics courses. The course will also include the analysis of inter-molecular interactions, such as ligand/receptor pairing, by employing software that permits modeling of molecular docking experiments. Tissue-specific protein expression will be addressed in lectures with descriptions of microarray, SAGE, 2D gel electrophoresis and other contemporary technologies and in the laboratory through software commonly used to analyze and compare gene expression levels. Each student will be assigned a project designed to integrate salient principles covered in the course and provide an opportunity for each student to give an oral presentation to his or her peers. (BIOL-330 Bioinformatics) **Class 2, Lab 3, Credit 3 (S)**

**BIOL-495 Advanced Biology Research**

This course is a faculty-directed student project or research involving laboratory or field work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (Permission of instructor) **Credit 1-4 (F, S, Su)**

**BIOL-498 Advanced Biology Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (Permission of instructor) **Class variable, Credit 1-4**

**BIOL-570 Research Scholars Course I**

This course represents the first semester of the Research Scholars Program. Long-term research projects (minimum of 3 semesters) are undertaken with the mentorship of a faculty sponsor. Students must apply to the School of Life Sciences Research Scholars Program and be accepted prior to registration. (Acceptance into Research Scholars Program) **Class 4-12, Credit 1-4 (F, S, Su)**

**BIOL-571 Research Scholars Course II**

This course is taken in the second semester of the Research Scholars Program. A long-term research project (minimum of three semesters) is undertaken with the mentorship of a faculty sponsor. Oral presentations about the research projects are evaluated by a faculty committee. (BIOL-570 Research Scholars Course I and good standing in the Research Scholars Program) **Class 4-12, Credit 1-4 (F, S, Su)**

**BIOL-572 Research Scholars Course III**

This course is the third semester of the Research Scholars Program. Long-term research projects (minimum of 3 semesters) are undertaken with the mentorship of a faculty sponsor. This course may be repeated for additional credit if desired. (BIOL-571 Research Scholars II and good standing in the Research Scholars Program) **Class 4-12, Credit 1-4 (F, S, Su)**

## Chemistry

**CHEM-130 Chemistry Connections**

This course introduces first-year chemistry and biochemistry majors to the topics of chemical safety, ethics, database searching, citation protocol, presentation development and execution as well as the career options in the field and opportunities at RIT and beyond. These topics will be covered in the context of developing a product that the student will accomplish during the lab component of the course. (Matriculated chemistry or biochemistry majors) **Class 2, Lab 4, Credit 3 (F)**

**CHEM-151 General Chemistry**

An accelerated entry-level course designed for chemistry and biochemistry majors. Topics include measurement, atomic theory, chemical bonding and structure, stoichiometry, equilibrium and acid-base chemistry. (One year of high school chemistry, at least three years of high school math, and a score of 55% or higher on School of Mathematical Sciences Placement Exam; corequisite CHEM-130 Chemistry Connections) **Class 3, Credit 3 (F)**

**CHEM-189 Introductory Special Topics**

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of instructor) **Credit 1-3**

**CHEM-201 Clean Energy: Hydrogen Fuel Cells**

This course focuses on clean energy sources, theories of different fuel cell operations, hydrogen infrastructure, and the introduction of devices that employ hydrogen. Principles of energy utilization as they relate to the issues of global warming are presented. The fundamentals of electrochemistry, acid-base reactions, organic chemistry, polymers, thermodynamics, chemical kinetics, photochemistry, and plasma chemistry will be covered to develop a foundation for an understanding of renewable energy and hydrogen technology. Topics in the course include technical aspects of hydrogen utilization for power generation and transportation. Disposal schemes for by-products are also discussed. (CHMG-121, CHMG-131, CHMG-141, CHMG-151, or equivalent) **Class 3, Credit 3 (S, Su)**

**CHEM-203 Clean Energy: Hydrogen Fuel Cells Laboratory**

This laboratory course introduces the science of hydrogen technology and fuel cells. Students will gain hands-on experience in hydrogen systems instrumentation assembly, building control systems, and measuring the amount of hydrogen generated. Students will also become familiar with hydrogen sensing. (Corequisite CHEM-201) **Lab 2, Credit 1 (S, Su)**

**CHEM-289 Intermediate Special Topics**

This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of instructor) **Credit 1-3**

**CHEM-298** **Chemistry Independent Study**  
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. (Permission of instructor) **Credit 1-3**

**CHEM-301** **Undergraduate Teaching Experience**  
This course allows students to assist in a class or laboratory for which they have previously earned credit. The student will assist the instructor in the operation of the course. Assistance by the student may include fielding questions, helping in workshops, and assisting in review sessions. In the case of labs, students may also be asked to help with supervising safety practices, waste manifestation, and instrumentation. (Permission of instructor) **Credit 1-3 (F, S, Su)**

**CHEM-498** **Advanced Chemistry Independent Study**  
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (Permission of instructor) **Credit 1-3**

**CHEM-493** **Chemistry Research**  
This course is a faculty-directed student project or research in chemistry that could be considered of an original nature. (Permission of instructor) **Credit 1-3 (F, S, Su)**

**CHEM-495** **Advanced Chemistry Research**  
This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (Permission of instructor) **Credit 1-3 (F, S, Su)**

**CHEM-499** **Chemistry Co-op**  
This course is a cooperative education experience for undergraduate chemistry students. (Permission of instructor) **Credit 0 (F, S, Su)**

**CHMA-161** **Quantitative Analysis**  
This course will introduce students to quantitative methods. The course will cover gravimetric techniques, equilibria, statistical methods, and solution chemistry. In addition, equilibrium for polyprotic acids, electrochemistry and potentiometry will be discussed. (CHEM-151 General Chemistry or CHMG-141 General and Analytical Chemistry I; corequisite CHMA-165 Analytical Methods Lab) **Class 3, Credit 3 (S)**

**CHMA-165** **Analytical Methods Lab**  
This laboratory is designed for chemistry and biochemistry majors or those interested in pursuing a minor in chemistry. Experiments include statistics, calibration of equipment, spectroscopy, volumetric analyses, kinetics, Gran Plot, double endpoint titrations, potentiometric titration, photometric determination of copper, and water hardness. (CHEM-130 Chemistry Connections or CHMG-145 General and Analytical Chemistry I Lab; corequisite CHMA-161 Quantitative Analysis) **Lab 6, Credit 2 (S)**

**CHMA-221** **Instrumental Analysis**  
This course presents a preliminary treatment of instrumental theory and technique. The course will cover the properties of electromagnetic radiation and its interaction with matter, instrumental components, signals and noise. Specific instrumental techniques include: flame atomic absorption; molecular ultraviolet, visible, and infrared absorption; molecular fluorescence; and nuclear magnetic resonance spectroscopies. Students will have hands on experience with several chemical spectrometers. (CHMA-161 Quantitative Analysis or CHMG-142, General and Analytical Chemistry II) **Class 2, Lab 4, Credit 3 (F, S)**

**CHMA-222** **Chemical Separations**  
This course will address current chemical separations methods, including solvent extraction, planar chromatography, gas chromatography and various mechanisms of high performance liquid chromatography. Current theory and applications of mass spectroscopy will also be covered. Experiments with chemical separation techniques include extractions (both solution and solid phase), thin layer chromatography, HPLC, gel filtration, gas chromatography and mass spectroscopy. Laboratory report writing is emphasized. (CHMA-161 Quantitative Analysis or CHMG-142 General and Analytical Chemistry II) **Class 2, Lab 4, Credit 3 (F, S)**

**CHMB-189** **Introductory Special Topics**  
This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of instructor) **Credit 1-3**

**CHMB-240** **Biochemistry for Health Sciences**  
This course will focus on the application of biochemical knowledge to the field of medicine. Students will learn the basic functions of water, carbohydrates, lipids, proteins, and nucleic acids in humans, then explore implications of this knowledge in nutrition and metabolism and its relationship to health and disease. (CHMG-142 General and Analytical Chemistry II or equivalent) **Class 3, Credit 3 (F)**

**CHMB-289** **Intermediate Special Topics**  
This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of instructor) **Credit 1-3**

**CHMB-402** **Biochemistry I**  
This course introduces the structure and function of biological macromolecules and their metabolic pathways. The relationship between the three-dimensional structure of proteins and their function in enzymatic catalysis will be examined. Membrane structure and the physical laws that apply to metabolic processes will also be discussed. (CHMO-231 Organic Chemistry I or equivalent) **Class 3, Credit 3 (F, S, Su)**

**CHMB-403** **Biochemistry II**  
The course begins with in-depth studies of the metabolism of lipids, amino acids and nucleotides. Studies on metabolism will conclude with an exploration of the integration and hormonal control of metabolic processes in humans. The course will then focus on nucleic acid structures, including both DNA and RNA. Nucleic acid metabolism and the flow of genetic information including replication of DNA, its transcription into RNA, and the translation of messenger RNA into protein are presented. RNA biochemistry including ribozyme structure and function, RNA interference, and riboswitches are described. Other topics may include genomics, telomeres and telomerase, and DNA repair. (CHMB-402 Biochemistry I and CHMO-232 Organic Chemistry II or equivalent, or permission of instructor) **Class 3, Credit 3 (F, S, Su)**

**CHMB-405** **Biochemistry Lab**  
An introduction to the theory and practice of modern experimental biochemical laboratory techniques and concepts. The weekly two-hour lecture provides a theoretical framework for the course and includes a discussion of the properties of biomolecules and how those properties are exploited in the separation and characterization of the molecules. Practical laboratory techniques include the preparation of buffers, centrifugation, chromatography, electrophoretic methods, and UV-visible spectrophotometry as applied to the isolation and characterization of proteins and nucleic acids. The manipulation of genetic material in *E. coli* will also be executed. This course will be offered in a writing intensive format where the students will write and submit the different sections found in scientific papers (abstract, introduction, materials and methods, results, discussion, conclusions, references, figures, tables) in an iterative fashion that will include regular feedback from the instructor. (CHMB-402 Biochemistry I) **Class 2, Lab 3, Credit 3 (F, S)**

**CHMB-450** **Biochemistry of Infectious Disease**  
This course investigates the biochemical mechanisms of pathogenesis of bacterial, viral, and other microbial infectious agents. This course also covers the historical, social, and cultural impact that these infectious diseases have had on society. Topics may include: antibiotics and antibiotic resistance, vaccines, gut microflora and health, food borne illnesses, bioterrorism, HIV, tuberculosis, malaria, and staph infections. (CHMB-402 Biochemistry I or permission of instructor) **Class 3, Credit 3 (S)**

**CHMB-489** **Advanced Special Topics**  
This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of instructor) **Credit 1-3**

**CHMB-493** **Biochemistry Research**  
This course is a faculty-directed student project or research in biochemistry that could be considered of an original nature. (Permission of instructor) **Credit 1-3 (F, S, Su)**

**CHMB-495** **Advanced Biochemistry Research**  
This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (Permission of instructor) **Credit 1-3 (F, S, Su)**

**CHMB-498** **Advanced Biochemistry Independent Study**  
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (Permission of instructor) **Credit 1-3**

**CHMB-499** **Biochemistry Co-op**  
This course is a cooperative education experience for undergraduate biochemistry students. (Permission of instructor) **Credit 0 (F, S, Su)**

**CHMB-610** **Advanced Protein Biochemistry: Structure and Function**  
This course analyzes protein structure function relationships. Students will investigate how proteins function and how the structure relates to that function. The principles that explain enzyme rate enhancements and mechanistic enzymology will be examined. Additionally, protein superfamilies for phylogenetic relationships will be explored to enhance understanding of protein structure-function relationships. Students will read and discuss the current scientific literature and classic papers. (Graduate standing or CHMB-403 Biochemistry II or equivalent) **Class 3, Credit 3 (S)**

**CHMG-111** **General Organic Biochemistry I**  
This course is a foundations course in chemistry; no chemistry background is required. Fundamentals include: dimensional analysis; matter and energy; atomic theory; molecular structure; chemical bonding; chemical reactions; solution chemistry, states of matter, reaction rates, equilibrium, and acid/base chemistry. The lecture is complemented by hands-on laboratory exercises with workshop-style problem sessions in which the student will gain experience with basic laboratory techniques: gravimetric, volumetric, thermal and titration analyses, and use these techniques to analyze chemical reactions. The course material will emphasize the relationship between chemistry and modern sociological, nutritional and environmental issues. **Class 3, Lab 3, Credit 4 (F, S)**

**CHMG-112** **General Organic Biochemistry II**  
The course covers the foundations of organic chemistry and biochemistry. Fundamentals include organic nomenclature and structure, functional groups including alcohols, carbonyls, amines, and organic reactions. The course then applies functional group chemistry to the study of carbohydrates, lipids, nucleic acids and proteins. The lecture is complemented by laboratory exercises in which the student will gain experienced with organic laboratory techniques. Methods of separating, purifying, and characterizing organic compounds are covered. The lecture/lab course will familiarize students with the relationship between organic chemistry, biochemistry, and modern pharmaceutical, nutritional and environmental issues. (CHMG-111 General Organic Biochemistry I) **Class 3, Lab 3, Credit 3 (F, S)**

**CHMG-121** **Chemical Principles and Applications**  
This course is an introduction to basic concepts of chemistry, assuming limited prior experience. Topics include the periodicity of the elements, chemical bonding, stoichiometry, solutions, and states of matter. The laboratory component gives students experience with basic laboratory techniques: gravimetric, volumetric, thermal and titration analyses, and use these techniques to analyze chemical reactions. The lecture and lab are supported by workshop-style problem sessions. Offered in traditional and online formats. **Class 2, Lab 3, Credit 3 (F, S, Su-online only)**

**CHMG-122** **Chemistry of Water and Wastewater**  
This course addresses the chemistry of water and its analysis, which includes: pH; alkalinity; acidity; fluoride; chloride; phosphate; biochemical oxygen demand; chemical oxygen demand, nitrogen; metals; radioactivity; residual chlorine; chlorine demand; measurement of solid matter in industrial wastes and sludges; and trace contaminants. (CHMG-121 Chemical Principles and Applications or equivalent) **Class 2, Lab 2, Studio 1, Credit 3 (F)**

**CHMG-123** **Chemistry of Materials**  
The course will address three fundamental concepts of general chemistry by covering three aspects of all chemical reactions: kinetics, equilibrium and thermodynamics. Acid/base and oxidation/reductions will be discussed. The chemistry of metals, ceramics and synthetic polymers will be covered, including electrochemistry and a brief overview of organic chemistry. (CHMG-131 General Chemistry for Engineers or permission from instructor) **Class 2, Lab 3, Credit 3 (F, S)**

**CHMG-131** **General Chemistry for Engineers**  
This rigorous course is primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stoichiometry, First Law of Thermodynamics, thermochemistry, electronic theory of composition and structure, and chemical bonding. The lecture is supported by workshop-style problem sessions. Offered in traditional and online format. **Class 2, Workshop 1, Credit 3 (F, S)**

**CHMG-141** **General and Analytical Chemistry I**  
This is a general chemistry course for students in the life and physical sciences. College chemistry is presented as a science based on empirical evidence that is placed into the context of conceptual, visual, and mathematical models. Students will learn the concepts, symbolism, and fundamental tools of chemistry necessary to carry on a discourse in the language of chemistry. Emphasis will be placed on the relationship between atomic structure, chemical bonds, and the transformation of these bonds through chemical reactions. The fundamentals of organic chemistry are introduced throughout the course to emphasize the connection between chemistry and the other sciences. (High school chemistry or equivalent; corequisite CHMG-145 General and Analytical Chemistry I Lab) **Class 3, Recitation 1, Credit 3 (F, S, Su)**

**CHMG-142** **General and Analytical Chemistry II**  
The course covers the thermodynamics and kinetics of chemical reactions. The relationship between energy and entropy change as the driving force of chemical processes is emphasized through the study of aqueous solutions. Specifically, the course takes a quantitative look at: 1) solubility equilibrium, 2) acid-base equilibrium, 3) oxidation-reduction reactions and 4) chemical kinetics. (CHMG-141 General and Analytical Chemistry I or equivalent; corequisite CHMG-146 General and Analytical Chemistry II Lab) **Class 3, Credit 3 (S, Su)**

**CHMG-145** **General and Analytical Chemistry I Lab**  
The course combines hands-on laboratory exercises with workshop-style problem sessions to complement the CHMG-141 lecture material. The course emphasizes laboratory techniques and data analysis skills. Topics include: gravimetric, volumetric, thermal, titration and spectrophotometric analyses, and the use of these techniques to analyze chemical reactions. (Corequisite CHMG-141 General and Analytical Chemistry I) **Lab/Workshop 3, Credit 1 (F, S, Su)**

**CHMG-146** **General and Analytical Chemistry II Lab**  
The course combines hands-on laboratory exercises with workshop-style problem sessions to complement the CHMG-142 lecture material. The course emphasizes the use of experiments as a tool for chemical analysis and the reporting of results in formal lab reports. Topics include the quantitative analysis of a multicomponent mixture using complexation and double endpoint titration, pH measurement, buffers and pH indicators, the kinetic study of a redox reaction, and the electrochemical analysis of oxidation reduction reactions. (CHMG-141 General and Analytical Chemistry I and CHMG-145 General and Analytical Chemistry I Lab or equivalent; corequisite CHMG-142 General and Analytical Chemistry II or credit) **Lab/Workshop 3, Credit 1 (S, Su)**

**CHMG-201** **Introduction to Organic Polymer Technology**  
The first part of the course covers the fundamentals of organic chemistry. The organization, nomenclature, structure, bonding and basic reactions of organic compounds will be discussed, in particular those concepts that are relevant to understand polymer chemistry. The second part of the course will introduce the nomenclature and classification of synthetic polymers. The reactions leading to the formation of relevant polymers, their chemical and physical behavior, and some of their many applications will be discussed. (CHMG-131 General Chemistry for Engineers, CHMG-123 Chemistry of Materials) **Class 3, Credit 3 (F)**

**CHMI-351** **Inorganic Chemistry I**  
This course covers the chemistry of the more common elements, including large-scale industrial processes and their environmental impacts; practical applications, nanostructured materials, periodicity and preliminary aspects of bonding theory will also be discussed. (CHMO-231 Organic Chemistry I or equivalent) **Class 3, Credit 3 (F)**

**CHMI-352** **Inorganic Chemistry II**  
This course will teach students how the properties of inorganic materials are explained by current theories (per the Scientific Method), and how these theories are being applied to help address major challenges facing humanity, including catalysis, solid state chemistry, bioinorganic chemistry and inorganic polymers. The topics discussed in this course are symmetry, metallic bonding, ionic bonding, crystal field theory, Valence Shell Electron Repulsion Theory, Valence Bond Theory and Molecular Orbital Theory. (CHMI-351 Inorganic Chemistry I and CHMP-442 Physical Chemistry II) **Class 3, Credit 3 (S)**

**CHMI-565** **Preparative Inorganic Chemistry Lab**  
This course provides a laboratory environment for students to learn the strategies necessary to synthesize a wide variety of inorganic compounds and organometallic complexes. Students will learn how to plan and develop synthetic protocols in both atmospheric and inert reaction processes. This course is intended to give an opportunity to develop innovative skills and writing proficiency. Library, literature and textbook research will be required. (CHMI-351 Inorganic Chemistry I) **Lab 8, Credit 3 (S)**



**CHMI-764****Modern Inorganic Chemistry**

Students will become acquainted with advanced instrumental methods that are of particularly great value to the inorganic chemist, and appreciate the value of symmetry in the study of spectroscopy. They will also study reactions that depict the distinctive chemical behaviors of the heavier elements and how they can be applied in current areas of inorganic chemistry research. (CHMP-442 Physical Chemistry II) **Class 3, Credit 3 (S, alternate years)**

**CHMO-231****Organic Chemistry I**

This course is a study of the structure, nomenclature, reactions and synthesis of the following functional groups: alkanes, alkenes, alkynes. This course also introduces chemical bonding, IR and NMR spectroscopy, acid and base reactions, stereochemistry, nucleophilic substitution reactions, and alkene and alkyne reactions. In addition, the course provides an introduction to the use of mechanisms in describing and predicting organic reactions. (CHMG-142 General and Analytical Chemistry II or permission of instructor; corequisite CHMO-235 Organic Chemistry Lab I) **Class 3, Credit 3 (F, S, Su)**

**CHMO-232****Organic Chemistry II**

This course is a continuation of the study of the structure, nomenclature, reactions and synthesis of the following functional groups: aromatic systems, alcohols, ethers, epoxides, and carbonyls. This course will introduce the use of mechanisms in describing and predicting organic reactions. (CHMO-231 Organic Chemistry I or permission of instructor; corequisite CHMO-236 Organic Chemistry Lab II) **Class 3, Credit 3 (F, S)**

**CHMO-235****Organic Chemistry Lab I**

This course trains students to perform techniques important in an organic chemistry lab. The course also covers reactions from the accompanying lecture CHMO-231. (Corequisite CHMO-231 Organic Chemistry I) **Lab 3, Credit 1 (F, S, Su)**

**CHMO-236****Organic Chemistry Lab II**

This course teaches students to apply basic lab techniques to organic synthetic experiments reactions covered in the accompanying lecture CHMO-232. This course will also help students to solidify the concepts taught in lecture. The course will continue to instruct students in maintaining a professional lab notebook. (CHMO-235 Organic Chemistry Lab I; corequisite CHMO-232 Organic Chemistry II) **Lab 3, Credit 1 (F, S)**

**CHMO-331****Comprehensive Organic Chemistry I**

This course is a rigorous study of the structure, nomenclature, reactions and synthesis of the following functional groups: alkanes, alkenes, and alkynes. The course will also provide an introduction to chemical bonding, IR and NMR spectroscopy, acid and base reactions, stereochemistry, nucleophilic substitution reactions, alkene, and alkyne reactions. This course will require the use of mechanisms in describing and predicting organic reactions. (CHEM-151 General Chemistry or equivalent; corequisite CHMO-335 Comprehensive Organic Chemistry Lab I) **Class 3, Credit 3 (F, S)**

**CHMO-332****Comprehensive Organic Chemistry II**

This course is a comprehensive study of the structure, reactions and synthesis of the following functional groups: aromatic rings, ketones, aldehydes, and carboxylic acids and their derivatives. Students will apply their knowledge from CHMO-331 to predict products and derive mechanisms that describe various organic reactions. (CHMO-331 Comprehensive Organic Chemistry I; corequisite CHMO-336 Comprehensive Organic Chemistry Lab II) **Class 3, Credit 3 (F, S)**

**CHMO-335****Comprehensive Organic Chemistry Lab I**

This course prepares students to perform techniques important in an organic chemistry lab and to carry out reactions covered in the accompanying lecture CHMO-331. (Corequisite CHMO-331 Comprehensive Organic Chemistry I) **Lab 4, Credit 1 (F, S)**

**CHMO-336****Comprehensive Organic Chemistry Lab II**

This course teaches students to perform techniques important in an organic chemistry lab and reactions covered in the accompanying lecture CHMO-332. This course will also help students to solidify the concepts taught in lecture and perform qualitative analysis of unknown compounds. (CHMO-335 Comprehensive Organic Chemistry Lab I; corequisite CHMO-332 Comprehensive Organic Chemistry II) **Lab 4, Credit 2 (F, S)**

**CHMO-535****Advanced Techniques in Organic Synthesis**

This advanced lab course teaches students to perform advanced techniques important in an organic chemistry lab. Techniques covered include working under inert atmospheres, working with air-sensitive reagents, using syringes, purification methods, and carrying on material for subsequent synthetic steps. Characterization of synthesized compounds will be conducted. (CHMO-336 Comprehensive Organic Chemistry Lab II) **Lab 8, Credit 3 (S)**

**CHMO-710****Literature Exploration of Organic Synthesis**

This course will be a survey of the recent literature in organic chemistry with a focus on the chemistry concerning the synthesis of natural products and/or methodology towards synthesizing natural products. During each week of the course a student is selected to lead a discussion based on an article from a premier journal. This course may be repeated for credit. (CHMO-637 Advanced Organic Chemistry, graduate standing in chemistry, and permission of instructor) **Class 1, Credit 1 (F, S)**

**CHMP-441****Physical Chemistry I**

This course provides fundamental concepts, and organizing principles, applied in all aspects of chemistry and related fields. A rigorous and detailed explanation of central, unifying concepts in thermodynamics and chemical kinetics will be developed. Mathematical models that provide quantitative predictions will be described for thermodynamics and chemical kinetics. These contain the mathematical underpinnings to concepts applied in analytical, inorganic, organic, and biochemistry courses, as well as more advanced topics in chemistry. The course will cover: gases, temperature, energy and the First Law of Thermodynamics, entropy and the Second and Third laws, Helmholtz and Gibbs free energies, criteria for equilibrium and spontaneity, chemical equilibrium, electrochemistry, kinetic molecular theory and chemical kinetics. (CHMA-221 Instrumental Analysis, MATH-219 Multivariable Calculus and one year of College Physics or equivalent) **Class 2, Workshop 2, Credit 3 (F)**

**CHMP-442****Physical Chemistry II**

This course provides fundamental concepts, and organizing principles of quantum chemistry, applied in all aspects of chemistry and related fields. A rigorous and detailed explanation of central, unifying concepts in quantum chemistry will be developed. Mathematical models will be described, which contain the underpinnings to concepts applied in analytical, inorganic, organic, and biochemistry courses, as well as more advanced topics in chemistry. The course will cover: Postulates and formulation of Schrödinger equations, Operators and matrix elements, Solutions for the particle-in-a-box, simple harmonic oscillators, the rigid rotor and angular momentum, the hydrogen atom; spin, the Pauli principle. Approximation methods will be described for the helium atom, the hydrogen molecule ion, the hydrogen molecule, Diatomic molecules. Linear combinations of atomic orbitals and computational chemistry will be introduced and quantum chemistry applications will be provided. In addition this course will cover standard thermodynamic functions expressed in partition functions and spectroscopy and light-matter interaction (CHMP-441 Physical Chemistry I and PHYS-212 University Physics II) **Class 2, Workshop 2, Credit 3 (S)**

**CHMP-445****Experimental Physical Chemistry**

An advanced laboratory course on the use of wet chemical and instrumental analysis to apply, test and formulate physical and mathematical models to explain chemical phenomena. Emphasis is placed on formulating a scientific argument, supported by experimental evidence and established theories, and presented in a formal technical report. Writing Intensive (CHMP-441 or equivalent) **Class 1, Lab 6, Credit 3 (S)**

**Environmental Science****ENVS-101****Concepts of Environmental Science**

This course is the foundation course for the Environmental Science major and presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through lecture, case studies and active participation. In this course, the focus will be on sustainability as the foundation for problem solving while investigating a number of environmental issues and establishing environmental literacy. Topics may include biodiversity, ecosystems, pollution, energy, and global climate change. To demonstrate the interdisciplinary methodology of environmental science, elements of government/political science/policy, ethics, economics, sociology, history and engineering are embedded in the scientific matrix used to present this course. **Class 3, Credit 3 (F)**

**ENVS-111****Soil Science**

This is an introductory course on soil science, covering concepts such as soil taxonomy, soil ecology, physical soil properties, soil formation and geomorphology, and soil conservation. The lecture portion of the course will consist of in-class demonstrations and exercises, discussion groups, and traditional lecture materials. Lab exercises will focus on field sampling techniques and bench analyses, soil texture and particle size analyses, basic soil chemistry properties, land use planning, and spatial analyses. **Class 3, Lab 3, Credit 4 (F)**

**ENVS-150****Ecology of the Dalmatian Coast**

This course is an introduction to population, community, and ecosystem ecology; stressing the dynamic interrelationships of plant and animal communities of the Dalmatian Coast. The course includes such ecological concepts as energy flow and trophic levels in natural communities, population and community dynamics, biogeography and ecosystem ecology. Field trips to local Croatian ecosystems are included. **Class 3, Lab 2, Credit 4 (S)**

**ENVS-151****Scientific Inquiries in Environmental Science**

This course is part of a two-semester sequence that when combined presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through case studies, site visits, and field work. Through assigned readings, classroom discussion and case studies dealing with global environmental issues as well as the environmental issues related to the Dalmatian coast, students will learn how to critically analyze environmental problems from a multidisciplinary perspective and to propose solutions. (ENVS-150) **Class 3, Lab 2, Credit 4 (F)**

**ENVS-201****Environmental Workshop**

This workshop serves as the second core course for the environmental science major. Through in-class exercises, outside labs, and field trips, students will begin to learn problem solving and analytical skills needed to investigate and address environmental issues. Topics may include assessing campus biodiversity and ecosystems, calculating personal and campus ecological footprints and sustainability indexes, environmental modeling, and campus sustainability projects. To demonstrate the interdisciplinary methodology of environmental science, elements of government/political science/policy, ethics, economics, sociology, and history are embedded in the scientific matrix used to present this course (ENVS-101 Concepts of Environmental Science or STSO-220 Environment and Society). **Class 3, Credit 3 (S)**

**ENVS-205****Biology of Bird Banding**

This course is designed to prepare the student to safely band passerine species of birds and to safely engage in research using banding methods. Important topics of avian biology are introduced. The course is also designed to meet requirements of the United States Fish and Wildlife Service and the North American Banding Council for banders and for bander training. This course constitutes the first step toward obtaining a USFWS permit to band birds and to conduct avian conservation research. (BIOL-122 Introduction to Biology II or equivalent) **Class 1, Lab 3, Credit 2 (F)**

**ENVS-250****Applications of Geographic Information Systems**

Through hands-on projects and case studies, this course illustrates concepts and applications of raster and vector geographic information systems (GIS) in a variety of disciplines, such as environmental science, biology, geology, geography, sociology, and economics. Students will learn how to use GIS software and spatial analyses, plan a project, create a database, and conduct an independent project. Students should have completed a foundational course in their major and be comfortable working with computers. Experience with programming is also useful. (Foundational course in student's major field of study or permission of instructor). **Lecture/Lab 6, Credit 4 (F)**

**ENVS-298****Environmental Science Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. (Permission of instructor) **Class variable, Credit 1-4**

**ENVS-301****Environmental Science Field Skills**

Environmental Science Field Skills presents an integrated approach to the interrelated, interdisciplinary principles of environmental science through case studies, site visits and field work. In this course, the focus will be on learning methods for environmental analysis, including experimental design, water and soil quality, primary production and biodiversity, land use/land cover change and ecosystem restoration. The course will culminate in a stressed stream analysis of a local watershed. Additional topics may include geographic information systems, wetlands, environmental education and sustainable food production. The interdisciplinary nature of environmental science will be illustrated through elements of government/political science/policy, ethics, economics, sociology, history and engineering. (ENVS-201 Environmental Workshop, CHMG-141 General and Analytical Chemistry I, and BIOL-122 Introductory Biology II) **Class 3, Lab 3, Credit 4 (S)**

**ENVS-311****Wetlands**

This is a course on the interactions of vegetation, soils, and hydrology that characterize wetlands. Ecosystem characteristics and processes are emphasized. Wetland policies, regulations, classification, and value systems are also covered. Field work and hands-on learning are integrated into the course through projects and field trips. (BIOL-240 General Ecology) **Lecture/Lab 4, Credit 3 (S alternate years)**

**ENVS-450****Advanced Applications of Geographic Information Systems**

Aerial photography, satellite imagery, Global Positioning Systems (GPS), and Geographic Information Systems (GIS) are extremely useful tools in ecological and environmental applications such as biological monitoring, environmental assessment, habitat restoration, change analysis, resource management, and risk assessment. This course will: 1) introduce students to spatial analysis theories, techniques, and issues associated with ecological and environmental applications; 2) provide hands-on training in the use of these spatial tools while addressing a real world problem; 3) provide experience linking GIS analyses to field assessments and monitoring activities; and 4) enable students to solve a variety of spatial and temporal ecological and environmental problems. (ENVS-250 Applications of Geographic Information Systems or equivalent or permission of instructor) **Lecture/Lab 6, Credit 4 (S)**

**ENVS-498****Advanced Environmental Science Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (Permission of instructor) **Class variable, Credit 1-4 (F, S, Su)**

**ENVS-551****Environmental Science Capstone Seminar I**

This course brings together all of the principles of Environmental Science the student has learned during his/her four year undergraduate education at RIT. To accomplish this, students will work in teams to provide solutions to a real environmental problem or issue. In addition to working with RIT faculty, the students will work with practicing environmental scientists and the public. This first course will focus on problem definition, developing a problem solving strategy, and begin data collection and background analyses. Students will present their preliminary findings to the client through presentations and status reports. (Fourth-year status as an environmental science major, minor, or permission of instructor) **Lecture/Lab 3, Credit 3 (F)**

**ENVS-552****Environmental Science Capstone Seminar II**

This course continues to bring together all of the principles of Environmental Science the student has learned during his/her four year undergraduate education at RIT as the follow-up to the first capstone course. Students will work in teams to provide solutions to a real environmental problem or issue. In addition to working with RIT faculty, the students will work with practicing environmental scientists and the public. This second course will focus on refining the methodology and strategy proposed to address the environmental issue, continue data collection and background analyses, interpret results, and propose solutions to the assigned problem. Students will generate a final report and present their findings to the clients. (ENVS-551 Environmental Science Capstone Seminar I or permission of instructor) **Lecture/Lab 3, Credit 3 (S)**

**General Science****GSCI-101****Science Exploration I**

This course prepares students within the College of Science for choosing a major through an intensive, team-based research project. The project is selected each year by the faculty and is presented to the class as a goal. The students will self-organize into groups, define group sub-goals, conduct research, communicate their results on a weekly basis, and integrate the modules into a final, complete research paper that is presented at the end of the spring semester. Students will be graded on their teamwork, individual and group creativity, scientific rigor, thoroughness of supporting research results, and the overall quality of the final research paper. (First-year College of Science student status without a declared major; or permission of instructor) **Class 3, Credit 3 (F)**

**GSCI-102****Science Exploration II**

This course continues to prepare students within the College of Science for choosing a major through an intensive, team-based research project. The project, presented to the class in the first semester, is selected each year by the faculty. The students will continue to work on the project defined in the first semester and will work towards the goal of building and demonstrating the system at Imagine RIT in May. Students will be graded on their teamwork, individual and group creativity, scientific rigor, thoroughness of supporting research results, and the overall quality of the final research paper. Students will present a formal project report at the end of the semester to faculty and staff. (First-year College of Science student status without a declared major; GSCI-101, or permission of instructor) **Class 3, Credit 3 (S)**

## Imaging Science

### IMGS-111

#### Imaging Science Fundamentals

This course is an exploration of the fundamentals of imaging science and the imaging systems of the past, present, and future. Imaging systems studied include the human visual system, consumer and entertainment applications (e.g., traditional and digital photography, television, digital television, HDTV, and virtual reality); medical applications (e.g., X-ray, ultrasound, and MRI); and systems used in remote sensing and astronomy (e.g., night-vision systems, ground- and satellite-based observatories). The laboratory component reinforces the principles and theories discussed in the lecture, while giving students experience with many imaging systems and exposure to the underlying scientific principles. (Competency in algebra) **Class 2, Lab 3, Credit 3 (F, S)**

### IMGS-112

#### Astronomical Imaging Fundamentals

This course familiarizes students with the goals and techniques of astronomical imaging. The broad nature of astronomical sources will be outlined, in terms of requirements on astronomical imaging systems. These requirements are then investigated in the context of the astronomical imaging chain. Imaging chains in the optical, X-ray, radio, and/or other wavelengths will be studied in detail. Laboratory assignments will range from construction and characterization of a hand-held telescope to analysis of astronomical images. (IMGS-111 Imaging Science Fundamentals or permission of instructor) **Class 2, Lab 3, Credit 3 (S)**

### IMGS-141

#### Earth System Dynamics I

This course is the first of a two-course sequence, general elective offering that will expose students to earth systems dynamics, i.e., the lithosphere, hydrosphere, atmosphere, and terrestrial components, and their interactions at a global scale. The course also offers introductions to regional and local scale interactions, as well as societal impacts, e.g., science, engineering, policy, and economics. This course will provide students with the critical thinking skills to evaluate the underlying science of system components, how they fluctuate, interact, and what this means for society as a whole. This will include theoretical background, guest lecturers, class discussion centered on prominent topics, e.g., global warming and the science behind this, and a class project that focuses on global scale interactions and their relevance to scientific, engineering, social, and economic endeavors. **Class 2, Lab 3, Credit 3 (F)**

### IMGS-142

#### Earth System Dynamics II

This course is the second of a two-course sequence, general elective offering that will expose students to earth systems dynamics, i.e., the lithosphere, hydrosphere, atmosphere, and terrestrial components, their interactions at various scales, and their impacts on a set of human (societal) endeavors. The first offering in the sequence focused on earth systems, while this section will delve into global, regional, and local scale interactions, as well as societal impacts, e.g., science, engineering, policy, social, and economics. We will develop case studies at especially the regional and local scales and discuss how these systems are actually drivers of much of what we as humans do in our daily lives. This will include theoretical background, guest lecturers, class discussion centered around prominent topics, and a class project that focuses on local and regional interactions and their relevance to scientific, engineering, social, and economic endeavors. (IMGS-141 Earth System Dynamics I or permission of instructor) **Class 2, Lab 3, Credit 3 (S)**

### IMGS-181

#### Freshman Imaging Project I

This is the first of a two-course sequence aimed at designing, developing, and building a functional imaging system that will be useful to a real world external constituency to achieve its technical goals. With help from faculty and staff from imaging science and other departments across campus, the unified team of students will plan and organize the effort, assess technology options, integrate components, and confirm that the system meets desired levels of performance. Students will develop a general understanding of the foundational concepts of imaging science, a working knowledge of the principles of systems engineering, an appreciation for the value of teamwork in technical disciplines, and practice oral and written technical communication. In this first course of the sequence, students will develop their system to the level of a preliminary design review and will plan trade-off studies needed to proceed with system construction and testing in the second course in the sequence. (Corequisite MATH-171 Calculus A or MATH-181 Project-Based Calculus I or equivalent or permission of instructor) **Lecture/Lab 3, Credit 3 (F)**

### IMGS-182

#### Freshman Imaging Project II

This is the second of a two-course sequence aimed at designing, developing, and building a functional imaging system that will be useful to a real world external constituency to achieve its technical goals. With help from faculty and staff from imaging science and other departments across campus, the unified team of students will plan and organize the effort, assess technology options, integrate components, and confirm that the system meets desired levels of performance. Students will develop a general understanding of the foundational concepts of imaging science, a working knowledge of the principles of systems engineering, an appreciation for the value of teamwork in technical disciplines, and practice oral and written technical communication. In this second course of the sequence, students proceed with construction and testing of their system that was designed in IMGS-181. (MATH-171 Calculus A or MATH-181 Project-based Calculus I or equivalent or permission of instructor; corequisite MATH-172 Calculus B or MATH-173 Calculus C or MATH-182 Project-based Calculus II, PHYS-211 University Physics I or permission of instructor) **Lecture/Lab 3, Credit 3 (S)**

### IMGS-201

#### Introduction to Imaging Systems

This course introduces the end-to-end characterization and analysis of imaging systems, with emphasis on hands-on laboratory explorations. Fundamental concepts of the elements of the imaging chain (energy and radiation propagation; optics; sensors; image processing; image quality analysis) are applied to describe and analyze commercial and scientific imaging systems. Key concepts in systems design, characterization, and calibration are introduced or reviewed via practical laboratory explorations and a student-directed final project incorporating familiar imaging systems (e.g., digital still cameras, LCD displays, and video frame transfer systems). Scientific applications of imaging systems and current developments in their design and use may be incorporated at the discretion of the instructor. (MATH-182 Project-based Calculus II, PHYS-211 University Physics I) **Class 2, Lab 3, Credit 3 (F)**

### IMGS-211

#### Probability and Statistics for Imaging

This course introduces the principles of probability and statistics that are used in imaging science. The first half of the course covers probability distributions for discrete and continuous random variables, expectation, variance, and joint distributions. The second half of the course will consider point estimation, statistical intervals, hypothesis testing, inference, and linear regression. (MATH-182 Project-based Calculus II; corequisite MATH-221 Multivariable and Vector Calculus) **Class 3, Credit 3 (S)**

### IMGS-221

#### Vision and Psychophysics

This course presents an overview of the organization and function of the human visual system and some of the psychophysical techniques used to study visual perception. (Matriculation in imaging science or digital cinema or permission of instructor) **Class 3, Credit 3 (F)**

### IMGS-251

#### Radiometry

This course introduces the concepts of quantitative measurement of electromagnetic energy. The basic radiometric and photometric terms are introduced using calculus-based definitions. Governing equations for source propagation and sensor output are derived. Simple source concepts are reviewed and detector figures of merit are introduced and used in problem solving. The radiometric concepts are then applied to simple imaging systems so that a student could make quantitative measurements with imaging instruments. (MATH-182 Project-based Calculus II, PHYS-212 University Physics II) **Class 2, Lab 3, Credit 3 (S)**

### IMGS-261

#### Linear and Fourier Methods for Imaging

This course develops the concepts of complex numbers and linear algebra for describing imaging systems in the frequency domain via the discrete and continuous Fourier transforms. (MATH-221 Multivariable and Vector Calculus) **Class 4, Credit 4 (S)**

### IMGS-290

#### Introduction to Scientific Research

This course will expose a student who is in the early stages of their post-secondary education to the process of conducting scientific research in an established university research laboratory setting. The student will perform experiments, document results, present their findings, and work closely with a faculty mentor who will design the research to be conducted. It is anticipated that this may be the student's first exposure to the field in which they are conducting research and the importance of background research and literature review will be emphasized. (Permission of instructor) **Credit 1-4 (F, S, Su)**

**IMGS-321****Geometric Optics**

This course introduces the analysis and design of optical imaging systems based on the ray model of light. Topics include reflection, refraction, imaging with lenses, stops and pupils, prisms, magnification and optical system design using computer software. (PHYS-211 University Physics I) **Class 2, Lab 3, Credit 3 (F)**

**IMGS-322****Physical Optics**

Light waves having both amplitude and phase will be described to provide a foundation for understanding key optical phenomena such as interference, diffraction, and propagation. Starting from Maxwell's equations the course advances to the topic of Fourier optics. (PHYS-212 University Physics II, IMGS-261 Linear and Fourier Methods for Imaging or both PHYS-283 Vibrations and Waves and PHYS-320 Mathematical Methods in Physics) **Class 2, Lab 3, Credit 3 (S)**

**IMGS-341****Interactions Between Light and Matter**

This course introduces the principles of how light interacts with matter. The principles of atomic physics as applied to simple atoms are reviewed and extended to multi-electron atoms to interpret their spectra. Molecular structure and spectra are covered in depth, including the principles of lasers. The concepts of statistical physics concepts are introduced and applied to the structure of crystalline solids, their band structure and optical properties. These concepts are then used to understand electronic imaging devices, such as detectors. (PHYS-213 Modern Physics I) **Class 3, Credit 3 (S)**

**IMGS-351****Color Science**

This course introduces color perception, measurement, and reproduction in imaging systems. It builds upon the understanding of the human visual system and psychophysics and radiometric measurements and computations from the prerequisite courses to explore the basis of color perception in more detail. It applies those principles to the measurement of color stimuli and explores the applications of color science in imaging system evaluation, characterization, and modeling. (IMGS-221 Vision and Psychophysics, IMGS-251 Radiometry) **Class 3, Credit 3 (F)**

**IMGS-361****Digital Image Processing I**

This course is an introduction to the basic concepts of digital image processing. The student will be exposed to image capture and image formation methodologies, sampling and quantization concepts, statistical descriptors and enhancement techniques based upon the image histogram, point processing, neighborhood processing, and global processing techniques based upon kernel operations and discrete convolution as well as the frequency domain equivalents, treatment of noise, geometrical operations for scale and rotation, and grey-level resampling techniques. Emphasis is placed on applications and efficient algorithmic implementation using the student's programming language of choice. (IMGS-211 Probability and Statistics, or equivalent, IMGS-261 Linear and Fourier Methods for Imaging; corequisite IMGS-365 IDL Programming or equivalent programming experience) **Class 3, Credit 3 (F)**

**IMGS-362****Digital Image Processing II**

This course considers the more advanced concepts of digital image processing. The topics include image reconstruction, noise sources and techniques for noise removal, information theory, image compression, video compression, wavelet transformations, frequency-domain based applications, morphological operations, and modern digital image watermarking and steganography algorithms. Emphasis is placed on applications and efficient algorithmic implementation using the student's computer programming language of choice, technical presentation, and technical writing. (IMGS-361 Digital Image Processing I) **Class 3, Credit 3 (S)**

**IMGS-365****IDL Programming**

This course introduces the IDL environment as a data visualization tool and a programming language, including the capabilities and use of the language to rapidly prototype solutions to various imaging-related problems. The fundamental concepts of programming and data structures are introduced as these solutions are developed. Programming assignments will parallel the algorithms being examined corequisite class in Digital Image Processing, including scalar, vector and array processes. This course emphasizes the need for problem definition, decomposition into sub-problems, implementation/testing, and presentation/documentation of algorithms and results. (Corequisite IMGS-361 Digital Image Processing I) **Lab 3, Credit 1 (F)**

**IMGS-401****Research Practices**

This course is designed to develop skills in technical communication and scientific research practices. The technical communication aspect of this course is concerned with sharpening students' powers of oral and written persuasion in the form of a proposal presentation and writing. Each student is required to research, write, and present a proposal for an independent research project (IMGS-361 Digital Image Processing I, IMGS-351 Color Science and IMGS-321 Geometric Optics or permission of instructor) **Class 1, Credit 1 (S)**

**IMGS-431****Environmental Applications of Remote Sensing**

This course offers an introduction to remote sensing systems and a selection of environmental applications of remote sensing. The basic properties of electromagnetic radiation, its interaction with the atmosphere and earth surfaces (e.g., vegetation, minerals, water, etc.), and the interpretation of these interactions are dealt with in the first half of the course. This is followed by a description of airborne and spaceborne, active and passive sensors that operate throughout the electromagnetic spectrum for detecting physical phenomena. Finally, an introduction is provided to pre-processing and analysis techniques that are useful for extracting information from such sensors. The Earth's atmospheric, hydrospheric, and terrestrial processes are considered at local to regional scales. Application areas include monitoring vegetation health, measuring biomass (carbon sequestration), identifying cultural features, assessing water resources, and detecting pollution and natural hazards. (ENVS-250 or permission of instructor) **Class 2, Lab 3, Credit 3 (S)**

**IMGS-433****Remote Sensing Systems Engineering**

This course develops knowledge and understanding of the design and analysis of optical remote sensing systems for Earth remote sensing. Building on general imaging fundamentals learned earlier in their program, students will learn domain-specific tools and techniques for analyzing airborne and satellite sensor systems for the optical spectral imaging of Earth. Through a combination of classroom and laboratory experiences, students will learn about the propagation of photons and signals from the Sun through the formation of a digital image. The course will emphasize a linear systems modeling perspective and provide the students the background to understand, model, and predict remote sensing imaging system performance. (IMGS-251 Radiometry, IMGS-441 Noise and System Modeling, and IMGS-471 Imaging Systems Analysis I, or permission of instructor) **Class 3, Credit 3 (S)**

**IMGS-441****Noise and System Modeling**

This course develops the concepts of noise modeling and random processes within the context of imaging systems. After a brief review of probability theory, the concept of image noise is introduced. Random processes are considered in both the spatial and spatial frequency domains, with emphasis on the autocorrelation function and power density spectrum. Finally, the principles of random processes are applied to signal and noise transfer in multistage imaging systems. At the completion of the course the student will be able to model signal and noise transfer within a multistage imaging system. (IMGS-211 Probability and Statistics, or equivalent, IMGS-261 Linear and Fourier Methods for Imaging) **Class 3, Credit 3 (F)**

**IMGS-451****Imaging Detectors**

This course provides an overview of the underlying physical concepts, designs, and characteristics of detectors used to sense electromagnetic radiation having wavelengths ranging from as short as X-rays to as long as millimeter radiation. The basic physical concepts common to many standard detector arrays will be reviewed. Some specific examples of detectors to be discussed include photomultipliers, micro channel plates, hybridized infrared arrays, positive-intrinsic-negative (PIN) detectors, and superconductor-insulator-superconductor (SIS) mixers. The use of detectors in fields such as astronomy, high energy physics, medical imaging and digital imaging will be discussed. (IMGS-251 Radiometry, IMGS-341 Interactions Between Light and Matter or equivalent) **Class 3, Credit 3 (S)**

**IMGS-461****Multi-wavelength Astronomical Imaging**

Multi-wavelength Astronomical Imaging will survey multi-wavelength astronomical observing techniques and instrumentation. Students will gain an understanding of how the telescopes, detectors, and instrumentation in the major ground-based and space-based observatories function and how to use them. Observatories to be studied include the Very Large Array, GBT, ALMA, Spitzer, HST, Gemini, JWST, and Chandra. Students will plan and carry out a multi-wavelength archival program on a topic of their choice. (PHYS-213 Modern Physics I) **Class 3, Credit 3 (F)**

**IMGS-462 Multivariate Statistical Image Processing**  
This course discusses the digital image processing concepts and algorithms used for the analysis of hyperspectral, multispectral, and multi-channel data in multiple imaging application areas. Concepts are covered at the theoretical and implementation level using current, popular commercial software packages and high-level programming languages to work examples, homework problems and programming assignments. The requisite multivariate statistics will be presented as part of this course as an extension of the univariate statistics that the students have previously been exposed to in the introductory statistics classes. Topics include methods for supervised data classification, clustering algorithms and unsupervised classification, multispectral data transformations, data-redundancy reduction techniques, derivation of non-spectral images features to aid in the classification process, and data fusion for resolution enhancement. (IMGS-362 Digital Image Processing II and permission of instructor) **Class 3, Credit 3 (F, alternate years)**

**IMGS-471 Imaging Systems Analysis I**  
This is the first of a two-course sequence in Imaging System Analysis (ISA) that introduces students to the theory and practice of imaging systems analysis. This course focuses on analyzing the radiometric and 2D spatial properties of imaging systems. Students will learn techniques for measuring the tone transfer function (TTF), point spread function (PSF) and modulation transfer function (MTF) of continuous and sampled imaging systems. They will apply both spatial and frequency domain mathematical tools for modeling system response properties and for designing imaging systems to meet specific performance criteria. (IMGS-261 Linear and Fourier Methods for Imaging, IMGS-365 IDL Programming or equivalent programming experience) **Class 3, Credit 3 (F)**

**IMGS-472 Imaging Systems Analysis II**  
This course focuses on the analysis of time-sequential, stereoscopic volumetric and synthetic imaging systems. Students will learn techniques for characterizing the temporal, spatio-temporal, and volumetric analogues of the point spread (PSF) and modulation transfer functions (MTF) of continuous and sampled imaging systems, and will learn to use both spatial and frequency domain mathematical tools for modeling system response properties and for designing imaging systems to meet specific performance criteria. (IMGS-471 Imaging Systems Analysis I) **Class 3, Credit 3 (S)**

**IMGS-475 Advanced Imaging Laboratory I**  
Advanced Imaging Laboratory I is a companion laboratory sequence to the Imaging Systems Analysis I course. Empirical measurements of 1D (point) and 2D (plane) imaging systems are used to build computational models of tone-transfer function, point-spread function, and modulation transfer function of several systems. Significant programming and writing assignments are included. (Corequisite IMGS-471 Imaging Systems Analysis I) **Lab 3, Credit 1 (F)**

**IMGS-476 Advanced Imaging Laboratory II**  
Advanced Imaging Laboratory II is a companion laboratory sequence to the Imaging Systems Analysis II course. Empirical measurements of three-dimensional (3-D) signals, e.g., stereoscopic, volumetric, time-sequential, and spectral images and 3+D imaging systems (e.g., time-sequences of spectral data) are used to build computational models of imaging systems. Significant programming and writing assignments are included. (IMGS-475 Advanced Imaging Laboratory I; corequisite IMGS-472 Imaging Systems Analysis II) **Lab 3, Credit 1 (S)**

**IMGS-495 Advanced Imaging Science Research**  
This course is a faculty-directed student project or research involving laboratory work, computer modeling, image analysis, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (Permission of instructor) **Credit 1-4 (F, S, Su)**

**IMGS-499 Imaging Science Co-op**  
This course is a cooperative education experience for undergraduate imaging science students. (Permission of instructor) **Credit 0 (F, S, Su)**

**IMGS-502 Imaging Science Senior Project I**  
Students perform the independent research project defined in the proposal developed in IMGS-401. The project is supervised by a faculty member in imaging science and is expected to require 9-12 hours per week. (IMGS-401 Research Practices and permission of instructor) **Research 3, Credit 3 (F, S, Su)**

**IMGS-503 Imaging Science Senior Project II**  
Students perform the independent research project defined in the proposal developed in IMGS-502. The project is supervised by a faculty member in imaging science. The student presents the results of the project to a public meeting. (Permission of instructor) **Credit 3 (F, S, Su)**

**IMGS-528 Design and Fabrication of Solid State Camera**  
The purpose of this course is to provide the student with hands-on experience in building a CCD camera. The course provides the basics of CCD operation including an overview, CCD clocking, analog output circuitry, cooling, and evaluation criteria. (Fourth-year standing in imaging science or permission of instructor) **Class 1, Lab 6, Credit 3 (F)**

**IMGS-539 Principles of Solid State Imaging Arrays**  
This course covers the basics of solid state physics, electrical engineering, linear systems, and imaging needed to understand modern focal plane array design and use. The course emphasizes knowledge of the working of complementary metal-oxide-semiconductor (CMOS) and infrared arrays. (Fourth-year standing in imaging science or permission of instructor) **Class 3, Credit 3 (F)**

**IMGS-542 Testing of Focal Plane Arrays**  
This course is an introduction to the techniques used for the testing of solid state imaging detectors such as CCD, CMOS, and infrared arrays. This is a hands-on course where the students measure the performance parameters of a particular camera in detail. (Fourth-year standing in imaging science or permission of instructor) **Class 1, Lab 6, Credit 3 (S)**

**IMGS-599 Imaging Science Independent Study**  
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in any of their years of study. (Permission of instructor) **Credit 1-4 (F, S, Su)**

## Mathematics

**MATH-090 Algebra**  
This course covers operation involving polynomials, algebraic fractions, factoring, exponents and radicals, solutions of linear and quadratic equations, and graphing linear equations. In order to be successful in this course, students should have high school algebra and geometry. **Class 3, Credit 0 (F, S)**

**MATH-101 College Algebra**  
This course provides the background for an introductory level, non-trigonometry based calculus course. The topics include a review of the fundamentals of algebra: solutions of linear, fractional, and quadratic equations, functions and their graphs, polynomial, exponential, logarithmic and rational functions, and systems of linear equations. (In order to be successful in this course, students should have two years of high school algebra.) **Class 3, Credit 3 (F, S)**

**MATH-104 Contemporary Mathematics**  
This course provides an exploration of assorted mathematical concepts by using a hands on approach. Topics will be selected from a wide array of fields to show the presence and importance of mathematics in everyday life. **Class 3, Credit 3 (S)**

**MATH-111 Precalculus**  
This course provides the background for an introductory level, trigonometry-based calculus course. The topics include functions and their graphs, trigonometric functions, and conic sections. (In order to be successful in this course, students should have three years of high school mathematics) **Class 3, Credit 3 (F, S)**

**MATH-131 Discrete Mathematics**  
This course is an introduction to the topics of discrete mathematics, including number system sets and logic, relations, combinatorial methods, graph theory, regular sets, vectors, and matrices. (In order to be successful in this course, students should have MATH-101 College Algebra or equivalent.) **Class 4, Credit 4 (F, S)**

**MATH-131T Discrete Mathematics (Transition)**  
This course is intended to facilitate the quarter-to-semester transition of students who were required to take both 1016-205 and 1016-206 in the quarter system, who finished 1016-205 but did not complete 1016-206. The course will be offered only once, and covers the content of MATH-131 that was not included in the quarter-calendar course 1016-205. (1016-205 or equivalent) **Class 2, Credit 2 (F)**

**MATH-161 Applied Calculus**  
This course is an introduction to the study of differential and integral calculus, including the study of functions and graphs, limits, continuity, the derivative, derivative formulas, applications of derivatives, the definite integral, the fundamental theorem of calculus, basic techniques of integral approximation, exponential and logarithmic functions, basic techniques of integration, an introduction to differential equations, and geometric series. Applications in business, management sciences, and life sciences will be included with an emphasis on manipulative skills. (In order to be successful in this course, students should have C or better in MATH-101 College Algebra, or a score of at least 55% on the RIT Mathematics Placement Exam.) **Class 4, Credit 4 (F, S)**

**MATH-171** **Calculus A**  
This is the first course in a three-course sequence (MATH-171, MATH-172, MATH-173). This course includes a study of functions, continuity, and differentiability. The study of functions includes the definition, representations and the trigonometric functions. Limits of functions are used to study continuity and differentiability. The study of the derivative includes the definition, the basic rules including the chain rule, and implicit differentiation. Applications of the derivative include problems in related rates and curve sketching. (In order to be successful in this course, students should have C or better in MATH-111 Precalculus, or a score of at least 50% on the RIT Mathematics Placement Exam) **Class 3, Workshop 2, Credit 3 (F, S)**

**MATH-172** **Calculus B**  
This is the second course in three-course sequence (MATH-171, MATH-172, MATH-173). This course includes L'Hospital's Rule, optimization, Riemann sums, the Fundamental Theorem of Calculus, techniques of integration include substitution, integration by parts, and partial fractions. The applications of the definite integral include areas between curves, volumes, arc length, and average values of functions. (C or better in MATH-171 Calculus A or in 1016-171T or 1016-281 or 1016-231) **Class 3, Workshop 2, Credit 3 (F, S)**

**MATH-173** **Calculus C**  
This is the third course in three-course sequence (MATH-171, MATH-172, MATH-173) that covers topics in the Project-based Calculus I and II. This course includes representations of functions infinite series, convergence and divergence of series, curves defined by parametric equations, and polar coordinates. (C or better in MATH-172 Calculus B) **Class 3, Workshop 2, Credit 3 (F, S)**

**MATH-181** **Project-based Calculus I**  
This is the first in a two-course sequence intended for students majoring in mathematics, science or engineering. It emphasizes the understanding of concepts, and using them to solve physical problems. The course covers two-dimensional analytic geometry, functions, limits, continuity, the derivative, rule of differentiation, applications of the derivative, Riemann sums, definite integrals, and indefinite integrals. (In order to be successful in this course, students earn an A in MATH-111 Precalculus, or a score of at least 75% on the RIT Mathematics Placement Exam) **Class 4, Workshop 2, Credit 4 (F, S, Su)**

**MATH-182** **Project-based Calculus II**  
This is the second in a two-course sequence intended for students majoring in mathematics, science or engineering. It emphasizes the understanding of concepts, and using them to solve physical problems. The course covers techniques of integration including integration by parts, partial fractions, improper integrals, applications of integration, representing functions by infinite series, convergence and divergence of series, parametric curves and polar coordinates. (C or better in MATH-181 Project-based Calculus I) **Class 4, Workshop 2, Credit 4 (F, S, Su)**

**MATH-184T** **Analytic Geometry (Transition)**  
This course will be offered on once, and covers the content of 1016-228, including slopes, lines, conic sections, determinants, parametric equations, and vectors in two and three dimensions. In order to be successful in this course, students should have MATH-101 or equivalent. **Class 3, Credit 3 (F)**

**MATH-185** **Mathematics of Graphical Simulation I**  
This is the first part of a two course sequence that aims at providing the mathematical tools needed to manipulate graphical objects and to model and simulate the physical properties of these objects. Topics from linear algebra, primarily in two and three dimensional space, analytic geometry, and calculus will be presented. The emphasis is on linear algebra, particularly its application to problems in geometry and graphical systems. (MATH-101 College Algebra or MATH-171 Calculus A or MATH-181 Project-based Calculus or permission of adviser) **Class 3, Credit 3 (S)**

**MATH-186** **Mathematics of Graphical Simulation II**  
This is the second part of a two-course sequence that aims at providing the mathematical tools needed to manipulate graphical objects and to model and simulate the physical properties of these objects. Topics from linear algebra, primarily in two and three dimensional space, analytic geometry, and calculus will be presented. The emphasis is on analytic geometry and calculus, as applied to geometric and physical simulations. (MATH-185 Mathematics of Graphical Simulation I or equivalent) **Class 3, Credit 3 (F) Note: this course will be offered fall 2014.**

**MATH-190** **Discrete Mathematics for Computing**  
This course introduces students to ideas and techniques from discrete mathematics that are widely used in computer science. Students will learn about the fundamentals of propositional and predicate calculus, set theory, relations, recursive structures and counting. This course will help increase students mathematical sophistication and their ability to handle abstract problems. (In order to be successful in this course, students should have: corequisite MATH-172 Calculus B or MATH-182 Project-based Calculus II) **Class 3, Credit 3 (F, S)**

**MATH-190T** **Discrete Mathematics for Computing (Transition)**  
This course will be offered one time. It is intended to facilitate the calendar transition for students in a program that required 1016-265 Discrete Math I and 1016-366 Discrete Math II on the quarter calendar; specifically, the course is needed by students who finished 1016-265 but not 1016-366. The course includes content covered in MATH-190 that is not found in 1016-265. (1016-265) **Class 1, Credit 1 (F)**

**MATH-199** **Mathematics and Statistics Seminar**  
This course introduces the programs within the School of Mathematical Sciences, and provides an introduction to math and statistics software. The course provides practice in technical writing. **Class 1, Credit 1 (F)**

**MATH-200** **Discrete Mathematics and Introduction to Proofs**  
This course provides preparation for professions that use mathematics in daily practice or university mathematics courses beyond the introductory level where it is essential to communicate effectively in the language of mathematics. It covers various methods of mathematical proof, starting with basic techniques in propositional and predicate calculus and set theory, and then moving to applications in advanced mathematics. (MATH-173 Calculus C or MATH-182 Project-based Calculus II, or permission of instructor) **Class 3, Credit 3 (F)**

**MATH-211** **Elements of Multivariable Calculus and Differential Equations**  
This course includes an introduction to differential equations, Laplace transforms, numerical methods in differential equations, and the calculus of functions of two variables. The emphasis is on the application of these topics to problems in engineering technology. (C or better in MATH-172 Calculus B or MATH-182 Project-based Calculus II or equivalent) **Class 3, Credit 3 (F, S)**

**MATH-219** **Multivariable Calculus**  
This course is principally a study of the calculus of functions of two or more variables, but also includes vector-valued functions and their derivatives. The course covers limits, partial derivatives, multiple integrals, and includes applications in physics. Credit cannot be granted for both this course and MATH-221. (C or better in MATH-182 Project-based Calculus II or MATH-173 Calculus C or equivalent) **Class 3, Credit 3 (F, S, Su)**

**MATH-220** **Vector Calculus**  
This course introduces students to the concepts, techniques, and central theorems of vector calculus. It includes a study of line integrals, conservative vector fields, the flux of vector fields across curves and surfaces, Green's Theorem, the Divergence Theorem, and Stoke's Theorem. Credit may not be earned for this course if it is earned in MATH-221. (MATH-219 or equivalent) **Class 1, Credit 1 (F)**

**MATH-221** **Multivariable and Vector Calculus**  
This course is principally a study of the calculus of functions of two or more variables, but also includes vector-valued functions and their derivatives. The course covers limits, partial derivatives, multiple integrals, Stokes' Theorem, Green's Theorem, the Divergence Theorem, and applications in physics. Credit cannot be granted for both this course and MATH-219. (MATH-182 Project-based Calculus II or MATH-173 Calculus C or equivalent) **Class 4, Credit 4 (F, S, Su)**

**MATH-221H** **Honors Multivariable and Vector Calculus**  
This course is an honors version of MATH-221. It includes an introduction to vectors, surfaces, and multivariable functions. It covers limits, partial derivatives and differentiability, multiple integrals, Stokes' Theorem, Green's Theorem, the Divergence Theorem, and applications. Unlike MATH-221, students in this course will often be expected to learn elementary skills and concepts from their text so that in-class discussion can focus primarily on extending techniques, interpreting results, and exploring mathematical topics in greater depth; homework exercises and projects given in this class will require greater synthesis of concepts and skills, on average, than those in MATH-221. Credit cannot be granted for both this course and MATH-219 or MATH-221. (C or better in MATH-182 or MATH-173) **Class 4, Credit 4 (F)**

**MATH-231** **Differential Equations**  
This course is an introduction to the study of ordinary differential equations and their applications. Topics include solutions to first order equations and linear second order equations, methods of undetermined coefficients, variation of parameters, linear independence and the Wronskian, vibrating systems, Laplace transforms, and an introduction to systems of equations. (MATH-173 Calculus C or MATH-182 Project-based Calculus II) **Class 3, Credit 3 (F, S, Su)**

**MATH-233** **Linear Systems and Differential Equations**  
This is an introductory course in linear algebra and ordinary differential equations in which a scientific computing package is used to clarify mathematical concepts, visualize problems, and work with large systems. The course covers matrix algebra, the basic notions and techniques of ordinary differential equations with constant coefficients, and the physical situation in which they arise. (MATH-172 Calculus B or MATH-182 Project-based Calculus II) **Class 4, Credit 4 (S)**

**MATH-241** **Linear Algebra**  
This course is an introduction to the basic concepts of linear algebra, with an emphasis on matrix manipulation. Topics include Gaussian elimination, matrix arithmetic, determinants, of a matrix, eigenvalues, and eigenvectors. Various applications are studied throughout the course. (MATH-219 Multivariable Calculus or MATH-221 Multivariable and Vector Calculus or MATH-190 Discrete Mathematics for Computing or MATH-200 Discrete Mathematics and Introduction to Proofs) **Class 3, Credit 3 (F, S)**

**MATH-251** **Probability and Statistics I**  
This course will introduce sample spaces and events, axioms of probability, counting techniques, conditional probability and independence, distributions of discrete and continuous random variables, joint distributions (discrete and continuous), the central limit theorem, descriptive statistics, interval estimation, and applications of probability and statistic to real-world problems. (MATH-182 Project-based Calculus II or MATH-172, or equivalent or permission of instructor) **Class 3, Credit 3 (F, S, Su)**

**MATH-252** **Probability and Statistics II**  
This course covers basic statistical concepts, sampling theory, hypothesis testing, confidence intervals, point estimation, and simple linear regression. The statistical software package MINITAB will be used for data analysis and statistical applications. (MATH-251 Probability and Statistics I) **Class 3, Credit 3 (F, S)**

**MATH-255** **Actuarial Mathematics**  
This course provides challenging problems in probability whose solutions require a combination of skills that one acquires in a typical mathematical statistics curriculum. Course work synthesizes basic, essential problem-solving ideas and techniques as they apply to actuarial mathematics. (Permission of instructor) **Class 2, Credit 2 (S)**

**MATH-261** **Topics in Mathematical Finance**  
This course examines concepts in finance from a mathematical viewpoint. It includes topics such as the Black-Scholes model, financial derivatives, the binomial model, and an introduction to stochastic calculus. Although the course is mathematical in nature, only a background in calculus (including Taylor series) and basic probability is assumed; other mathematical concepts and numerical methods are introduced as needed. (MATH-219 and STAT-145 or equivalent) **Class 1, Credit 1 (alternating years, S)**

**MATH-289** **Special Topics**  
This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of instructor) **Class 1-3, Credit 1-3**

**MATH-291** **History of Mathematics**  
This course provides the opportunity to study and write about topics in the history of mathematics. Topics will vary. **Class 3, Credit 3 (alternating years)**

**MATH-295** **Topics in Mathematical Problem Solving**  
This course develops strategies for solving problems that are chosen from a wide variety of areas in mathematics. Emphasis is on attempting problem solutions and presenting efforts to the class or instructor. (MATH-182 Project-based Calculus II or MATH-173 Calculus C or permission of instructor) **Class 2, Credit 2 (F)**

**MATH-301** **Mathematics of Simulation**  
This course is an introduction to computer simulation, simulation languages, model building and computer implementation, mathematical analyses of simulation models and their results using techniques from probability and statistics. (MATH-252 Probability and Statistics II or permission of instructor) **Class 3, Credit 3 (S)**

**MATH-311** **Linear Optimization**  
This course presents the general linear programming problem. Topics include a review of pertinent matrix theory, convex sets and systems of linear inequalities, the simplex method of solution, artificial bases, duality, parametric programming, and applications. (MATH-241 Linear Algebra or permission of instructor) **Class 3, Credit 3 (S)**

**MATH-312** **Nonlinear Optimization**  
This course provides a study of the theory of optimization of non-linear functions of several variables with or without constraints. Applications of this theory in business, management, engineering and the sciences are considered. Algorithms for practical applications will be analyzed and implemented. The course may require the use of specialized software to analyze problems. Students taking this course will be expected to complete applied projects and/or case studies. (MATH-311 Linear Optimization or permission of instructor) **Class 3, Credit 3 (S)**

**MATH-321** **Game Theory**  
This course introduces solution techniques and applications of Game Theory. Topics include game trees, matrix games, linear inequalities, convex sets, the minimax theorem, and n-person games. (MATH-241 Linear Algebra) **Class 3, Credit 3 (S)**

**MATH-326** **Boundary Value Problems**  
This course provides an introduction to boundary value problems. Topics include Fourier series, separation of variables, Laplace's equation, the heat equation, and the wave equation in Cartesian and polar coordinate systems. (MATH-219 Multivariable Calculus or MATH-221 Multivariable and Vector Calculus, and MATH-231 Differential Equations) **Class 3, Credit 3 (F, S)**

**MATH-331** **Dynamical Systems**  
The course revisits the equations of spring-mass system, RLC circuits, and pendulum systems in order to view and interpret the phase space representations of these dynamical systems. The course begins with linear systems followed by a study of the stability analysis of nonlinear systems. Matrix techniques are introduced to study higher order systems. The Lorentz equation will be studied to introduce the concept of chaotic solutions. (MATH-231 Differential Equations and MATH-241 Linear Algebra) **Class 3, Credit 3 (S)**

**MATH-341** **Advanced Linear Algebra**  
This course provides a further study of the fundamental concepts of linear algebra such as linear transformations, similarity, diagonalization, orthogonality, inner products, Gram-Schmidt, QR and SV Decomposition, quadratic forms, and various numerical techniques. Several applications of these ideas are also presented. (MATH-241 Linear Algebra) **Class 3, Credit 3 (F, S)**

**MATH-351** **Graph Theory**  
This course covers the theory of graphs and networks for both directed and undirected graphs. Topics include graph isomorphism, Eulerian and Hamiltonian graphs, matching, covers, connectivity, coloring, and planarity. There is an emphasis on applications to real world problems and on graph algorithms such as those for spanning trees, shortest paths, and network flows. (MATH-190 Discrete Mathematics for Computing or MATH-200 Discrete Mathematics and Introduction to Proofs or permission of instructor) **Class 3, Credit 3 (F)**

**MATH-361** **Combinatorics**  
This course introduces the mathematical theory of enumeration of discrete structures. Topics include enumeration, combinatorial proofs, recursion, inclusion-exclusion, and generating functions. (MATH-190 Discrete Mathematics for Computing or MATH-200 Discrete Mathematics and Introduction to Proofs, or permission of instructor) **Class 3, Credit 3 (S)**

**MATH-367** **Codes and Ciphers**  
This course will introduce, explain and employ the basic techniques of cryptography, both classical and modern. Topics will include the VignEre cipher, affine ciphers, Hill ciphers, one-time pad encryption, Enigma, cryptosystems such as DES (Data Encryption Standard) and AES (Advanced Encryption Standard), public key encryption scheme (RSA), and hash functions. The course will include an introduction to number theoretic tools used in cryptography. (MATH-190 Discrete Mathematics for Computing or MATH-200 Discrete Mathematics and Introduction to Proofs) **Class 3, Credit 3 (S)**

**MATH-371** **Number Theory**  
This course provides an introduction to the study of the set of integers and their algebraic properties. Topics include prime factorization and divisibility, linear Diophantine equations, congruences, arithmetic functions, primitive roots, and quadratic residues. (MATH-190 Discrete Mathematics for Computing or MATH-200 Discrete Mathematics and Introduction to Proofs or permission of instructor) **Class 3, Credit 3 (S)**



**MATH-381** **Complex Variables**  
This course covers the algebra of complex numbers, analytic functions, Cauchy-Riemann equations, complex integration, Cauchy's integral theorem and integral formulas, Taylor and Laurent series, residues, real integrals by complex methods, and conformal mappings. (MATH-219 Multivariable Calculus or MATH-221 Multivariable and Vector Calculus, or equivalent) **Class 3 (F, S, Su)**

**MATH-401** **Stochastic Processes**  
This course explores Poisson processes and Markov chains with an emphasis on applications. Extensive use is made of conditional probability and conditional expectation. Further topics, such as renewal processes, Brownian motion, queueing models and reliability are discussed as time allows. (MATH-241 Linear Algebra and MATH-251 Probability and Statistics I, or permission of instructor) **Class 3, Credit 3 (F)**

**MATH-411** **Numerical Analysis**  
This course covers numerical techniques for the solution of nonlinear equations, interpolation, differentiation, integration, and the solution of initial value problems. Eligibility: some programming knowledge. (MATH-231 Differential Equations and MATH-241 Linear Algebra, and some programming knowledge) **Class 3, Credit 3 (F)**

**MATH-412** **Numerical Linear Algebra**  
This course covers numerical techniques for the solution of systems of linear equations, eigenvalue problems, singular values and other decompositions, applications to least squares, boundary value problems, and additional topics at the discretion of the instructor. Eligibility: some programming knowledge. (MATH-221 Multivariable and Vector Calculus and MATH-231 Differential Equations and MATH-341 Advanced Linear Algebra) **Class 3, Credit 3 (S)**

**MATH-421** **Mathematical Modeling**  
This course explores problem solving, formulation of the mathematical model from physical considerations, solution of the mathematical problem, testing the model and interpretation of results. Problems are selected from the physical sciences, engineering, and economics. (MATH-221 Multivariable and Vector Calculus, MATH-241 Linear Algebra, MATH-251 Probability and Statistics I) **Class 3, Credit 3 (F)**

**MATH-431** **Real Variables I**  
This course is an investigation and extension of the theoretical aspects of elementary calculus. Topics include mathematical induction, real numbers, sequences, functions, limits, and continuity. The workshop will focus on helping students develop skill in writing proofs. (MATH-190 Discrete Mathematics for Computing or MATH-200 Discrete Mathematics with Introduction to Proofs, MATH-221 Multivariable and Vector Calculus, or equivalent, or permission of instructor) **Class 3, Workshop 1, Credit 3 (F, S)**

**MATH-432** **Real Variables II**  
This course is a continuation of MATH-431. It concentrates on differentiation, integration (Riemann and Riemann-Stieltjes integrals), power series, and sequences and series of functions. (MATH-431 Real Variables I) **Class 3, Credit 3 (S)**

**MATH-441** **Abstract Algebra I**  
This course covers basic set theory, number theory, groups, subgroups, cyclic and permutation groups, Lagrange and Sylow theorems, quotient groups, and isomorphism theorems. Group Theory finds applications in other scientific disciplines like physics and chemistry. (MATH-190 Discrete Mathematics for Computing or MATH-200 Discrete Mathematics with Introduction to Proofs and MATH-241 Linear Algebra) **Class 3, Workshop 1, Credit 3 (F, S)**

**MATH-442** **Abstract Algebra II**  
This course covers the basic theory of rings, integral domains, ideals, modules, and abstract vector spaces. It also covers the key constructions including direct sums, direct products, and field extensions. These topics serve as the foundation of mathematics behind advanced topics such as algebraic geometry and various applications like cryptography and coding theory. (MATH-441 Abstract Algebra I) **Class 3, Credit 3 (S)**

**MATH-461** **Topology**  
The course defines metric spaces and topological spaces. For metric spaces it examines continuity spaces of continuous functions and completeness in Euclidean spaces. For topological spaces it examines compactness, continuous functions, and separation axioms. (MATH-432 Real Variables II) **Class 3, Credit 3 (S)**

**MATH-489** **Advanced Special Topics**  
This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of instructor) **Class 1-3, Credit 1-3**

**MATH-499** **Co-op**  
This course is a cooperative education experience for undergraduate students majoring in applied mathematics, computational mathematics or statistics. (Permission of instructor) **Credit 0 (F, S, Su)**

## Physics

**PHYS-103** **Explorations in Physics**  
This is an activity-based course in which topics will encompass a range of physical phenomena. Scientific concepts are introduced to provide a basis for understanding phenomena such as sight and optics, motion, rainbows, cloud formation, and global warming. The course is modular in nature, with students working through activity units in order to master basic material, and then developing a project on a topic of their choosing. Two or three units are chosen from a canon including, but not limited to: motion, forces, and scientific theories; light, sight, and rainbows; heat, temperature, and cloud formation; buoyancy, pressure, and flight; and atoms, crystals, and snowflakes. Each unit introduces basic concepts needed to understand a complicated natural phenomenon. The main emphasis is on the process of scientific investigation, including how to frame scientific questions and what constitutes acceptable evidence of a scientific idea. **Workshop 4, Credit 3 (F, S)**

**PHYS-104** **Stellar Astronomy**  
This course provides an introduction to the basic concepts of stellar astronomy including the celestial sphere, constellations, nomenclature, physical properties of stars, principles of spectroscopy as applied to astronomy, double stars, variable stars, star clusters, stellar evolution, gaseous nebulae, stellar motions and distribution, the Milky Way system, external galaxies, and cosmology. (Competency in Algebra) **Class 2, Credit 2 (S)**

**PHYS-105** **Stellar Astronomy Lab**  
This laboratory course includes experiments and exercises that relate to the principles and theories discussed in PHYS-104 Stellar Astronomy. Observational exercises utilizing the RIT observatory and associated equipment will be emphasized. (Corequisite PHYS-104 Stellar Astronomy) **Lab 3, Credit 1 (S)**

**PHYS-106** **Solar System Astronomy**  
This course provides an introduction to basic concepts of solar system astronomy including celestial sphere, zodiac, astronomical telescopes, sun, moon, eclipses, earth as planet, planets and their satellites, comets, meteors, and theories of the origin of the solar system. (Competency in Algebra) **Class 2, Credit 2 (F)**

**PHYS-107** **Solar System Astronomy Lab**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture course Solar System Astronomy PHYS-106. Observational exercises utilizing the RIT observatory and associated equipment will be emphasized. (Corequisite PHYS-106 Solar System Astronomy) **Lab 3, Credit 1 (F)**

**PHYS-111** **College Physics I**  
This is an introductory course in algebra-based physics focusing on mechanics, waves, and optics. Topics include kinematics, planar motion, Newton's laws, gravitation; rotational kinematics and dynamics; work and energy; momentum and impulse; conservation laws; fluids; simple harmonic motion; mechanical and electromagnetic waves; geometrical optics; physical optics and interference; data presentation/analysis and error propagation. The course is taught using both traditional lectures and a workshop format that integrates material traditionally found in separate lecture, recitation, and laboratory settings. (Competency in algebra, geometry and trigonometry.) **Class 2, Workshop 4, Credit 4 (F, S, Su)**

**PHYS-112** **College Physics II**  
This course is an introduction to algebra-based physics focusing on thermodynamics, electricity and magnetism, and elementary topics in modern physics. Topics include heat and temperature, laws of thermodynamics, electric and magnetic forces and fields, DC and AC electrical circuits, electromagnetic induction, the concept of the photon, and the Bohr model of the atom. The course is taught using both traditional lectures and a workshop format that integrates material traditionally found in separate lecture, recitation, and laboratory settings. (PHYS-111 College Physics I) **Class 2, Workshop 4, Credit 4 (F, S, Su)**



**PHYS-150****Introduction to Special Relativity**

In this course students will learn aspects of Einstein's Theory of Special Relativity including time dilation, length contraction, Lorentz transformations, velocity transformations, relativistic Doppler effect, issues with simultaneity, and relativistic expressions for energy and momentum. (High school physics and algebra) **Class 3, Credit 3 (F)**

**PHYS-189****Introductory Special Topics**

This is an introductory course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of department) **Credit 1-4**

**PHYS-205****Principles of Optics**

This course is an introduction to physical and geometrical optics. Topics will include: wave and photon description of light; propagation of electromagnetic waves in vacuum and transparent media; mirrors, lenses, and simple optical instruments; basics of optical fibers; polarization of light and polarizing optical elements; interference; Michelson interferometer; Fraunhofer and Fresnel diffraction; diffraction gratings. (PHYS-112 College Physics II) **Workshop 4, Credit 3 (F, alternate years)**

**PHYS-206****University Physics I: AP-C Mechanics**

This is a course in calculus-based physics for science and engineering majors. Topics include kinematics, planar motion, Newton's Laws, gravitation, work and energy, momentum and impulse, conservation laws, systems of particles, rotational motion, static equilibrium, mechanical oscillations, and data presentation/analysis. This course is used to award credit for the Advanced Placement Physics C Mechanics exam. This course is never scheduled. (Score of 4 or 5 on the Physics AP-C Mechanics exam) **Class 0, Credit 3 (Other)**

**PHYS-207****University Physics I: AP-C Waves**

This course is primarily for students who have earned credit for the AP-C Mechanics exam. This is a course in calculus-based physics for science and engineering majors. Topics include mechanical oscillations and waves, and data presentation/analysis. The course is taught in a workshop format that integrates the material traditionally found in separate lecture and laboratory courses. This course together with PHYS-206 University Physics I: AP-C is equivalent to PHYS-211 University Physics I. (PHYS-206 University Physics I: AP-C Mechanics, MATH-181 Project-based Calculus I or MATH-181A Calculus I or MATH-172 Calculus B and credit or co-registration in MATH-182 Project-based Calculus II or MATH-182A Calculus I or MATH-172 Calculus B or equivalent) **Workshop 2.5 hrs/wk for 7 wks, Credit 1 (F, S)**

**PHYS-208****University Physics II: AP-C Electricity and Magnetism**

This is a course in calculus-based physics for science and engineering majors. Topics include electrostatics, Gauss' law, electric field and potential, capacitance, resistance, DC circuits, magnetic field, Ampere's law and inductance. This course is used to award credit for the Advanced Placement Physics C Electricity and Magnetism exam. This course is never scheduled. (Score of 4 or 5 on the Physics AP-C Electricity and Magnetism exam) **Class 0, Credit 3 (Other)**

**PHYS-209****University Physics II: AP-C Optics**

This course is primarily for students who have earned credit for the AP-C Electricity and Magnetism exam. Topics include geometrical and physical optics. The course is taught in a lecture/workshop format that integrates the material traditionally found in separate lecture and laboratory courses. This course together with PHYS-208 University Physics II: AP-C Electricity and Magnetism is equivalent to PHYS-212 University Physics II. (PHYS-211 University Physics I, or PHYS-206 University Physics I: AP-C Mechanics and PHYS-207 University Physics I: AP-C Waves; PHYS-208 University Physics II: AP-C Electricity and Magnetism; MATH-182 Project-based Calculus II or MATH-182A Calculus II or MATH-172 Calculus B or equivalent) **Workshop 2.5 hr/wk for 7 wks, Credit 1 (F, S)**

**PHYS-211****University Physics I**

This is a course in calculus-based physics for science and engineering majors. Topics include kinematics, planar motion, Newton's Laws, gravitation, work and energy, momentum and impulse, conservation laws, systems of particles, rotational motion, static equilibrium, mechanical oscillations and waves, and data presentation/analysis. The course is taught in a workshop format that integrates the material traditionally found in separate lecture and laboratory courses. (Grade of C or better in MATH-181 Project-based Calculus I and credit or co-registration in MATH-182 Project-based Calculus II) **Workshop 6, Credit 4 (F, S)**

**PHYS-211A****University Physics IA**

This is a course in calculus-based physics for science and engineering majors whose performance on the Math Placement Exam resulted in their placement in MATH-181A. Topics include kinematics, planar motion, Newton's Laws, gravitation, work and energy, momentum and impulse, conservation laws, systems of particles, rotational motion, static equilibrium, mechanical oscillations and waves, and data presentation/analysis. The course is taught in a workshop format that integrates the material traditionally found in separate lecture and laboratory courses. (Grade of C or better in MATH-181A or MATH-172 or equivalent and credit or co-registration in MATH-182A or MATH-172 or equivalent) **Workshop 8, Credit 4 (F, S)**

**PHYS-212****University Physics II**

This course is a continuation of PHYS-211, University Physics I. Topics include electrostatics, Gauss' law, electric field and potential, capacitance, resistance, DC circuits, magnetic field, Ampere's law, inductance, and geometrical and physical optics. The course is taught in a lecture/workshop format that integrates the material traditionally found in separate lecture and laboratory courses. (PHYS-211 or PHYS-211A or PHYS-206 and credit or co-registration in PHYS-207, or all of the following three courses: MECE-102, MECE-103, and MECE-205; MATH-182 Project-based Calculus II or MATH-182A or MATH-172; a grade of C or better is required in all prerequisites) **Workshop 6, Credit 4 (F, S)**

**PHYS-213****Modern Physics I**

This course provides an introductory survey of elementary quantum physics, as well as basic relativistic dynamics. Topics include the photon, wave-particle duality, deBroglie waves, the Bohr model of the atom, the Schrodinger equation and wave mechanics, quantum description of the hydrogen atom, electron spin, and multi-electron atoms. (PHYS-212, or PHYS-208 and PHYS-209) **Class 3, Credit 3 (F, S, Su)**

**PHYS-214****Modern Physics II**

This course is a continuation of a survey of modern physics beyond the topics introduced in Modern Physics I. Central topics include the physics of multi-electron atoms, molecular structure, fundamentals of statistical physics applied to systems of particles, elementary solid-state physics, applications to semiconductor materials and simple devices, and basic elements of nuclear physics. (PHYS-213 Modern Physics I. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (F)**

**PHYS-216****University Physics I: Physics Majors**

This is a course in calculus-based physics for physics majors. Topics include kinematics, planar motion, Newton's Laws, gravitation, work and energy, momentum and impulse, conservation laws, systems of particles, rotational motion, static equilibrium, mechanical oscillations and waves, and data presentation/analysis. Calculus and basic numerical techniques will be applied throughout the course to analyze non-idealized complex systems. The course is taught in a workshop format that integrates the material traditionally found in separate lecture and laboratory courses. The course will also include enrichment activities connecting current developments in the field of physics. (Grade of C or better in MATH-181 Project-Based Calculus I or MATH-181A Calculus I and credit or co-registration in MATH-182 Project-based Calculus II or MATH-182A Calculus II) **Workshop 7.5, Credit 4 (F, S)**

**PHYS-217****University Physics II: Physics Majors**

This course is a continuation of PHYS-216, University Physics I: Physics Majors. Topics include fluids, thermodynamics, electrostatics, Gauss' law, electric field and potential, capacitance, resistance, circuits, magnetic field, Ampere's law, inductance, and geometrical and physical optics. Calculus and basic numerical techniques will be applied throughout the course to analyze non-idealized complex systems. The course is taught in a lecture/workshop format that integrates the material traditionally found in separate lecture and laboratory courses. The course will also include enrichment activities connecting current developments in the field of physics. (MATH-182 Project-based Calculus II or MATH-182A Calculus II; PHYS-216 University Physics I: Physics Majors or PHYS-206 University Physics I: AP-C Mechanics and credit or co-registration in PHYS-207 University Physics I: AP-C Waves [a grade of C or better is required in all prerequisites]) **Workshop 7.5, Credit 4 (F, S)**

**PHYS-220****University Astronomy**

This course is an introduction to the basic concepts of astronomy and astrophysics for scientists and engineers. Topics include the celestial sphere, celestial mechanics, methods of data acquisition, planetary systems, stars and stellar systems, cosmology, and life in the universe. (PHYS-211 or PHYS-211A; or PHYS-206 and PHYS-207, or all of the following three courses: MECE-102, MECE-103, and MECE-205) **Class 3, Credit 3 (F, S)**

**PHYS-222** **Electronic Measurements**  
This course covers the fundamentals of AC and DC circuit theory, electrical analysis of simple linear networks, operations of and circuits containing diodes and transistors, linear and non-linear operation of op-amps and their applications, and analysis of basic digital circuits. Laboratory classes reinforce lecture material and teach practical skills in use of basic test and measurement equipment. (PHYS-212 University Physics II, or PHYS-208 and PHYS-209) **Class 2, Lab 3, Credit 3 (S)**

**PHYS-225** **Introduction to Computational Physics and Programming**  
This course introduces methods for using computers to model the behavior of physical systems. Students will learn how computers represent numbers, limits of computation, how to write computer programs, and to use good programming practices. Students will also apply numerical methods of differentiation and integration, and numerical solutions to differential equations in physical situations. (PHYS-211 University Physics I or PHYS-211A or PHYS-206 and credit or co-registration in PHYS-207, MATH-182 Project-based Calculus II or MATH-182A or departmental permission; corequisite PHYS-212 University Physics II or PHYS-208 and PHYS-209) **Class 1, Lab 4, Credit 3 (F)**

**PHYS-275** **Sophomore Physics Seminar**  
This seminar will assist students in their preparation for the Physics Comprehensive Oral Exam (CORE) required at the end of the course by presenting a unified as opposed to topical approach to physics. Physics majors must pass this course before going on to 300-level Physics courses. (PHYS-212 University Physics I or PHYS-208 and PHYS-209; corequisite PHYS-213 Modern Physics I) **Class 2, Credit 1 (F, S)**

**PHYS-283** **Vibrations and Waves**  
This course is an introduction to the physics of vibrations and waves, beginning with the simple harmonic oscillator, the foundation to understanding oscillatory and vibratory systems. The course will include driven and damped single oscillators, coupled discrete oscillators, and continuous vibrating systems. Connections will be made with many areas of physics that involve oscillation, including mechanics, electromagnetism, and quantum mechanics. (PHYS-212 University Physics II or PHYS-208 and PHYS-209, MATH-182 Project-based Calculus II or MATH-182A; corequisite MATH-231 Differential Equations) **Class 3, Credit 3 (S)**

**PHYS-289** **Intermediate Special Topics**  
This is an intermediate course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of department) **Credit 1-4**

**PHYS-295** **Physics Research**  
This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their first three years of study. (Permission of department) **Credit 1-4 (F, S, Su)**

**PHYS-298** **Physics Independent Study**  
This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their first three years of study. (Permission of department) **Credit 1-4**

**PHYS-315** **Experiments in Modern Physics**  
In this course, students perform experiments representative of the foundation of modern quantum physics. These include investigations of wave particle duality, and the earliest of quantum mechanical models as well as measurements of fundamental constants. Experiments typically include electron diffraction, the photoelectric effect, optical diffraction and interference, atomic spectroscopy, charge-to-mass ratio of an electron, and blackbody radiation. This class teaches basic instrumentation techniques as well as data reduction and analysis. Students are expected to keep a laboratory notebook and present results in a journal-style paper. (PHYS-213 Modern Physics I. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 1, Lab 4, Credit 3 (F)**

**PHYS-316** **Advanced Laboratory in Physics**  
In this course, students perform advanced experiments representative of the foundation of modern quantum physics. Experiments typically explore properties of materials, semiconductors, atomic physics, and nuclear decay. This class continues the instruction in instrumentation techniques as well as data reduction and analysis that began in Experiments in Modern Physics, PHYS-315. Students are expected to keep a laboratory notebook and present results in a journal-style paper. (PHYS-315 Experiments in Modern Physics, PHYS-214 Modern Physics II. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 1, Lab 4, Credit 3 (F)**

**PHYS-320** **Mathematical Methods in Physics**  
This course serves as an introduction to the mathematical tools needed to solve intermediate and upper-level physics problems. Topics include matrix algebra, vector calculus, Fourier analysis, partial differential equations in rectangular coordinates, and an introduction to series solutions of ordinary differential equations. (MATH-219 Multivariable Calculus or MATH-221 Multivariable and Vector Calculus; MATH-231 Differential Equations; PHYS-212 University Physics II, or PHYS-208 University Physics II: AP-C Electricity and Magnetism and PHYS-209 University Physics II: AP-C Optics.) **Class 3, Credit 3 (F)**

**PHYS-321** **Advanced Mathematical Methods in Physics**  
This course is a continuation of PHYS-320, serving to introduce additional mathematical tools needed to solve intermediate and upper-level physics problems. Topics include special functions, series solutions to ordinary differential equations, solutions to partial differential equations in curvilinear coordinate systems, matrix techniques, and the calculus of variations. (PHYS-320 Mathematical Methods in Physics) **Class 3, Credit 3 (S)**

**PHYS-330** **Classical Mechanics**  
This course is a systematic presentation of Newtonian kinematics and dynamics including equations of motion in one- and three-dimensions, conservation laws, non-inertial reference frames, central forces, Lagrangian mechanics, and rigid body motion. This course will use advanced mathematical techniques including differential equations, vector calculus, and matrix and tensor formulations. (PHYS-212 University Physics II, or PHYS-208 University Physics II: AP-C Electricity and Magnetism and PHYS-209 University Physics II: AP-C Optics; MATH-219 Multivariable Calculus or MATH-221 Multivariable and Vector Calculus; MATH-231 Differential Equations; corequisite PHYS-320 Mathematical Methods in Physics or permission of department. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 4, Credit 4 (F)**

**PHYS-360** **Introduction to Chaotic Dynamics**  
This course introduces basic tools for visualizing the behavior of nonlinear systems. In particular, the students are required to use the computer as an exploratory tool for generating and observing transitions between periodic behavior and chaotic behavior. Most of the course focuses on the driven, damped pendulum as a model dynamical system, but the ideas are readily extended to other systems as well. (PHYS-283 Vibrations and Waves, PHYS-330 Classical Mechanics. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (S, alternate years)**

**PHYS-365** **Physical Optics**  
In this course light waves having both amplitude and phase will be described to provide a foundation for understanding key optical phenomena such as interference, diffraction, and propagation. Starting from Maxwell's equations the course advances to the topic of Fourier optics. (PHYS-212 University Physics II or PHYS-208 University Physics II: AP-C Electricity and Magnetism and PHYS-209 University Physics II: AP-C Optics; MATH-221 Multivariable and Vector Calculus or MATH-219 Multivariable Calculus; PHYS-225 Intro to Computational Physics and Programming; PHYS-283 Vibrations and Waves; PHYS-320 Mathematical Methods in Physics. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) Cross-listed with IMGS-322. **Class 2, Lab 3, Credit 3 (S)**

**PHYS-370** **Stellar Astrophysics**  
This course presents concepts of stars and stellar systems at an intermediate level. Topics include the observed characteristics of stars, stellar atmospheres, stellar structure and evolution, interaction of stars with the interstellar medium, and the populations of stars within the Milky Way Galaxy. (PHYS-220 University Astronomy, PHYS-213 Modern Physics I. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (S, alternate years)**

**PHYS-371** **Galactic Astrophysics**  
This course describes the structure and dynamics of the Milky Way galaxy. It provides an overview of the major constituents of the Milky Way, their interactions, and the methods by which astronomers study them. (PHYS-213 Modern Physics I; PHYS-220 University Astronomy. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (F, alternate years)**

**PHYS-372** **Extragalactic Astrophysics and Cosmology**  
This course provides a survey of the structure of the universe on the largest scales, including galaxies and clusters of galaxies. The course also provides an overview of the history of the universe from the Big Bang to the current day, and describes the observational evidence for our current values of the cosmological parameters. (PHYS-213 Modern Physics I; PHYS-220 University Astronomy. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (F, alternate years)**

**PHYS-373** **Observational Astronomy**  
This course provides a practical, hands-on introduction to optical astronomy. Students will use the RIT Observatory's telescopes and CCD cameras to take images of celestial objects, reduce the data, and analyze the results. The course will emphasize the details of image processing required to remove instrumental effects from CCD images. (PHYS-220 University Astronomy or permission of department. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 2, Lab 2, Observatory variable, Credit 3 (S, alternate years)**

**PHYS-377** **Advanced Computational Physics**  
This course introduces students to advanced methods for using computers to model the behavior of physical systems. Topics will include numerical solutions to differential equations such as heat transfer, planetary motion, and shock waves, the Monte Carlo approach to problems with large domains, tradeoffs between efficiency and precision, minimization and maximization of functions, and the statistical modeling of data. (PHYS-225 Introduction to Computational Physics and Programming, PHYS-320 Mathematical Methods in Physics. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 2, Lab 3, Credit 3 (S, alternate years)**

**PHYS-408** **Laser Physics**  
This course covers the semi-classical theory of the operation of a laser, characteristics and practical aspects of various laser systems, and some applications of lasers in scientific research. (PHYS-365 Physical Optics or permission of department. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (F, alternate years)**

**PHYS-411** **Electricity and Magnetism**  
This course is a systematic treatment of electrostatics and magnetostatics, charges, currents, fields and potentials, dielectrics and magnetic materials, Maxwell's equations and electromagnetic waves. Mathematical formalism using differential and integral vector calculus is developed. Field theory is treated in terms of scalar and vector potentials. Special techniques for solution to Laplace's equation as a boundary value problem are covered. Wave solutions of Maxwell's equations, and the behavior of electromagnetic waves at interfaces, are discussed. (PHYS-212 University Physics II; PHYS-320 Mathematical Methods in Physics. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 4, Credit 4 (F)**

**PHYS-412** **Advanced Electricity and Magnetism**  
This course is an advanced treatment of electrodynamics including propagating waves, electromagnetic radiation, and relativistic electrodynamics. Field theory is treated in terms of scalar and vector potentials. Wave solutions of Maxwell's equations, the behavior of electromagnetic waves at interfaces, guided electromagnetic waves, and simple radiating systems will be covered. Relativistic electrodynamics will be introduced including field tensors and four vector notation. (PHYS-411 Electricity and Magnetism) **Class 3, Credit 3 (F)**

**PHYS-414** **Quantum Mechanics**  
This course is a study of the concepts and mathematical structure of non-relativistic quantum mechanics. Topics for the course include wave functions and the Schrodinger equation, solutions to the one-dimensional and three-dimensional time-independent Schrodinger equation, stationary states and their superposition to produce time-dependent states, quantum-mechanical operators, commutators, and uncertainty principles, solutions to general central potential problems and the hydrogen atom, and the quantum theory of angular momentum. (PHYS-213 Modern Physics I, PHYS-320 Mathematical Methods in Physics, PHYS-330 Classical Mechanics. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (F)**

**PHYS-415** **Advanced Quantum Mechanics**  
This course is a continued study of the concepts and mathematical structure of quantum mechanics presented in Quantum Mechanics (PHYS-414), with an emphasis on applications to real physical systems. Topics covered include the quantum theory of spin, effect of magnetic fields on spin-1/2 particles, many-particle systems, variational principle, time-independent and time-dependent perturbation theory, absorption and emission of radiation by atoms, quantum theory of scattering, and interpretations and paradoxes of quantum mechanics. (PHYS-414 Quantum Mechanics) **Class 3, Credit 3 (S)**

**PHYS-424** **Nuclear Physics**  
This course is a study of the properties and structure of the atomic nucleus as determined by experiments and theory. Topics for the course include a description and quantum-mechanical treatment of radioactive decay, nuclear reactions, basic aspects of nuclear radiation detection, and selected applications of nuclear physics. (PHYS-214 Modern Physics II, PHYS-320 Mathematical Methods in Physics, PHYS-330 Classical Mechanics. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (S, alternate years)**

**PHYS-432** **Solid State Physics**  
This course is an introduction to the physics of the solid state including crystal structure, x-ray diffraction by crystals, crystal binding, elastic waves and lattice vibrations, thermal properties, the free electron model of solids, and band theory and its applications. (PHYS-214 Modern Physics II, PHYS-320 Mathematical Methods in Physics. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (S)**

**PHYS-440** **Thermal and Statistical Physics**  
This course is an introduction to the principles of classical thermodynamics and its statistical basis, including: equations of state, the first and second laws of thermodynamics, microscopic basis of entropy, temperature and thermal equilibrium, thermodynamic potentials, applications of thermodynamics, kinetic theory of gases, and Boltzmann and quantum statistics. (PHYS-213 Modern Physics I, MATH-231 Differential Equations. Students in the PHYS-BS program must also complete PHYS-275 Sophomore Physics Seminar prior to taking this course.) **Class 3, Credit 3 (F)**

**PHYS-441** **Advanced Thermal and Statistical Physics**  
This course is a continued study of the concepts and mathematical structure of statistical physics presented in Thermal and Statistical Physics (PHYS-440). Topics covered include ensembles in statistical physics, weakly interacting gases, the Ising model of a ferromagnet, monatomic liquids, kinetic theory of transport processes, path integral and Boltzmann equation formulations of transport theory. (PHYS-320 Mathematical Methods in Physics, PHYS-440 Thermal and Statistical Physics) **Class 3, Credit 3 (S)**

**PHYS-450** **Capstone Preparation**  
This course is a preparation for the two-semester physics capstone project to be carried out in the following year. It includes selection of a project and faculty mentor, preparation of a feasibility study, preparation of a paper, and a public oral presentation. (Departmental approval required) **Class 1, Credit 1 (S)**

**PHYS-451** **Capstone Project I**  
In collaboration with faculty mentor(s), students will carry out the first phase of an experimental, theoretical, or computational physics research project, will prepare an interim paper, and will present a short talk on their progress to physics faculty and students. The projects are those planned during the capstone preparatory course taken during the prior spring semester. (PHYS-450 Capstone Preparation) **Lab 12, Credit 3 (F)**

**PHYS-452****Capstone Project II**

In collaboration with faculty mentor(s), students will carry out the final phase of an experimental, theoretical, or computational physics research project, will prepare a written paper and present an oral report on their progress to physics faculty and students. The projects are those planned during the capstone preparatory course taken during the prior Spring semester and commenced during the prior fall semester. (PHYS-451 Capstone Project I) **Lab 12, Credit 3 (S)**

**PHYS-489****Advanced Special Topics**

This is an advanced course on a topic that is not part of the formal curriculum. This course is structured as an ordinary course and has specific prerequisites, contact hours, and examination procedures. (Permission of department) **Credit 1-4**

**PHYS-493****Astrophysics Research**

This course is a faculty-directed student project or research involving observational or theoretical work in astrophysics that could be considered of an original nature. (Permission of department) **Credit 1-4 (F, S, Su)**

**PHYS-495****Advanced Physics Research**

This course is a faculty-directed student project or research involving laboratory work, computer modeling, or theoretical calculations that could be considered of an original nature. The level of study is appropriate for students in their final two years of study. (Permission of department) **Credit 1-4 (F, S, Su)**

**PHYS-498****Advanced Physics Independent Study**

This course is a faculty-directed tutorial of appropriate topics that are not part of the formal curriculum. The level of study is appropriate for student in their final two years of study. (Permission of department) **Credit 1-4**

**PHYS-499****Physics Co-op**

This course is a cooperative education experience for undergraduate physics students. (Permission of department) **Credit 0 (F, S, Su)**

**Statistics****STAT-145****Introduction to Statistics I**

This course will study the statistical methods of presenting and analyzing data. Topics covered include descriptive statistics and displays, random sampling, the normal distribution, confidence intervals, and hypothesis testing. The statistical software MINITAB is used to reinforce these principles and to introduce the use of technology in statistical analysis. This is a general introductory statistics course and is intended for a broad range of programs. Note: This course may not be taken for credit if credit is to be earned in STAT-205. (MATH-101 College Algebra or equivalent) **Class 3, Credit 3 (F, S, Su)**

**STAT-145H****Honors Introduction to Statistics I**

This course provides an enriched learning environment for RIT Honors Students with a project-based, lab-oriented approach to learning statistics. Students will learn to formulate research problems in statistical terms, design a statistical model to study these problem, collect data, summarize data, draw inferences in the context of the applications, and present their analyses. Students learn the use of the statistical software package Minitab to aid in the analysis of data. Students will be expected to participate in class discussions. This course may not be taken for credit if credit is to be earned in STAT-145 or STAT-155 or STAT-205. **Class 3, Credit 3 (S)**

**STAT-146H****Introduction to Statistics II**

This course is an elementary introduction to the topics of regression and analysis of variance. The statistical software package Minitab will be used to reinforce these techniques. The focus of this course is on business applications. This is a general introductory statistics course and is intended for a broad range of programs. (STAT-145 Introduction to Statistics I) **Class 6, Credit 4 (F, S, Su)**

**STAT-155****Introduction to Biostatistics**

This course is an introduction to the use of statistical techniques for solving problems in the health and biological sciences. The statistical software package Minitab will be used to reinforce these techniques and to introduce the students to the use of computers in statistical analysis. This is a general introductory course for students interested in the applications of statistics to the health and biological sciences. (In order to be successful in this course, students should have MATH-101 College Algebra or permission of instructor.) **Class 3, Credit 3 (F, S, Su)**

**STAT-205****Applied Statistics**

This course covers basic statistical concepts and techniques including descriptive statistics, probability, inference, and quality control. The statistical package Minitab will be used to reinforce these techniques. The focus of this course is on statistical applications and quality improvement in engineering. This course is intended for engineering programs and has a calculus prerequisite. Note: This course may not be taken for credit if credit is to be earned in STAT-145 or STAT-155. (MATH-182 Project-based Calculus II or MATH-173 Calculus C, or permission of instructor) **Class 3, Credit 3 (F, S)**

**STAT-295****Statistical Analysis for Bioinformatics**

This course is an introduction to the probabilistic models and statistical techniques used in computational molecular biology. Probabilistic and/or statistical techniques will be presented for the understanding of pairwise and multiple sequence alignment methods, gene and protein classification methods, and phylogenetic tree construction. (MATH-173 Calculus C or MATH-182 Project-based Calculus II, and MATH-190 Discrete Mathematics for Computing or MATH-200 Discrete Mathematics and Introduction to Proofs, and STAT-155 Introduction to Biostatistics, or permission of instructor) **Class 3, Credit 3 (S)**

**STAT-305****Regression Analysis**

This course covers regression techniques with applications to the type of problems encountered in real-world situations. It includes use of statistical software SAS. Topics include review of simple linear regression, residual analysis, multiple regression, matrix approach to regression, model selection procedures, and various other models as time permits. (MATH-241 Linear Algebra and MATH-252 Probability and Statistics II) **Class 3, Credit 3 (S)**

**STAT-315****Statistical Quality Control**

This course presents the probability models associated with control charts, control charts for continuous and discrete data, interpretation of control charts, and some standard sampling plans as applied to quality control. A statistical software package will be used for data analysis. (STAT-205 or MATH-252) **Class 3, Credit 3 (S)**

**STAT-325****Design of Experiments**

This course is a study of the design and analysis of experiments. It includes extensive use of statistical software. Topics include single-factor analysis of variance, multiple comparisons and model validation, multifactor factorial designs, fixed, random and mixed models, expected mean square calculations, confounding, randomized block designs, and other designs and topics as time permits. (STAT-205 Applied Statistics or MATH-252 Probability and Statistics II) **Class 3, Credit 3 (F)**

**STAT-335****Introduction to Time Series**

This course is a study of the modeling and forecasting of time series. Topics include ARMA and ARIMA models, autocorrelation function, partial autocorrelation function, detrending, residual analysis, graphical methods, and diagnostics. A statistical software package is used for data analysis. (STAT-205 or MATH-252) **Class 3, Credit 3 (S)**

**STAT-345****Nonparametric Statistics**

This course is an in-depth study of inferential procedures that are valid under a wide range of shapes for the population distribution. Topics include tests based on the binomial distribution contingency tables, statistical inferences based on ranks, runs tests and randomization methods. A statistical software package is used for data analysis. (STAT-205 Applied Statistics or MATH-252 Probability and Statistics II) **Class 3, Credit 3 (F)**

**STAT-405****Mathematical Statistics I**

This course provides a brief review of basic probability concepts and distribution theory. It covers mathematical properties of distributions needed for statistical inference. (STAT-205 Applied Statistics or MATH-252 Probability and Statistics II) **Class 3, Credit 3 (F)**

**STAT-406****Mathematical Statistics II**

This course is a continuation of STAT-405 covering classical and Bayesian methods in estimation theory, chi-square test, Neyman-Pearson lemma, mathematical justification of standard test procedures, sufficient statistics, and further topics in statistical inference. (STAT-405 Mathematical Statistics I) **Class 3, Credit 3 (S)**

**STAT-415****Statistical Sampling**

This course provides a basis for understanding the selection of the appropriate tools and techniques for analyzing survey data. Topics include design of simple surveys, methods of data collection, a study of standard sampling methods. A statistical software package is used for data analysis. (STAT-205 Applied Statistics or MATH-252 Probability and Statistics II) **Class 3, Credit 3 (F)**

**STAT-425****Multivariate Analysis**

This course is a study of the multivariate normal distribution, statistical inference on multi-variate data, multivariate analysis of covariance, canonical correlation, principal component analysis, and cluster analysis. A statistical software package such as Excel or SAS is used for data analysis. (MATH-241 Linear Algebra and STAT-305 Regression Analysis) **Class 3, Credit 3 (S, alternate years)**

**STAT-435****Statistical Linear Models**

This course is an introduction to the theory of linear models. Topics covered are least squares estimators and their properties, matrix formulation of linear regression theory, random vectors and random matrices, the normal distribution model and the Gauss-Markov theorem, variability and sums of squares, distribution theory, the general linear hypothesis test, confidence intervals, confidence regions, correlations among regressor variables, ANOVA models, geometric aspects of linear regression, and less than full rank models. (MATH-241 Linear Algebra and STAT-305 Regression Analysis) **Class 3, Credit 3 (S, alternate years)**

**STAT-445****Senior Seminar in Statistics**

The seminar introduces the student to statistical situations not encountered in previous courses of study. Topics include open-ended analysis of data, motivating use of statistical literature, development of statistical communication skills, and the pros and cons of statistical software packages. (STAT-305 Regression Analysis and STAT-325 Design of Experiments) **Class 3, Credit 3 (S)**

# Academic Affairs

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*Course numbering: RIT courses are generally referred to by their alpha-numeric registration label. The four alpha characters indicate the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099), lower division (100–299), upper division (300–599), or graduate level (600 and above).*

*Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.*

## University Writing Program

### UWRT-100 Critical Reading and Writing

Critical Reading and Writing is a one semester, three-credit course limited to 15 students per section. The course is designed to help students develop the literacy practices they need to be successful in their First Year Writing course. Students will read, understand, interpret, and synthesize a variety of texts representing different cultural perspectives and/or academic disciplines. Assignments are designed to challenge students intellectually and to stimulate their writing. Through inquiry-based assignment sequences, students develop academic research and literacy practices that will be further strengthened in their First Year Writing course. Particular attention will be given to critical reading, information management, synthesis of source materials, academic writing conventions, and revision. Small class size promotes frequent student-instructor and student-student interaction. The course also emphasizes the principles of intellectual property and academic integrity. The credits earned comprise part of the student's general education framework, but this course may not be substituted for any writing-intensive general education course. **Class 3, Credit 3 (F, S)**

### UWRT-150 FYW: Writing Seminar

Writing Seminar is a three-credit seminar limited to 21 students per section. The course is designed to develop first-year students' proficiency in analytical writing, rhetorical reading, and critical thinking. Students will read, understand, and interpret a variety of texts representing different cultural perspectives and/or academic disciplines. Academic, non-fiction texts focusing on writing and rhetoric, are designed to challenge students intellectually and to stimulate their writing for a variety of contexts and purposes. Through inquiry-based assignment sequences, students develop academic research and literacy practices that will be further strengthened throughout their academic careers. Particular attention will be given to the writing process, including an emphasis on teacher-student conferencing, self-assessment, class discussion, peer review, formal and informal writing, research, and revision. Small class size promotes frequent student-instructor and student-student interaction. The course also emphasizes the principles of intellectual property and academic integrity for both current academic and future professional writing. **Class 3, Credit 3 (F, S, Su)**

# Academic Support Center

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**ACSC-010** **YearOne**  
The YearOne course serves as an interdisciplinary catalyst for first-year students to access campus resources, services and opportunities that promote self-knowledge, leadership development, social responsibility and life skills awareness and application. YearOne is also designed to challenge and encourage first-year students to get to know one another, build friendships and become an integral part of the campus community. **Credit 0 (F)**

**ACSC-061** **Applied Study Strategies**  
This hands-on course is designed for students who are in good academic standing and interested in further developing their abilities in the specific areas of study skills and time management. Students enrolled in this course will gain a greater understanding of the learning process and will be able to identify and use strategies that meet their preferred learning style. Students will apply these strategies to their current credit courses to develop advanced proficiency as active learners. Additionally, students will receive support through individualized coaching sessions. **Credit 0 (F, S)**

**ACSC-062** **Insights on Success**  
This course provides students who are academically at-risk or probationary an opportunity to gain foundational insight into their learning process and learn basic study strategies, how they are used, and why they are valuable. Through individualized coaching, journal writing, and presentation, students will set and monitor goals, reflect on their learning process and source(s) of motivation. Student will report progress on organization, time management, and study skills. Discussion topics include the 10 scales found within the Learning and Study Strategies Inventory (LASSI). **Credit 0 (F, S)**

**ACSC-063** **Study Strategies Lab**  
This hands-on course is designed for students interested in maintaining their study strategies and organizational skills with regular support and feedback from an instructor. Sessions will consist of a brief overview of a study strategy topic followed by time for students to study for their current courses. (One of the following: CRPG-061 CRP Academic Strategies, HEOP-060 HEOP Study Skills, ACSC-062 Insights on Success, or ACSC-061 Applied Study Strategies) **Credit 0 (F, S)**

**ACSC-072** **Critical Math Skills**  
This course is offered to RIT students who wish to strengthen their math skills before enrolling in or while taking an RIT credit math course. The class consists of a self-review or remediation of prerequisite math concepts with which students may find themselves struggling. A customized list of review topics called a Study Plan will be created based on an initial math assessment that focuses on basic algebra, trigonometry, precalculus and introductory calculus. An instructor is present to enhance students' math study skills as well as deepen their understanding of math concepts. This course requires meeting with a student support specialist in the Academic Support Center prior to enrollment. Please contact the ASC for additional details. **Credit 0 (F, S)**

# Center for Recreation, Intramurals, and Wellness–Wellness Instructional Program

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*Unless otherwise noted, the following courses are offered annually. Specific times and dates can be found in each semester's schedule of courses. Prerequisites/corequisites are noted in parentheses near the end of the course description.*

## Dance

### WDAN-001

#### Ballet

Ballet is a form of dancing performed for theatre audiences. Like any other dance forms, ballet may tell a story, express a mood, or simply reflect the music. But a ballet dancer's technique (way of performing) and special skills differ greatly from those of other dancers. Ballet dancers perform many movements that are unnatural for the body, but when these movements are well executed, they look natural and beautiful. This course will focus on the various ballet movements, from the very fundamental to more complex movements and poses and classical styles. A course fee applies via SFS bill. **(All semesters)**

### WDAN-006

#### Ballroom Dance

This foundational course is designed for the complete beginners to advanced, covering dances that are currently socially trendy and popular. The focus is on a mixture of melodies and Latin rhythms to give the student an overall feel for social dancing. The intent is to create a sense of student competency as an above average ballroom dancer. Major course objectives include: Body and self-awareness, how to mix well with the same and opposite sexes, boosting self-confidence, developing natural body rhythms and improving posture and poise. Dances covered are: Foxtrot, Merengue, Swing, Salsa, Jazz, Tango, Waltz, Cha cha, Ballet and Jitterbug. A course fee applies via SFS bill. **(All semesters)**

### WDAN-007

#### Ballroom Dance: Intermediate-Advanced

This class is designed for those who have had Ballroom Dancing or a foundation in dance before and who want to go beyond the beginner level. We will cover Foxtrot, Waltz, Tango, Rumba, Cha cha, Samba & Swing. You do not have to have a partner to take this course, we will be rotating partners. This class is a great way to meet new people, a stress buster and a lot of fun! Not to mention it can be good exercise too!! A course fee applies via SFS bill. **(All semesters)**

### WDAN-008

#### West Coast Swing

The newest version of Swing Dancing! This is a slotted dance that you can do in small spaces to a huge variety of music. If you like Swing, Rhythm & Blues, Funk and Country music then you will love this dance. You can even be improvisational and creative with the music and the movements. You do not have to have a partner to take this course, we will be rotating partners. This class is a great way to meet new people, a stress buster and a lot of fun! Not to mention it can be good exercise too! A course fee applies via SFS bill. **(All semesters)**

### WDAN-009

#### Latin Dance–Beginner Level

You will learn introductory level figures in Salsa, Merengue, Bachata and Cha cha. We will pay particular attention to understanding different Latin Rhythms and how to move differently to the different songs and styles of music. You do not have to have a partner to take this course, we will be rotating partners. This class is a great way to meet new people, a stress buster and a lot of fun! Not to mention it can be good exercise too! A course fee applies via SFS bill. **(All semesters)**

### WDAN-010

#### Latin Dance: Intermediate

You will learn more advanced steps and figures in Salsa, Merengue, Bachata & Cha cha. We will also introduce Salsa Rueda which is a partner mixing dance!! This is for the student who wants to be an awesome club dancer. You do not have to have a partner to take this course, we will be rotating partners. This class is a great way to meet new people, a stress buster and a lot of fun! Not to mention it can be good exercise too! A course fee applies via SFS bill\*\* **(All Semesters)**

### WDAN-012

#### Jazz Dance

This course provides students with a wide range dance vocabulary which is created from ballet, modern dance and ethnic traditions. The styles of Bob Fosse and the fall and rebound of Jose Limon are a basis for this jazz course. The course will focus on the basic, intermediate and some advanced movements of contemporary jazz dance to help enable students to experience successful and enjoyable jazz dancing. A course fee applies via SFS bill. **(All semesters)**

### WDAN-015

#### Country Line Dance

Covering the latest line dances, club, and studio couples dances, Country Line Dancing is designed for beginning to intermediate dancers. Traditional dances give depth and background to the various basic terminology and techniques. Becoming familiar with today's social sector, dance adds excitement to body coordination, improved memorization, gained confidence, partner skills, self-confidence and enhanced creativity. The Electric Slide, Chattahoochee, Dr. CC, Earthquake and Bubba are line dances of distinction. Couples pursue the Cha-Cha, Two Step, Waltz and the Sugar Waltz (full of turns and spins). Beginning with music beats and basic dance choreography counting, students pursue understanding that lays foundation to all. A course fee applies via SFS bill. **(All semesters)**

### WDAN-031

#### Hip Hop Dance

Hip Hop dance refers to styles primarily danced to hip hop music or that have evolved as a part of the hip hop culture. Hip hop dances are often considered street dances because of how they were formed and are being practiced. This hip hop class offers basic to more advanced skills that will encourage students to use their bodies in ways that help to develop/execute many different stylistic techniques. This class is high-paced and challenging and allows students to emphasize their creative rhythmic talents. As hip hop is a broad genre in dance studios the instructor has the freedom/room for personal interpretation thus allowing the class to be highly creative. A course fee applies via SFS bill. **(All semesters)**

### WDAN-033

#### FUZION Technique

FUZION Technique is exactly what the name implies, an artfully fierce fusion of dance styles into a singular yet evolving technique. The fundamentals learned here can be tailored and applied to any dance style. FUZION offers a fun, judgment free environment to learn and create new and interesting dance moves while vibin' to cutting edge tracks. Students will have the opportunity to influence both the predominant dance style of the each class and the music. Come explore the dancer within and possibly discover your own dance swag! LEVITAS! A course fee applies via SFS bill. **(All semesters)**

### WDAN-034

#### Hip Hop Hustle

For decades, everyone has loved "the Hustle". Well we've gone a step further and come up with "Hip Hop Hustle"! This class takes the fun factor up a notch with super hot moves that will have everyone wanting more. This class incorporates all the great Hip Hop moves you can imagine-with outstanding music and gears up the cardiovascular system like never before. Enjoy dancing while you get an outstanding aerobic work-out! No experience required! This class is a completely pre-designed hip-hop class that's easy to follow and easy to teach. Which, by the way makes it even better because anyone can do the moves and make them their own. Successful completion of this course can be used as one activity course credit toward the graduation required. A course fee applies via SFS bill. **(All semesters)**

### WDAN-035

#### Dance Choreography and Performance

Will allow students to apply dance concepts (to develop body strength, agility, coordination, problem solving-skills, self-confidence, formation and staging along with choreography and appreciation of movement as an art form) in depth and allow for increased opportunity for skill development, creativity and understanding of dance concepts. A \$90.00 course fee applies via SFS bill. **(All semesters)**



**WDAN-037****Irish Step**

Often marked with a blur of flashing feet, Irish step dancing has emerged from the pubs of Ireland to the international stage. This course teaches the style of dance made famous by the shows *Riverdance* and *Lord of the Dance*. In addition to being introduced to the rich history of Irish dance, students will learn soft shoe, hard shoe and ceili (group) dances. Be prepared for a great cardiovascular workout. Irish dance requires endurance, coordination and strength. The first dances (reels, jigs and slip jigs) are taught in soft shoe. These dances begin to teach the fundamentals of Irish dance. As you progress, you will start to learn more complex soft shoe dances, and then move onto learning hard shoe dances (treble jigs and hornpipes). A course fee applies via SFS bill. **(All semesters)**

**WDAN-042****Swing Dance**

Swing Dance is a popular social dance. This course includes two styles of Swing Dance: The Lindy and East Coast Swing. The Lindy Hop, or Jitterbug, is a joyful, flowing style that closely reflects its music from the late 20's hot jazz to the early 40's big band. Partners are connected smoothly to each other while relating closely to the music. The energetic East Coast Swing is a variation of the Lindy Hop, while the footwork is somewhat different, the basic lead and follow partnering skills are the same. A fun way to meet new friends, dance, and hear great music! Beginner and advanced classes are offered. A course fee applies via SFS bill. **(All semesters)**

**WDAN-045****Argentine Tango**

Tango Dancing will focus on dancing comfortably and expressively to traditional tango music in a social setting. Argentine Tango traditionally stresses improvisation over repetition of set patterns. Students will progress from simple walking exercises to an introduction to simple steps and figures that are idiomatic of Argentine tango. Once students are comfortable with basic figures and a connection to the music and their partner, we will progress to more complex sequences built up from the basics. We will emphasize the spontaneous discovery of these sequences as a creative response in the moment to the music and to our partners over the rote memorization of rigid choreography. Students will learn the art of dancing expressively while also respecting the boundaries of other dancers on the floor. Navigation—or floor craft—is an essential skill to master in order to enjoy dancing in a crowded room. Upon completion of the class, students will feel comfortable dancing at a tango social dance along side experienced tango dancers. A course fee applies via SFS bill. **(All semesters)**

**WDAN-048****Tap**

Rhythm, technique, and musicality are the three areas of tap dance emphasized in this course. Whether you are brand new to tap or have previous experience, this course challenges students of all levels. Each level will receive tap steps and variations appropriate for their level. Beginners will learn basic steps, shuffles, ball changes, flaps, Maxie Fords, buffalos, and turns. Intermediate and advanced technique include wings, pullbacks (pickups), more intricate footwork, directional changes, and challenging variations. Styles include soft shoe, waltz clog, swing tap, musical theater and urban. Tap shoes are required. A course fee applies via SFS bill. **(All semesters)**

**Fitness****WFIT-002****Power Sculpt**

This fitness course is designed to facilitate cardiovascular fitness as well as increase muscular strength, endurance and flexibility. All aerobics classes combine a balance of high and low impact moves that include a sequence of muscular strengthening and stretching exercises. In addition to the benefits of improved heart and lung function, students will have an opportunity to burn calories, increase muscular strength and endurance, and increase flexibility. Throughout the course students will be encouraged to work at individual paces, utilizing high or low impact moves where appropriate. Through instructor-led group movements, with the use of music, brief explanations of basic aerobic principles, definitions and guidelines for proper technique will be covered. A course fee applies via SFS bill. **(All semesters)**

**WFIT-003****Aqua Core and Sculpt**

Aqua Core and Sculpt is an excellent cardio and strength training workout in the pool. Some classes will use both the recreation pool and the diving well, and some just the recreation pool. It is a total body workout in the water/with music. This energizing class will incorporate upper body workouts using aqua-barbells to focus on toning /conditioning of the arms. Lower body workouts include kickboxing moves and resistance exercises and water running to tone the legs. The entire class works core muscles for a 50 minute workout as well. No need to know how to swim for this class since aqua belts are provided. A perfect class for weight loss and toning with no pressure on your joints. A course fee applies via SFS bill. **(All semesters)**

**WFIT-007****Deep Water Challenge**

Aqua exercise is an excellent cardio and strength workout in the pool. You can burn 700 calories in a 50 minute class? You will love the music and ultra-effective workout for both the upper and lower body. Classes meet in the diving well (deep water) in the pool. Workouts are done in the water, incorporating aqua barbells to tone and condition the arms. Underwater kickboxing and water running tones the lower body. There is no need to be a strong swimmer for this class as aqua belts are provided, however you should feel comfortable in chest level water. A perfect class for weight loss and toning with no pressure on your joints. This provides an intense workout with every punch. A course fee applies via SFS bill. **(All semesters)**

**WFIT-010****Fitness for Photographers**

This course is designed to give photographers a useful fitness plan to help prepare for the physical requirements of professional photography. Students will essentially be assessed in terms of their baseline physical fitness norms (cardiovascular fitness, muscular strength and endurance, flexibility, body composition and blood pressure). Class activities will also address an individual's endurance, upper and lower body strength, managing load (carrying of heavy and sometimes awkward equipment), avoiding injuries, clothing essentials, and body fuels (proper food and hydration). A course fee applies via SFS bill. **(All semesters)**

**WFIT-016****Group Personal Training**

This course is designed as a small group personal training session. Students will meet with a personal trainer weekly to develop fitness plans. Students will be assessed in fitness areas to develop baseline norms. Students will then work with the personal trainer to establish a personal fitness program tailored for each student's needs and unique fitness goals. The small group session will provide a nice way for students to interact and support one another's goals while at the same time allow for more one-on-one opportunities with the trainer to assist with technique and program development. A course fee applies via SFS bill. **(All semesters)**

**WFIT-019****Water Walking**

Using the concept of 'drag' versus 'propulsion' to increase resistance water walking is a work out that can range from high to low intensity and can be done in both shallow and deep water. Water Walking has an extremely effective cardiovascular component MINUS the wear and tear on the joints. Proper positioning, foot placement and full range of motion movements strengthen muscles around joint areas, increase flexibility and maintain tendon/ligament function. Water Walking is a smooth and continuous movement targeting the whole body: enhancing muscle strength toning and definition and develops core body stabilization. Class will end with a dynamic mix of conditioning, stretching and balance exercises leaving participants invigorated, yet calm and serene. Non-swimmers and swimmers will both enjoy this beneficial, fun, low-impact work out! A course fee applies via SFS bill. **(All semesters)**

**WFIT-022****TurboKick**

Want to burn 700 calories in a 50 minute class? If yes, Turbo kick is perfect for you. You will love the music which keeps the energy high and the calories burning. This is an ultra-effective workout that strengthens upper and lower body. If you are looking to tone and condition your whole body, this is the workout for you. It is also an intense ab workout since every punch comes from the core. This class is offered at over 2,000 fitness clubs in the United States. A course fee applies via SFS bill. **(All semesters)**

**WFIT-025****Turbo Ball**

This fitness-based group exercise class is designed to provide students with a new way to have a ball and get in great shape at the same time. Based on high level Turbo exercises, the exercise ball is used during the exercise routines for a whole new workout. This class is fun, funky, fast-paced and targets the core abdominal muscles like no other workout can. The Turbo Ball's round surface delivers quick results by working the core muscles harder from every angle. This group exercise course is a fantastic new way to fit by using an exercise ball to maximize core strength and development. A course fee applies via SFS bill. **(All semesters)**

**WFIT-026****Introduction to Fitness**

This class is for students who don't know where to start when it comes to exercise. Group weight training with dumbbells and weighted bars, cardio circuits and core workouts are all part of what you can expect. Students will learn the fitness components of wellness; flexibility, cardiorespiratory fitness, muscular strength and endurance, and body composition. Fitness and other positive life style habits that lead to better health, improved quality of life, and total well-being will be discussed. A course fee applies via SFS bill. **(All semesters)**

**WFIT-028****Cardio Core and Sculpt**

This class is designed to be high-impact-high intensity, perfect for intermediate and advanced fitness enthusiasts. The class is organized to provide work sessions on muscle groups using hand weights and/or resistance bands to tone and shape muscles resulting in improved overall fitness. Alternative exercises will be demonstrated to accommodate all levels of fitness. Also offered as Step Conditioning and Total Body Conditioning. A course fee applies via SFS bill. **(All semesters)**

**WFIT-031****Personal Training and Diet**

This course is designed for students who desire “1 on 1” personal training and nutritional consultation services. The course offers nine individual personal training sessions as well as a weekly lecture and a requirement to commit to an additional nine hours of independent study outside of class times. The course also includes an on-line component to track progress and as a forum for class discussion. Registration is conducted via the SIS system. Students will be contacted by their assigned personal trainer to establish training session dates/times. A course fee applies via SFS bill. **(All semesters)**

**WFIT-034****Core Glutes and Abs**

Core Glutes and Abs course will focus on developing/strengthening the body's core muscles, lower back, abdominals, hips, and gluteus. The body's core muscles are the foundation for all other movements of the body. Through use of Resist-a-Balls, weights, bands and conditioning exercises, the focus will be to develop and strengthen the body's trunk and pelvis area where the center of gravity is located. Benefits include improved posture, increased flexibility and range of motion, increased strength and protection of the spine, more stable center of gravity and controlled movement. This class is designed for all fitness levels. Instructor lead exercises and explanation of core principles and proper technique will be covered. This class will push your core to the limit with intense training using many different methods including stability balls, dumbbells, Bosu balls, and your own body weight. A person's flexibility refers to the ability of your joints to move through a full range of motion. Having flexibility in your muscles allows for more movement around the joints and you can achieve this with a basic or advanced stretching workout during this class. This is a perfect class for students looking to change their ab routine and see results without doing traditional crunches and floor work. A course fee applies via SFS bill. **(All semesters)**

**WFIT-035****Core Flexibility**

This class will push your core to the limit with intense training using many different methods including stability balls, dumbbells, Bosu balls, and your own body weight. A person's flexibility refers to the ability of your joints to move through a full range of motion. Having flexibility in your muscles allows for more movement around the joints and you can achieve this with a basic or advanced stretching workout during this class. This is a perfect class for students looking to change their ab routine and see results without doing traditional crunches and floor work. A course fee applies via SFS bill. **(All semesters)**

**WFIT-037****Personal Training**

This course is designed for students who desire “1-on-1” Personal Training Services. The course offers 9 individual personal training contact hours as well as a requirement to put in an additional 9 hours of independent study/work outside of the time working with a personal trainer. Registration for this course is conducted via the SIS system during the registration Period @ RIT. Students will be contacted by their assigned personal trainer directly for training session dates and times. Successful completion of this course work can be used/applied as an activity course toward the graduation requirement. A course fee applies via SFS bill. **(All semesters)**

**WFIT-040****Jogging**

Cardiovascular fitness, exercise awareness, endurance increase, resting heart rate improvement, and the pure joy of jogging will add an element of educational self-confidence building activity to your college career. Lecture, participation and gradual endurance awareness enlighten your jogging. A course evaluation based on attendance, practical work improvement and attitude, allow jogging class students experience in building many miles on a gradual time increased program from one to four miles per run throughout the semester. Jogging is a delightful mind-freeing exercise. A course fee applies via SFS bill. **(All semesters)**

**WFIT-043****Jogging 10K Training**

This is intended to be an activity course that will prepare students to participate in and complete a 10k run. Running provides many long and short term health benefits as well as skills that are beneficial in professional and personal life. Students will improve their fitness as well as develop knowledge about the basics of nutrition and appropriate training (training plan and cross training). Class includes lecture, participation, supplemental readings and class workouts. Students will be expected to do some readings and assignments outside of class and will be required to complete 2-3 workouts independently during the week. Students will be graded on participation, weekly performance on assignments and a final exam: The final exam will be entry and participation and completion of a local 10k race. A course fee applies via SFS bill. **(All semesters)**

**WFIT-046****Triathlon Training**

This fitness and conditioning course is for students who enjoy running as a means to cardiovascular health: designed for all types of runners who want to improve their running form and efficiency, improve their overall cardiovascular health, or even train for a race. This course benefits all fitness levels. Every-other class is active running, the other will be a classroom session/teach the different training methods of aerobic running, lactate threshold, VO2 max training, etc. The how to's of structuring one's own running program will be covered. There will also be components on proper nutrition and shoes. Students will also learn about the resources available to race and train with others in their community. The overall goal is to provide for proper training while also improving running performance. A course fee applies via SFS bill. **(All semesters)**

**WFIT-049****Endurance Spinning**

This group exercise course will be lead by an Instructor who will take students through fairly high levels of endurance spinning workouts. At the end of this course, students will be at a higher level of fitness based on workouts during class sessions. This is an indoor group cycling class which uses motivating music and disco lights to create a challenging yet motivating class environment for endurance fitness development. Top of the line Johnny G Spinning bikes are used with a high intensity, low impact workout. The general fitness goals are to facilitate a high cardio-fitness workout, enhance overall fitness, development coordination and balance and improve overall muscle tone and flexibility. A course fee applies via SFS bill. **(All semesters)**

**WFIT-052****Walking for Fitness**

This Walking for Fitness Course is designed to be beneficial for individuals of all fitness levels and we will enjoy the outdoors as weather permits. The major course objectives are to improve cardiovascular endurance, increase energy expenditure, develop overall toning, improve circulation, and relieve tension. There are additional benefits of a prolonged low impact physical activity such as purposeful walking done regularly. One can substantially reduce the risk of heart disease, lower total cholesterol, raise healthy HDL cholesterol and lower blood pressure. Course content will include stretching, warm-up, proper form, pace management, interval training, determining intensity and target heart rate and individual goal setting. A course fee applies via SFS bill. **(All semesters)**

**WFIT-055****Kickboxing**

This course is designed to develop physical fitness, strength, stamina, power, speed, endurance and flexibility. Students will have the opportunity to develop self-defense skills by utilizing the combination of boxing and karate techniques. Instructors will introduce basic kicking and punching skills and combine the element of aerobic activity with music to provide an outstanding work-out. Students will be encouraged to enhance their overall health, thus helping them look and feel good about themselves. Teaching methods include explanation, demonstration, program guidance and motivational lecturing. Students must have their own boxing gloves (can be purchased locally). Instructor will provide more information about glove purchasing). A course fee applies via SFS bill. **(All semesters)**

**WFIT-058****Spinning**

The spinning course program: Essentially is a form of exercise with classes focusing on the energy zones: endurance, strength, intervals, high intensity (race days) and recovery, that involve using a special stationary exercise bicycle with a weighted flywheel. Because the spinning program provides both high-intensity workouts and active recovery, without stress to the joints often associated with running, participants can experience a personalized ride every class. By focusing on specific training objectives during each class, students can map out a training plan to maximize results. Spinning program class options vary (check schedule): spinning (beginning, intermediate, advanced); spin and sculpt (added resistance training to spinning cardiovascular workout); spin and core (added core/abdominal) training to spinning cardiovascular workout. A course fee applies via SFS bill. **(All semesters)**

**WFIT-061****Personal Training/ Certification**

This course is designed to prepare and qualify students to work as personal trainers. The course bridges the gap between exercise science related course work and the practical application skills of personal training. Learn how to: properly screen and evaluate clients for safe participation in an exercise program, design and implement exercise prescriptions for multiple populations and successful goal attainment. Eligibility for personal trainer certification is provided through the National Council on Strength and Fitness Board for Certification (NCSFBC). All study materials are included in the cost of this course (textbook, study guide, lab manual and training and assessment DVD). Students will take the NCSF-CPT Exam at a Prometric testing center of their choice. A course fee applies via SFS bill. **(All semesters)**

**WFIT-064****Zumba Fitness**

Zumba is like no other workout you will ever experience. Zumba was created in the mid-90's for international pop superstars. Inspired by cumbia, salsa, samba and merengue, paired with Latin rhythms the red-hot international dance steps Zumba was born! Zumba (slang for "to move fast and have fun") has become one of the fastest growing dance-based crazes in the country. The music is infectious and the dance moves are easy to follow and have body-beautiful benefits. The instructor for this class will guide students through initial competence to highly challenging moves. A course fee applies via SFS bill. **(All semesters)**

**WFIT-067****Drums Alive**

Drums Alive is a course that combines traditional aerobic movements with strong rhythms to create a fun, powerful percussion workout for the entire body. This high energy class combines the exercise "ball", drumsticks and dynamic movements to give students a complete workout, strengthening the core muscles groups as well as the upper and lower body. Students should wear sneakers to class and should bring a towel as well. A course fee applies via SFS bill. **(All semesters)**

**WFIT-069****Rowing for Fitness**

The sport of competitive rowing dates back hundreds of years and is one of the oldest competitive sports still in existence today. In this class students will begin by learning proper rowing technique and will then move on to complete weekly rowing assignments to enhance their overall fitness and to improve their general rowing competency. Class time will be spent utilizing modern rowing ergometers and software to track rowing progress and in the fitness center completing strength programs to enhance rowing capacity. Students will have the opportunity to compete in informal in-class racing between other class participants and also compete against other rowers worldwide by utilizing online racing venues. While this class is well suited for novice rowers, more experienced individuals are also welcome to enroll. A course fee applies via SFS bill. **(All semesters)**

**WFIT-070****Swimming for Fitness**

This fitness and conditioning activity course is designed for students who enjoy the venue of swimming to develop cardiovascular health. Designed for intermediate-advanced swimmers. This is NOT an instructional swimming class. The course will focus on: General aquatic fitness; stretching; all swimming stroke refinement and development; lap swims, sprints, combination of times laps and outlined swim practices. Cool down sessions will take place followed by ideas for muscular strength and endurance development (outside of aquatic environment). This course is a perfect fit for individuals who wish to pursue physical fitness development in a "non-impact" situation. Students must provide their own swimming attire. A course fee applies via SFS bill. **(All semesters)**

**WFIT-071****Water Polo**

This exciting aquatic-oriented activity course is designed for students who wish to learn the sport of water polo. Students must be able to swim comfortably and at times challenging, before deciding to take this course, which is a basic-advanced skills of water polo. The general course outline covers: Basic swimming/sculling skills; individual physical building blocks (strength, flexibility, speed, fitness) and core individual skills; game rules/history/basic strategies; offensive skills and strategies; defensive skills and strategies; goal-keeping; plays; refereeing; and tournament play. Students must provide their own swimming attire (suit, goggles if desired, deck shoes, towels). RIT provides all other equipment. Class meets in the competitive pool and provides an excellent fitness workout! A course fee applies via SFS bill. **(All semesters)**

**WFIT-073****Bootcamp**

"BOOTCAMP" is an exciting full-body conditioning fitness program that is designed to challenge, tone, trim, stretch and completely exercise your body in 10 intense weeks. Whether you're a workout novice looking to jump-start a healthier lifestyle, training for a special event such as a wedding or high school reunion, or an athlete looking for a new challenge, this program can help you reach your fitness goals while enjoying it! Boredom is not an option in this 2 day a week program based on philosophies from both personal training and group fitness by combining calisthenics, plyometrics, resistance training, cardio challenges, relay races and partner drills, you get an action packed work out in one exciting hour. A course fee applies via SFS bill. **(All semesters)**

**WFIT-074****Humans/Zombies Bootcamp**

Are you sick of getting tagged by zombies? Want to tag more humans when you participate again? This 10 week class is a progressive training program designed to increase your knowledge and skills for successful HVZ participation. The course will address strength, flexibility, speed and endurance along with agility, hand-eye coordination, reaction time, balance and competitions. A skills and physical assessment are included for all participants. A course fee applies via SFS bill. **(All semesters)**

**WFIT-075****Sports Performance Training for Athletes**

This course is designed for students with an athletic background looking to utilize current training methods to enhance their physical performance. Course work will involve group training sessions and will take place in the Hale Andrews Students Life Center and Gordon Field House, as well as adjacent track and field complexes. Students can expect each class to offer a variety of challenging exercises and/or drills that will focus on aspects of health and skill based fitness. All exercises and training programs will be modified to meet the individual needs of each student, but it is recommended that course participants already possess a base level of fitness prior to registering in the course. A course fee applies via SFS bill. **(All semesters)**

**WFIT-076****Introduction to Weight Training**

Basic weight training fundamentals offer beginners/intermediates the chance to build strength through method discovery. Content includes: stretching; flexibility; spotting; safety; free weights; cybex; the different kinds of program designs; and cardiovascular development. Course design will focus on individual need and desire, leading to unique and successful program designs. Instructors will present information on muscle development, basic CV training; use of free weights and Cybex equipment. Highlight: individual program effort. Class work involves initial orientation, handouts/discussion, definitions, Cybex station techniques; free weight specifics, and routine development for total body work. Beginner, Intermediate, Advanced and Women's sections are offered. A course fee applies via SFS bill. **(All semesters)**

**WFIT-082****PiYo**

This course dramatically transforms the body to help look, feel and perform better. PiYo is an athletic blend of Pilates, Yoga and so much more? It includes modifications for the group exercise environment, yet also offers progression to challenges for all levels of student participants (Faculty/staff are welcome too?). PiYo exercises are selected and balanced through strategic variations (pose angles and application of force), with each specific movement. Each PIYO class session builds on the last to increase exercise adherence and avoid hitting "plateaus". Beginner, Intermediate and Advanced levels are offered. A course fee applies via SFS bill. **(All semesters)**

**WFIT-085****Pilates**

This course will progress from Pilates fundamentals and basic exercises to a traditional intermediate level workout by the final class. Pilates focuses on abdominal strength, stability of the pelvis, flexibility and balance. Mindful, intelligent movement and a deeper understanding of your body is the goal. Relaxation and some stretching may be added to the traditional mat work of Joseph H. Pilates. An Intermediate section assumes that the student has knowledge in Pilates fundamentals and the mechanics of basic classic exercises. Class will be more vigorous and will begin to develop concepts of flow and transition. The class will move and flow more than the beginner level. Previous experience in Pilates or a previous class in Pilates is required for Intermediate sections. A course fee applies via SFS bill. **(All semesters)**

**WFIT-086****Pilates Bootcamp**

Pilates Bootcamp will combine classic Pilates with traditional Boot Camp exercises, such as plyometrics, squats, lunges, and resistance work. Classes will be fast-paced and dynamic, providing a total body workout, while remaining true to the Pilates principles of control, concentration and centering. Students will work to improve not only core strength, but also balance, muscle tone, flexibility, alignment and posture, while conditioning the total body. A course fee applies via SFS bill. **(All semesters)**

**WFIT-088****Extreme Fitness**

Extreme Fitness is an exciting indoor full-body fitness program that will challenge, tone and trim your body in 10 intense weeks. Whether you are a novice or an athlete looking for a new challenge, this class will help you reach your fitness goals! Definitely challenging-working core muscle groups, endurance, PiYo type activities-they are all part of this newly designed, very dynamic class. Boredom is not an option in this two-day-a-week class. By combining calisthenics, plyometrics, resistance training, cardio, relay races, partner drills—you get an action packed workout in every session. Similar to Boot Camp but very much designed for those who want the “ultimate” fitness experience in an hour! A course fee applies via SFS bill. **(All semesters)**

**WFIT-090****90-Day Challenge**

Get ready to burn fat, boost your metabolism, and get lean. This class uses resistance training to get you better results in less time. The routine is based on proven techniques that shift your fat-burning focus from cardio to resistance training. By adding resistance training for 3 months, you'll build lean muscle, and that is what supercharges your metabolism so you burn fat longer after your workout—even while you sleep! It is recommended that students register for a cardio class on Tuesdays and Thursdays if possible to compliment this routine. A course fee applies via SFS bill. **(All semesters)**

**WFIT-094****Yoga**

A body/mind discipline, Yoga enables posture improvement, flexibility development and learned relaxation. Mastered through learning an ancient posture series incorporating breath control, the body and mind relationship is explored. The practice of meditation gives one an opportunity to experience stress management. Relaxation is Yoga practice's key. Attendance is required. Classes contain sequential stretches, postures and relaxation exercise, incorporated with breathing and visualization. Recommended clothing is comfortable and loose fitting. Mats are provided. Music featuring New Age and mainstream artists provide an inspiring atmosphere. Hatha Yoga exploration includes a diverse discipline collection for improving mental and physical health. A course fee applies via SFS bill. **(All semesters)**

**WFIT-095****Vinyasa Power Yoga**

Vinyasa Power Yoga is built upon traditional yoga poses, while at the same time adding several variations and extensions to the poses along the way. Unlike meditative yoga, the pace of this class provides a steady flow through a series of vinyasas (downward dog, plank, and upward dog) that keep the body engaged in a steady flow of movement. The pace of this movement offers cardiovascular conditioning, as well as an opportunity to challenge your strength and build your flexibility. The practice will offer you the opportunity to focus on your inner self and integrate and balance your body, mind, and spirit as one being. All levels welcome. A course fee applies via SFS bill. **(All semesters)**

**WFIT-097****Kundalini Yoga**

Kundalini yoga as taught by Yogi Bhajan is a 5,000-year-old authentic system of yoga exercise and meditation that promotes health, happiness, and spiritual awareness. Kundalini yoga is taught in over 300 centers in 35 countries by teachers trained through the international Kundalini Yoga Teacher's Association—combining breathing, movement, stretching and sound, Kundalini yoga is a safe, comprehensive technology that can be practiced by everyone. Through yogic breathing and meditation peace of mind can be obtained, giving an experience of deep inner calm and self-confidence. Kundalini yoga is more than a system of physical exercise. The technology is aimed at the spirit that has no boundaries therefore, it is universal and non denominational. A course fee applies via SFS bill. **(All semesters)**

**Health and Safety****WHLS-010****CPR and First Aid**

This course is designed to provide certification by the American Red Cross for CPR and First Aid. Upon successful completion of the course, students will receive certification cards for CPR and for First Aid. Class sessions are generally 2-4 hour formats, meeting once/week. Students will be presented with information on the following skills that apply to infants, children and adults: rescue breathing, blocked airway for a conscious/unconscious person, CPR, responding to an emergency situation, controlling bleeding and splinting techniques. Class sessions include the use of video tapes, lectures, demonstrations, partner practice and skill evaluation (by the instructor). All equipment (mannequins, mats, wraps) are provided by RIT. “CPR Pro” is offered optionally. A course fee applies via SFS bill. **(All semesters)**

**WHLS-020****Lifeguarding**

RIT's Lifeguarding course is designed to provide students with a certification by the American Red Cross (ARC). Training consists of methods for individual rescue around and in the water. Basic skills and concepts will be presented. Objectives are: Successful completion and certification for each individual by the final class day, following a ten-week course. Prerequisites for this course include a continuous 500 yard swim and demonstrated accomplishment in the front crawl, side stroke, and breast stroke. Students are required to have or purchase a lifeguarding textbook. This course covers all skills required by ARC. A course fee applies via SFS bill. **(All semesters)**

**WHLS-030****Water Safety Instruction**

Water Safety Instruction (WSI), a certification course through The American Red Cross, enables students to teach swimming and lifesaving classes following successful completion. Preparation for teaching proper Red Cross classes follows instruction in lifeguarding skill review, strokes, teaching methods, class structuring and organization. Current lifeguarding certification is required as a class prerequisite. Assignments, quiz evaluation and a written course final are given. Purchase of a book series is necessary for course completion. An intriguing course exploring teaching methods and problems, WSI allows actual teaching experience within the class curriculum. A course fee applies via SFS bill. **(All semesters)**

**Health and Wellness Seminars****WHWS-026****Wellness for Life**

This core wellness course is designed specifically to assist students in making healthy decisions regarding lifestyle behaviors. Students will be presented with wellness information (multidimensional) that will help students prepare for co-op, job interviews, the workplace and the building of healthy, lifelong relationships. Key areas that are covered: Behavior change strategies, stress, high risk behaviors, physical wellness, emotional wellness, psychological well being, safety and spirituality. Unique in design, this course meets once per week and includes ice breakers, instructional sessions and interactive group activities. Successful completion of this course can be used as 1 activity credit toward the graduation requirement. A course fee applies via SFS bill. **(All semesters)**

**WHWS-002****Wellness Challenge Exam**

This core wellness course is designed specifically as a “test out” option for students wishing to complete a wellness activity class for graduation. Strong wellness background is required (multidimensional). Textbooks are available to prepare for the exam in the RIT Bookstore (Wellness: Concepts and Applications (Ansbaugh, Hamrick & Rosato). Passing the exam can fulfill one (1) activity credit for graduation. Students should contact Dugan Davies at: [dugan.davies@rit.edu](mailto:dugan.davies@rit.edu), SLC 1260. Study guides are available in the SLC Lobby. A course fee applies via SFS bill. **(All semesters)**

**WHWS-004****Introduction to Massage Therapy**

Massage Therapy is fast becoming an accepted part of many rehab programs and has been proven beneficial in many acute and chronic medical conditions. It aids in the relief of stress, arthritis, sports injuries, trauma and many other conditions of pain and discomfort. There are many forms of massage: Medical, Orthopaedic, Swedish, Therapeutic, Myofascial Trigger Point, Myofascial Release and Accupressure, for examples. Licensed Massage Therapists trained in New York go through extensive training in the US. They are REGISTERED and are BOARD CERTIFIED after passing the State Boards. Most states require the therapist to have passed the state tests in order to practice in the state they reside in. The vast majority of therapists go on for additional training. Anyone can feel a need for some kind of therapy to relieve stress, chronic or acute conditions. This course provides simple but effective methods of relieving stress and the freedom of enjoying everyday activities. Welcome to a new and sacred adventure that will promote your health and total well-being. A course fee applies via SFS bill. **(All semesters)**

**WHWS-006****Motivation and Leadership**

What inspires you? Who motivates you? Would you like to learn more about how you can motivate others? Many people, past and present, stand out as great leaders, but what makes them great? Each one of us can learn from our experiences and challenges, using these opportunities to lead, inspire, and motivate in our own way. Can you? Register for this course and find out! Learn about leadership styles and discover your own along the way. Explore what keeps you motivated through stressful and challenging times. Learn from past examples by examining great leaders-their characteristics, and their great speeches. Get started on the road to becoming a better leader and motivator! Successful completion of this course can be applied as a wellness activity credit. A course fee applies via SFS bill. **(All semesters)**

**WHWS-008****Financial Fitness**

Fitness doesn't just have to mean working out in the gym. Learn how you can become financially fit! This course will give you that foundation. Learn about important topics that include: the time value of money, budgeting, taxes, credit (good debt vs. bad debt), buying vs. leasing a car, banking, housing, financing college and much more. You will learn tools on how to best manage your resources and gain a basic understanding of the complex world of personal finances. A course fee applies via SFS bill. **(All semesters)**

**WHWS-009****Eating, Body Image and Food**

This course is designed to focus on the Psychology of eating behaviors, body image, and attitudes toward food. Issues that will be addressed include: the meaning of food, factors which influence body image, dieting behaviors, cultural influences on eating and body image, obesity, eating disorders, and finally-healthy eating. Successful completion of this course counts as one (1) activity course (toward the graduation requirement). A course fee applies via SFS bill. **(All semesters)**

**WHWS-010****Friends, Foes and Lovers**

This course is designed to provide students with educational concepts and strategies regarding relationships while keeping personal safety in mind. Instructors and students will explore the topic of relationships (friends, dating, and partnerships) and being able to set appropriate boundaries: so that relationships are able to thrive. Issues of Relationship violence, stalking and sexual assault will also be addressed throughout the course. This course is taught by the staff from the Center for Women and Gender. Successful completion of this course can be used as one (1) activity course credit toward the graduation requirement. A course fee applies via SFS bill. **(All semesters)**

**WHWS-015****Stress Management**

This course focuses on the dynamic ways that students can effectively manage stress. Today's fast-paced daily grind can easily become overwhelming for people. It is difficult to balance the various duties and responsibilities that we, as a society face on a daily basis. This course will examine what stress is, how stress affects the body and how to effectively manage stress in a healthy fashion. Students will have the opportunity to experience a variety of different stress management techniques in order to determine which ones are best suited for them: Deep breathing, massage, tai chi practices, yoga and muscle relaxation are just a few of the techniques that will be introduced. A course fee applies via SFS bill. **(All semesters)**

**WHWS-018****How to Become Smoke Free**

This course is a self-help, low stress and "no test" class. If you have tried to quit smoking before, take comfort in the fact that most smokers try several times before successfully quitting. Your past attempts are not failures, but rather a step in the process towards becoming a non-smoker! The information presented in this class will help to ease your way through the quitting process. Discussions will include techniques to become "smoke free"; healthy behavior changes; stress management strategies and more! Options to obtain nicotine replacement therapy are available through the N.Y. Quits and RIT Student Health. So, join your friends and learn how to quit together! A course fee applies via SFS bill. **(All semesters)**

**WHWS-020****Dialogues on Spirituality**

This course explores some spiritually-related topics, and shows how spirituality plays an important part in our daily life. It offers an opportunity to become more familiar with spiritual teachings from various spiritual masters and beliefs, and to recognize areas in oneself that are ripe for further growth. The course will be signed in American Sign Language with interpreting service provided. A course fee applies via SFS bill. **(All semesters)**

**WHWS-021****Spirituality and Health**

This interactive course, through multiple aspects of spiritual exploration, will focus on understanding some of the laws that govern all of life. A human is a four-fold being governed by physical, mental, emotional and spiritual laws. When you learn to live and apply these teachings, you solve many human problems. These self mastery techniques: Meditation, contemplation, mysticism, color therapy, the power of intentions, sacred spaces, charkas, chanting, labyrinths, dowsing, visualization, healing and developing intuition are aimed at the spirit which has no boundaries and therefore is universal and non-denominational. This course focuses on the discovery of the wisdom within and developing the capacity to sense, understand and tap into the highest parts of yourself, others and the world around you. A course fee applies via SFS bill. **(All semesters)**

**WHWS-022****Meditation Practices**

Learn and practice a variety of meditation techniques that develop mindfulness, concentration, tranquility and insight. This approach to Wellness is one that can assist you in reducing stress and anxiety by the way of thought, contemplation and reflection. Through this course students will gain an understanding of the physical as well as the emotional benefits of meditative practices. Successful completion of this course can be applied as an activity course credit toward the graduation requirement. A course fee applies via SFS bill. **(All semesters)**

**Interactive Adventures****WINT-001****Teambuilding Tools**

Progressing into the 21st century working collaboratively in teams will be a key competitive advantage to individuals and groups that can attract them. Providing those we work with the insight and experience of working collaboratively will give them and us workforce advantage. In this series will present and discuss how to create experiences in team building without the benefit of having a ropes course. We will discuss the history and use of experiential activities, stages of group development, activity briefing/debriefing and safety considerations. We will spend time setting up and experiencing a variety of activities and games that require little or no props and can be easily transported and will discuss where to find additional activities, curriculum ideas and local resources. A course fee applies via SFS bill. **(All semesters)**

**WINT-002****Outdoor Leadership**

This course will introduce students to the theories, skills, and practices associated with leadership of outdoor adventure activities. Topics addressed will include history of outdoor education, self-awareness and conduct, decision making and judgment, teaching and facilitation, environmental stewardship, program management, safety and risk management, and core technical competencies. Backpacking will be the basic activity used to address universal issues that can be applied to various other, more specialized activities. This class will involve classroom lecture as well as practical, hands-on exercises and lessons and may take place, in part, in an outdoor setting. A course fee applies via SFS bill. **(All semesters)**

**WINT-004****Wilderness Skills**

This class will cover a variety of topics and is designed to impart a number of skills that pertain to safely and effectively enjoying the backcountry. Skills covered will include water treatment, bear bagging, camping skills, orienteering, backcountry first aid, environmental awareness and preparedness, wilderness ethics, and more. This class will be taught both in and outdoors. For more details visit our website at: [www.interactiveadventures.rit.edu](http://www.interactiveadventures.rit.edu). A course fee applies via SFS bill. **(All semesters)**

**WINT-005****Backcountry Living**

This is an introductory course in backcountry living. We will work in and out of the classroom to incorporate essential outdoor skills involved in backcountry camping and overnight basics. Students will leave this course with a strong base in fire-building; campsite selection and set up; outdoor cooking; rope work; shelter building; wilderness first aid; hypo/hyperthermia prevention, detection and care; and Leave-No-Trace ethics. A course fee applies via SFS bill. **(All semesters)**

**WINT-006****Leave No Trace Trainer**

This course is for hikers, climbers, campers and explorers. The Interactive Adventures Program presents its first ever Leave No Trace (LNT) Trainer Course for outdoor recreation students looking to lessen their environmental impacts on the backcountry and to educate others to do the same. Being more cognizant of the effects of our actions on the environment, we can work to sustain a healthy future. The seven Leave No Trace principles help to guide our awareness in all of our outdoor adventures. The goal of this course is to prepare participants to practice the seven Leave No Trace principles and to train others in the principles through this weekend trip. The course is one pre-trip meeting plus one weekend at the Finger Lakes Trails learning and applying their skills. A course fee applies via SFS bill. **(All semesters)**

**WINT-008****Camp Cooking**

This is a hands-on course that focuses on the safe operation and practical use of a variety of camping stoves and other backcountry cooking methods to prepare meals in the backcountry. Topics covered will include: stove/method selection, safe and effective use of the chosen apparatus, backcountry nutrition and related considerations, water purification, meal planning and preparation, food dehydration methods, non-cooked nutrition options and a variety of other factors and considerations. Students will be given a light-weight camp stove to keep. For more detailed information visit our website at: [www.interactiveadventures.rit.edu](http://www.interactiveadventures.rit.edu). A course fee applies via SFS bill. **(All semesters)**

**WINT-009****Orienteering**

The sport of Orienteering presents both physical and mental challenges while providing the participants with the fun of being outdoors, the challenge of being totally engaged and the rewards of physical activity. As part of this course, participants will receive instruction in map reading and interpretation, experience the enjoyment of the sport of "O" by participating in events, unlock the mysteries of the compass and receive coaching on techniques used by experienced Orienteers to find control flags and avoid being "lost." All classes will involve some classroom work as well as outdoor activity. A course fee applies via SFS bill. **(All semesters)**

**WINT -013****Trail Running**

This class will deal the sport of trail running, which involves running on un-paved trails of varying terrain and pitch. Students will learn about trail running technique and strategies, proper equipment including footwear and clothing, nutrition including hydration, proper warm up and post-activity exercise and strategies for measuring and gauging progress. Trail running is a great recreational activity, a means of maintaining personal fitness and a wonderful way to explore the outdoors. Students must have appropriate footwear. Students must have adequate health insurance to take this class. A course fee applies via SFS bill. **(All semesters)**

**WINT-014****Hiking**

In this class, students will learn all about and engage in the activity of wilderness hiking. Skills taught will include outdoor preparedness including choosing proper clothing for the wilderness, wilderness safety, proper nutrition for outings, reading weather, basic navigation and map-reading, hiking technique, Leave No Trace wilderness ethics as well as exposure to numerous local parks and trail systems. Students must have proper clothing for outdoor excursions that occur in varying weather conditions. Proper health insurance is required to take this course. A course fee applies via SFS bill. **(All semesters)**

**WINT-015****Hiking/Adirondack Peak**

This class meets for one evening preparatory session and one overnight trip. The evening session will cover: Acquainting the group, appropriate gear for the trip, outdoor preparedness, and general expectations and logistics for the trip. The overnight trip will depart from RIT Friday afternoon in an RIT van. That night, the class will stay in the Adirondacks with bunk-style accommodations. Saturday we will hike one of the many peaks in the Adirondack region. Hiking is typically strenuous on average, but the pace will be moderate and effort will be made to accommodate the abilities of the class when selecting a hike. Because of changing weather conditions and other unforeseeable factors, a peak may not be summited. Participants should possess dependable hiking boots/clothing. A course fee applies via SFS bill. **(All semesters)**

**WINT-016****Backpacking**

This class will impart basic backpacking skills such as fitting and properly packing your backpack, camping skills, and general outdoor awareness and preparedness. These skills will be put to use on an overnight backpacking / camping trip. The difficulty of the hike will be based on the abilities of the class. A course fee applies via SFS bill. **(All semesters)**

**WINT-017****Backpacking Trail Maintenance**

This course is designed to provide experience in backpacking and volunteer trail maintenance. Students will learn how to choose proper gear, work together as a team and care for the trail they are hiking on. Students will gain a basic knowledge of backpacking skills and equipment selection, learn how to work with trail organizations and trail maintenance projects, learn to demonstrate basic backpacking skills and gear terminology, participate in trail clean-up and preservation, and practice Leave No Trace camping/hiking ethics. This course consists of both (a) mandatory pre-trip session(s), as well as a weekend backpacking and trail maintenance excursion. Basic backpacking and camping gear are provided. A course fee applies via SFS bill. **(All semesters)**

**WINT-018****Indoor Ice Climbing**

This class is designed to teach indoor ice climbing skills, by way of using ice climbing tools on simulated high-density foam ice features. No previous experience is necessary. After a review of climbing fundamentals and safety considerations this class will cover such skills as usage of ice tools and various ice climbing techniques including the stein pull, figure four and figure nine. Students will climb indoors on both simulated ice and mixed climbing conditions. A course fee applies via SFS bill. **(All semesters)**

**WINT-019****Beginner Backpacking**

Explore the forests with your home in your pack. Sleep in tents or lean-tos, cook on camp stoves, and hike the trail as you learn about the lush history of the area. Class will focus on the essentials of backcountry camping: planning, communication, and execution. Learn to read the weather, a compass, and map; start fires using new and old tools; as well as interpret the flora and fauna of the trail. This class will follow Leave No Trace principles. All food will be provided. Hike requires the ability to walk for at least five hours with breaks. A course fee applies via SFS bill. **(All semesters)**

**WINT-021****Backpacking/Canoeing**

This multi-activity course will involve a weekend wilderness trip consisting of both backpacking and open water canoeing; one day of one activity will be followed by one day of the other. Topics addressed will include basic backcountry foot-travel, wilderness camping, outdoor preparedness, paddling skills and canoe navigation, and Leave No Trace ethics. A course fee applies via SFS bill. **(All semesters)**

**WINT-025****Mountain Biking**

Do you have a mountain bike and want to learn how to use it on something other than pavement? Come with your bike and helmet (required) to an on-campus meeting, then two Saturday classes at Dryer Rd. Park in Victor, NY. We will spend the first Saturday working on basic skills and using different trails based on ability and experience. The second Saturday will be spent further developing your abilities and exploring the park. This course is for all ability levels and beginners are welcome. The instructor will help rank your competency and hone the course to your needs as a rider. A course fee applies via SFS bill. **(All semesters)**

**WINT-027****Indoor Mountain Bike Trip**

Bike riding in the middle of the Winter? Ray's Indoor Bike Park in Cleveland, OH boasts over 100,000 square feet of indoor beginner—expert terrain, ranging from dirt tracks to wood ramps, stunts and bridges. As such, beginners to advanced riders are welcome. This class will focus on developing basic bike control and handling skills. There's something for everyone: learn "the basics of riding" in the beginner room, develop your balance and handling skills in the GT Sport section, or show-off in the Trek session room. More information: [www.ray-smtb.com](http://www.ray-smtb.com). This class involves a mandatory pre-trip meeting followed by a weekend trip to Ray's in Cleveland. A course fee applies via SFS bill. **(All semesters)**

**WINT-028****Bicycle Care and Maintenance**

This 20-hour course is taught as a hands-on introduction to building, caring for, maintaining and riding bicycles. Students are supplied with a basic bicycle repair kit and book which is theirs to keep. The focus of the course is to use the repair kit and book to discover the mechanical systems of a bicycle including: breaks, drive train, derailleurs, bearings, wheel truing and more. Instruction location will be split between the SLC-1325 and the Red Barn. The first through fourth will be in the SLC-1325 building various makes and models of new bicycles. The fifth and sixth weeks are spent in the Red Barn working on your own bicycle. The final class is a bike ride to Rochester via the Greenway Trail. NOTE: Students must bring their own bicycle to the LAST three classes only! Repair kit tools are designed for bikes 1995 and newer with external gears. Bikes older than 1995 may require different tools to conduct class procedures. A course fee applies via SFS bill. **(All semesters)**

**WINT-029****Bicycling for Fitness**

This class is designed for intermediate riders who feel comfortable operating and maintaining their own bicycle. Class will introduce riders to techniques such as circular pedaling, cadence, shifting and breathing to increase efficiency and fitness. The class will also look at riding etiquette and road safety by practicing and obeying NYS laws for cyclists. Students will also learn how to use a heart rate monitor and bicycle computer to increase fitness level. Weekly group rides will be 20-30 miles per class, which includes drills to improve fitness and efficiency. Important Note: class requires a road or hybrid bicycle (no mountain bikes). Students should be comfortable riding, shifting and controlling their bicycle (not for beginners). Class will meet on indoor spin bikes during March and when weather is unfavorable (TBA by instructor). A course fee applies via SFS bill. **(All semesters)**

**WINT-030****Advance Bike Care/Maintenance**

This class will expand upon information covered in the Basic Bicycle Care and Maintenance class. We will cover bearing overhauls, basic wheel truing, cable and housing replacement, and basic component removal such as cranks, bottom brackets, drivetrain components and forks. The course fee will include a selection of basic hand tools for students to keep that will begin their collection of component specific tools. This will also allow students to perform these repairs outside of the classroom environment. A course fee applies via SFS bill. **(All semesters)**

**WINT-035****Rock Climbing Bouldering**

Bouldering is the sport of climbing typically short distances without ropes or harnesses. These safety precautions are replaced with spotters and crash pads. This class is designed to expose students to the sport of bouldering, while teaching a variety of climbing techniques, mental and physical preparedness, proper spotting and other areas of climbing safety. The first session(s) will meet at the Red Barn and future sessions will take place in Niagara Glen bouldering area. All gear and transportation are provided. A course fee applies via SFS bill. For more detailed information please visit the website for interactive adventures at: [www.interactiveadventures.rit.edu](http://www.interactiveadventures.rit.edu). Students must bring a copy of their birth certificate and/or passport to each session to enter Canada. A course fee applies via SFS bill. **(All semesters)**

**WINT-037****Bouldering**

This course is designed to expose students to the sport of bouldering in an amazing outdoor setting. Climbing techniques, mental and physical preparedness, proper spotting and other safety techniques are presented. The sport of Bouldering is a type of rock climbing that involves shorter climbs or "problems" that require strategy and physical ability to complete. This is a physically demanding class! The first class meets at the Red Barn (required meeting) followed by a long weekend (Thursday-Sunday) trip to Cooper's Rock, WV—a large bouldering area just east of Morgantown, WV. Students will climb for two full days at a premier outdoor location. Visit [www.interactiveadventures.rit.edu](http://www.interactiveadventures.rit.edu) for more information. A course fee applies via SFS bill. **(All semesters)**

**WINT-039****Rock Climbing Indoor**

This class is designed to introduce and educate students about the sport of indoor rock climbing. Subject matter includes a variety of climbing techniques and terminology, gear and equipment use, as well as safety practices and protocols specific to the indoor climbing environment. Each class will consist of a lecture, demonstration and practice components—allowing students to learn and practice the skills presented. All necessary gear and equipment will be provided. This is an introductory course set up for individuals with little or no climbing experience. A course fee applies via SFS bill. **(All semesters)**

**WINT-040****Training for Climbers**

This class is designed for those with previous climbing experience and that are proficient in basic climbing movement and terminology (it is not required that students have knowledge of belay techniques and rope related skills for this class). We will explore various training techniques and establish a regular training schedule that will be followed throughout the semester. Training techniques will include the use of standard weight training practices, cardio-respiratory equipment, climbing specific training tools such as campus walls and finger boards, along with other exercises involving your own body weight. Programs will be developed based on individual need and will be tailored so that you progress throughout the semester. Class sessions will meet in both the Fitness Center (SLC) and the Red Barn. A course fee applies via SFS bill. **(All semesters)**

**WINT-042****Beginner Outdoor Rock Climbing**

This class is designed as an introduction to outdoor rock climbing. Subject matter includes a variety of climbing techniques, proper use of gear and equipment as well as all safety practices related to outdoor climbing. Class consists of one evening session and one all-day trip. The evening session will acquaint classmates with each other, cover all rope handling and climbing techniques and prepare the class for the outdoor trip. The trip usually takes place in Ontario, Canada, and transportation is provided. Here, students will have the opportunity to spend the day climbing on the cliffs of the Niagara Escarpment. All necessary gear is provided. You must attend the evening session to go on the trip, and both sessions are required for a passing grade. A course fee applies via SFS bill. **(All semesters)**

**WINT-043****Intermediate Outdoor Rock Climbing**

For students who have previous experience & want to take it to the next level, this course is for you. A major objective of this course is to provide the foundations & rationales for the application of advanced climbing skills. Before traveling to a nearby crag, a meeting (required) will take place at the Red Barn & will cover basic skills and trip logistics. The first day of the trip will focus on active and passive familiarization, placement/evaluation, gear anchor systems and equalization methods. The second day will focus on advanced rappelling techniques and an introduction to self rescue with remainder of the day spent on the rocks. Throughout the trip students will be introduced to the larger concepts involved in top rope anchor construction, rock climbing physics and risk management. All equipment & transportation is provided. A course fee applies via SFS bill. **(All semesters)**

**WINT-045****Climbing Toprope Set Up**

This class is designed to teach students how to assemble safe and reliable anchors for top rope climbing using natural anchors (no artificial protection will be used). Participants should know how to belay and have had some climbing experience. Skills taught will include: Basic knowledge of all gear and equipment being used, choosing an anchor, tying off anchors, creating equalized and redundant anchor systems, anchoring the belay, redirected belays, top belays, escaping the belay and basic mechanical advantage systems. Class consists of one evening session and a full day trip. The trip will be to Ontario, Canada, where participants will learn to set up and use their own climbs. Both sessions are mandatory. All necessary gear and transportation are provided. A course fee applies via SFS bill. **(All semesters)**

**WINT-047****Course Setting for Indoor Climbing**

This class will cover the fundamentals involved with the creation of indoor rock climbs through weekly guided course setting sessions. Students will come to understand the comprehensive process of creating indoor rock climbs by learning about: equipment usage and safety, general climbing and climbing hold terminology, understanding climbing movement and how to create a specific sequence of moves, and climbing wall and course maintenance. Class sessions will involve a short instructional period, followed by individual and/or group course setting work, and will end with forerunning and modification of all newly created climbs. A course fee applies via SFS bill. **(All semesters)**

**WINT-050****Canoeing Beginner**

This course is designed to provide instruction and experience in flat water canoeing. Students will learn how to choose the right equipment and learn the proper canoeing power and steering strokes. Areas of instruction also include canoeing safety, basic knowledge of canoeing skills and equipment selection, gear terminology, and basic rescue/ recovery techniques. This course is designed to enable students to participate in future recreational and occupational canoeing skills and experiences in a safe and comfortable way. A course fee applies via SFS bill. **(All semesters)**

**WINT-053****Canoe Camping**

Camping meets canoeing: learn to experience how a canoe allows for unique access to otherwise impractical camping opportunities, while being able to carry a payload greater than what could be feasibly carried on your back. This class involves a required pre-trip training meeting followed by a weekend-long trip to the Adirondacks. Skills to be covered include: Basic paddling, safety and navigation; Camping skill skills: tenting, fire-building, camp-cooking, and water purification as well as invaluable first-hand knowledge of one of the finest parks in the United States. A course fee applies via SFS bill. **(All semesters)**

**WINT-055****Beginner Kayaking**

This class is taught as an introduction to kayaking. It is typically taught in the pool and covers the following skills: Kayak parts, accessories and terminology, wet exits, hip snaps, paddle strokes, j-leans, Eskimo rescues and Eskimo rolls. All skills are taught in progression using drills, games and exercises leading up to a full roll. This class is taught in white water kayaks. All necessary gear and equipment is provided. Participants should expect to be in the water each class. A course fee applies via SFS bill. **(All semesters)**

**WINT-056****Whitewater Kayaking**

This course is an intermediate approach to whitewater kayaking. The participants should have some, but not necessarily extensive, kayaking experience. A preliminary class meeting will take place in the RIT competitive pool. This meeting will address/review the basics of whitewater paddling, maneuvering, righting and rescue techniques. An all-day trip will follow on easy to moderate whitewater. The meeting and the class trip are required to receive full activity course credit. Additional skills taught will include: whitewater safety skills, river reading/navigation, ferrying, eddying and peeling. Depending on the skill level of the class, other more advanced skills may be introduced as well. A course fee applies via SFS bill. **(All semesters)**

**WINT-058****Sea Kayaking**

Sea kayaks are long, narrow, seaworthy vessels that have a covered deck and, in lieu of the maneuverability of a whitewater kayak, are designed to have higher cruising speed, cargo capacity, ease of straight-line paddling, and comfort for long journeys. This class will teach students how to safely and effectively paddle a sea kayak and use this type of vessel for extended open-water trips. This class may include an overnight sea kayaking trip and involve wilderness camping. Proof of health insurance is required. A course fee applies via SFS bill. **(All semesters)**

**WINT-059****Stand-Up Paddle Boarding**

Stand-up paddle boarding (SUP) involves standing upright on a large, buoyant surf-board like watercraft and propelling the board with a body-length paddle using strokes similar to that of canoeing. SUP is a fun and easy-to-learn activity that can provide a great core work-out with a watercraft that is relatively light-weight and easy to transport while stilling being able to go anywhere a more cumbersome canoe or kayak can. Students will learn about paddle strokes and technique, water safety, and all the skills necessary to take up SUP independently. Students must be comfortable being on and in the water. Students must have adequate health insurance to take this class. A course fee applies via SFS bill. **(All semesters)**

**WINT-060****Snowshoeing**

This class is designed to utilize the sport of snowshoeing as a means of promoting and imparting physical fitness, outdoor preparedness, outdoor winter skills and knowledge of our local parks and natural resources. Students can expect to gain the necessary knowledge to continue enjoying this sport on their own. This class will typically meet at the Red Barn and depart for one of our many local trails and parks. In the event of a "no snow" day, hiking will be the substitute activity for the day. Equipment is provided by RIT. Offered in Winter periodically. Please refer to SIS for possible offerings and/or visit [www.interactiveadventures.rit.edu](http://www.interactiveadventures.rit.edu) (Interactive Adventures website). A course fee applies via SFS bill. **(All semesters)**

**WINT-062****Adirondack Snowshoeing**

This class consists of a mandatory pre-trip meeting followed by a weekend trip to the Adirondack State Park. Skills introduced include: snowshoe use, cold-weather preparedness and backcountry travel. This class meets for the (mandatory) pre-trip meeting and the weekend trip only. Must attend both for full activity course credit. Check the SIS system for more detailed class information. A course fee applies via SFS bill. **(All semesters)**

**WINT-063****Introduction to Winter Camping**

Explore the winter forest with your home in your pack. Sleep in tents or lean-to's, cook on camp stoves and hike or snowshoe the trail. Class will focus on the essentials of winter backcountry camping: planning, communication and execution. Learn to read the weather, pack for the cold and build fires. No previous experience needed, beginners welcome. This class will teach and follow the seven Leave No Trace principles. Hike requires the ability to walk for at least five hours with a pack. Durable snow boots or hiking boots required. A course fee applies via SFS bill. **(All semesters)**

**WINT-065****Cross Country Skiing**

Learn to cross-country ski and develop the basic skills needed to move on to downhill skiing. Designed for beginners, this class will focus on developing the classic diagonal stride, which is the main technique used by skiers to rhythmically propel themselves. Other skills taught will include stopping, turning, and climbing. A course fee applies via SFS bill. **(All semesters)**

**WINT-067****XC Ski Bristol**

Learn to cross-country ski, develop your technique, or log in mileage. Classes are held at Bristol Mountain Resort's Nordic Center, on top of Bristol Mountain. More info on the location: [www.bristolmountain.com](http://www.bristolmountain.com). The center has 100% snow making capability on 3.0km of groomed traditional and skate terrain. Designed for beginner to advanced skiers, this class will focus on developing the classic diagonal stride, which is the main technique used by skiers to rhythmically propel themselves. Other skills learned: stopping, turning and climbing. This class includes a mandatory pre-trip meeting. The first class at Bristol includes one group lesson (1-hour), conducted by a certified Bristol instructor. A course fee applies via SFS bill. **(All semesters)**

**WINT-066****Rock Climbing/Technical Skills**

This class is designed for those with some outdoor climbing experience. The class will be taught inside, but in simulated outdoor situations, covering such skills as anchor building and management; various belay methods and considerations; belay escapes and basic rescue skills; mechanical advantage and hauling systems; and, above all, safety and its many components in the climbing discipline. Climbing movement will only be covered inasmuch as it pertains to rope work and other technical considerations. A course fee applies via SFS bill. **(All semesters)**

**WINT-070****Introduction to Snowboarding**

This course is designed to introduce students to snowboarding and help guide students through the process of visiting a Ski and Snowboarding resort. Students will learn about the history of snowboarding, how to choose appropriate gear, basic skills, terminology, and basic outdoor winter safety and etiquette. This course consists of mandatory pre-trip lecture sessions on campus, and a one day workshop at Bristol Mountain consisting of a lesson and day long practice sessions with the instructor. There will also be a one hour debrief experience. Board, boots, helmets and bindings will be provided. Students will need to supply their own snow pants, winter jacket, synthetic or wool socks, mittens or gloves and hat. A course fee applies via SFS bill. **(All semesters)**

**WINT-075****Ice Climbing**

This class is designed to teach basic ice climbing skills that will include belaying, ice tool and crampon use as well as special skills and safety considerations particular to climbing on the ice. After required pre-trip meeting, the class will take day trips to local frozen waterfalls for climbing. This class is appropriate for all experience levels and all necessary gear and equipment is provided. A course fee applies via SFS bill. **(All semesters)**

**WINT-076****Ice Climbing Adirondacks**

Ice Climbing Adirondacks is an introduction to ice climbing. The class will begin with a required pre-trip meeting (at Red Barn) and then is followed by a weekend trip to the Adirondack State Park for a weekend of climbing. Skills covered will include: Proper and effective use of crampons including front-pointing and "French Technique," ice tool techniques, belays and rope work, and general winter preparedness. This class is open to all skill levels. Check SIS for more detailed class trip offerings and more specific meeting/Trip dates and times. Visit [interactive adventures website](http://www.interactiveadventures.rit.edu) for more detailed info: [www.interactiveadventures.rit.edu](http://www.interactiveadventures.rit.edu). A course fee applies via SFS bill. **(All semesters)**



**WINT-078****Introduction to Mountaineering**

This class is designed to teach basic techniques and concepts involved in travel through frozen terrain. This will include the usage of ice axes, crampons, snow shoes, as well as terrain identification, route finding, winter camping skills, snow shelters and safety considerations. After a required pre-trip meeting, the class will have a winter camping trip where students will learn and apply these skills around camp and on snow/ice covered terrain. All necessary gear and equipment is provided but students must have adequate clothing for winter camping. A course fee applies via SFS bill. **(All semesters)**

**WINT-085****Wilderness First Aid**

Whether you are an outdoor enthusiast, a trip leader, or just want to be better prepared to prevent and deal with accidents and emergencies in the wilderness, Wilderness First Aid is a must-have. This course uses both lecture and hands-on practice to provide a solid foundation in the basics of backcountry medical care. Areas of focus include response and assessment, musculoskeletal injuries, environmental emergencies, survival skills, soft tissue injuries, and medical emergencies. No previous medical training is necessary. WFA certification is good for two years. A course fee applies via SFS bill. **(All semesters)**

**WINT-090****Adirondack Spring Break**

This class consists of two mandatory pre-trip meetings followed by a week-long trip to the Adirondack State Park. Students will spend two days at Gore Mountain skiing or snowboarding, two days snowshoeing in the Marcy Dam area, and one day cross-country skiing at Cascade Cross-Country Ski Center. Skills introduced include: snowshoe and cross-country ski use, cold-weather preparedness and backcountry travel. This class meets for the (mandatory) pre-trip meetings and the week trip only. Students must attend ALL for full activity course credit. Check SIS for more detailed class information. A course fee applies via SFS bill. that includes all equipment, transportation, lodging and instruction **(All semesters)** This course is restricted. To register, students must contact Tom Connelly at tpcsc@rit.edu. A course fee applies via SFS bill. **(All semesters)**

**WINT-091****Slacklining**

Slacklining involves walking while balancing along a narrow, flat piece of nylon that is strung taught between two anchor points. This class will teach tips and techniques for both becoming proficient at slacklining as well as how to set up a slackline. As students become comfortable with basic skills, various additional tricks and challenges will be introduced. Slacklining is, in itself, a fantastic activity for improving balance, focus and kinesthetic awareness and also serves as effective cross-training for many other activities that depend on these capabilities. A course fee applies via SFS bill. **(All semesters)**

## Lifetime Recreational Activities

**WREC-001****Archery**

This course is designed to present the lifetime recreational activity of archery in a broad perspective for future use as a recreational and /or competitive pursuit. A major objective of the course is to develop strength in the upper back, neck and shoulder girdle. Students will be presented with the proper shooting techniques and forms. Instruction in the proper selection, use and care of archery tackle (equipment) will be provided. Students will be introduced to the rules, safety, etiquette of archery and archery competition. Once the fundamental skills have been well mastered, students will participate in a variety of class competitions (field, American, hunter, golf, clout, and flight.) Equipment provided by RIT. A course fee applies via SFS bill. **(All semesters)**

**WREC-004****Badminton**

Most people regard badminton as a gentle, noncompetitive, backyard diversion for relaxing summer afternoon play. However, the best setting has been found to be indoors or a breezy court. Here the shuttle cock ("birdie") can zip back and forth under great control and amazing speed: It becomes a very exciting game! Because it is physically/mentally demanding, it is one of the most invigorating and challenging sports in the world. It is also a great reducer of stress/tension and a wonderful muscle-toning activity. For the competitive person, badminton offers limitless opportunity to develop skills and for others, a wonderful recreational activity. A course fee applies via SFS bill. **(All semesters)**

**WREC-006****Pickleball**

Pickleball is a sport described as a combination of ping-pong, tennis and badminton. It is an intense work out, very social and athletic as well as competitive game. It is typically played on a badminton court with a net that is lowered to 34 inches in the middle. Players use a baseball sized wiffle ball and a paddle, similar to a large ping-pong paddle, to volley the ball back and forth to score on the opposing team. People of all athletic abilities can play this sport because it is easy to learn. Course fee applies via SFS bill. A course fee applies via SFS bill. **(All semesters)**

**WREC-007****Basketball**

This course is designed for beginner-advanced male and female students. It is designed to emphasize basic skill development and refinement, team competition and tournament play. Students will be encouraged to develop individualized skills of the game of basketball: Passing, shooting, dribbling, rebounding, offensive and defensive movement techniques. Objectives of the course are to enjoy playing the game of basketball/team competition, physical conditioning enhancement, to become more informed as to the strategies of the game and to benefit from the sociological aspects of becoming involved with a team sport. The general format of each class will include a warm-up, basic and advanced drills and in class competitions. Students must be dressed in appropriate athletic attire and sneakers. A course fee applies via SFS bill. **(All semesters)**

**WREC-010****Basketball Bootcamp**

This Basketball Bootcamp class is designed for all skill levels and for both men and women. The class will focus on Basketball skills from basic to advanced. Additionally, students will train in a variety of fitness skills (jumping, strength training, sprint work, footwork, abdominal work outs, upper/lower body fitness training) in order to move students to the next level of desired basketball skills. New to RIT, this course will provide and outstanding, challenging yet fun work-out while at the same time allow students to refine basketball skills and compete in pick-up games during class sessions. A course fee applies via SFS bill. **(All semesters)**

**WREC-016****Pocket Billiards**

Pocket Billiards is enjoyed by many of all ages and of all levels of proficiency and skill. The purpose of this course is to develop the fundamentals of a sound game. Emphasis is placed on stance, grip, bridges, stroking and aiming. Other topics introduced are stop shots, follow, draw, "English," position play, banks, caroms, combinations, eliminations, break shots and safety play. Games taught and played are: 8-Ball, 9-Ball, Straight (14.1) and Cutthroat. Each class period is divided into three segments: Lecture/demonstration/practice and play. All equipment is provided by RIT and no previous experience is necessary for beginner's sections. 24 student limit. Meets in the SAU game room. Advanced sections offered. A course fee applies via SFS bill. **(All semesters)**

**WREC-019****Bowling/off-campus**

This course is designed for beginner, intermediate/advanced students who wish to participate in the lifetime recreational sport of bowling. The course is designed to practice the basic techniques of bowling and covers the following: Stance, push-away, back swing, approach and release (fundamental skills of the game). Students will learn the importance of proper ball selection and care of equipment (balls, shoes, gloves). The class will be presented with the rules and etiquette of the game. Once averages have been established, students will be placed on teams and will bowl as a competitive league (format) for the remainder of the semester. Course held off campus Terrace Gardens. Directions in the SLC. RIT does not provide transportation. A course fee applies via SFS bill. **(All semesters)**

**WREC-022****Diving**

This course is designed to accommodate all ability levels. The fundamentals of diving will be covered early in the semester. Students will progress to the next ability levels at their own pace and with the guidance of the instructor. The course objectives are: To teach basic diving safety, fundamentals of diving, to build skill level and develop confidence to as high a point as possible. Course content includes the following areas: Approach, take off, aerial positions, twists and entries. Students must be reasonably coordinated, with average strength and have a basic swimming competency (should be comfortable in deep water). Materials needed: Swim suit and towel. A course fee applies via SFS bill. **(All semesters)**

**WREC-025****Fencing**

Introduction to the sport of fencing, basic moves, rules knowledge and understanding in combination with conditioning principles, stretching and flexibility design a class full of detail, competition and tactics. Objectives include basic footwork proficiency, Fencing blade work skills, rules understanding, experiential learning and the opportunity to direct (officiate) for one another. Classes begin with a light warm-up, followed by stretching and conditioning exercises. Focus on the basics and teaching fencing moves, also includes competition discussion and bout situations. Grading is on attendance. Variety in class options include and advanced fencing section (experience req.) A course fee applies via SFS bill. **(All semesters)**

**WREC-028****Introduction to Fencing: Sabre**

Introduction to the sport of sabre, basic moves, rules, conditioning and stretching/flexibility will be taught. Focus will be on footwork, sabre blade work and skills, experiential learning and the opportunity to direct (officiate) for one another. Classes begin with warmups and stretching followed by sabre moves and discussions on competitions and bouts will take place. Grading is on attendance. Final weeks include mini competitions, games, Olympic video and free sabre time. An advanced section offered periodically in the spring. A course fee applies via SFS bill. **(All semesters)**

**WREC-031****Fresh Water Fly Fishing**

This Fresh Water Fly Fishing course introduces students to fly fishing skills. This includes: identifying trout species, understanding trout behavior and trout habitat, basic entomology and hatch calendar, recognizing common artificial wet and dry patterns, tying wet and dry fly patterns, viewing some popular trout streams in the northeast and western United States, and reading stream conditions. This course includes hands-on sessions for fly casting techniques. A course fee applies (via student financial services bill). Equipment is provided for students who need it (rod, reel, leader material and flies). Class meets weeks 5-9 of the semester, with the last class meeting off site at the same regular class time. RIT does not provide transportation. Car pooling with others in class exists. A course fee applies via SFS bill. **(All semesters)**

**WREC-034****Flag Football**

Flag football offers a chance to experience football at its best. Sport equipment will be provided. Individual skills combine in an atmosphere of teamwork, goal attainment, leadership awareness and excitement. Skill presentation, demonstration, drill work and play allow students of all levels to benefit from flag football activity involvement. Passing, catching, flag techniques, offensive/defensive play, creativity, kickoffs, point after attempts, handoffs and rule review will highlight the course. Active participation progresses fitness levels in many areas. Flag football will be offered at various times throughout the school year (depending on instructor/facility availability). A course fee applies via SFS bill. **(All semesters)**

**WREC-037****Dodgeball**

Re-live the glory days of summer camp and middle school by taking part in one of the fastest growing activities on college campuses across the country. Dodgeball is a great way to exercise, relieve stress and most importantly-have fun! This course will focus on the recreational game of Dodgeball as it is sanctioned by many leading organizations such as: The World Dodgeball Association (WDA), The National Amateur Dodgeball Association (NADA), the International Dodgeball Federation (FDA) and the National Dodgeball League (NDL). Students will play the game of dodgeball using different rules, formats and balls, court and team sizes. This will be an intense, competitive class but with a relaxed, open environment that will accommodate all ability levels. A course fee applies via SFS bill. **(F, S, Su)**

**WREC-040****Ultimate Frisbee**

Ultimate Frisbee is a non-contact disc sport played by two teams of seven players. The object of the game is to score goals. A goal is scored when a player catches any legal pass in the end zone of the opposing team. The disc (frisbee) is advanced by throwing or passing it to team mates. The disc may be passed in any direction. Any time a pass is incomplete, intercepted, knocked down, or contacts an out of bounds area, a turnover occurs. A turnover results in an immediate change of team possession of the frisbee (disc). Students will learn the rules, basic throws and strategies of this exciting game while developing levels of physical fitness. A course fee applies via SFS bill. **(All semesters)**

**WREC-047****Golf**

Beginning golf familiarizes the student with basic principles of technique, rules, etiquette, equipment and various course layouts. Players will benefit from play alongside novice and experienced level players. Unique individual critiques, etiquette discussion, grip coverage, stance, posture and swing planes are learned, as well as use of irons, woods and putters. When appropriate, videotaped presentations are shown. Stretching, technique demonstration and review combine with various club hitting practice to fill fifty minutes of experiential golf education. Professional presentation delivery and breadth of information in combination with practice, lead to a 27-hole class required performance. Written examination tests learning levels, as well as a self-performance videotape. A course fee applies via SFS bill. **(All semesters)**

**WREC-050****Horseback/English**

Student equitation skills, horse control, walking work, the trot and canter develop within this beginning Horseback/English course. Moving on to higher level intermediate and advanced courses, students learn fence jumping and fence course introduction, while further refining equitation skills. Course objectives include riding and stable safe work techniques, developing correct positioning, riding control and specifics dealing with a variety of horses and presented situations. Ground work education such as horse stall exiting, ground leading and correct mounting procedures along with walking, sitting, posting and two-point positioning, walking without stirrups, trotting and cantering lead into intermediate skills. Must call Huntington Meadows Stables to set up lesson times (872-6286) and/or email instructor: rbouchard@rochester.rr.com Leave phone #! A course fee applies via SFS bill. **(All semesters)**

**WREC-053****Horseback/Western**

Enjoy scenic trail riding while learning how to safely work and communicate with western trained horses at Liberty Stables in Bloomfield, NY. This class includes weekly discussions/rides. Designed with the novice in mind, students will learn to ride at a walk, trot, and canter. However, the variety of 15 lesson horses allow for varied experience levels. Class discussions/demonstrations include ground and riding safety, basic care/maintenance of horses as well as a bit of history of the human/horse relationship over the past 3000 years! With 80 beautiful acres of rolling countryside, open fields and forested areas as well as outdoor/indoor lesson rings, you are sure to develop your riding foundation. Attendance is key to success in this class. A course fee applies via SFS bill. **(All semesters)**

**WREC-056****Lacrosse**

The sport of lacrosse brings excitement to activity. This course is designed for students who have either played lacrosse or have an interest in gaining basic skills and knowledge of the game. Beginners as well as advanced players are welcome. Students must bring their own Lacrosse stick to each class. RIT will provide safety goggles along with all other required equipment and instruction. Objectives of the class include: Learning to catch/pass/dodge and shoot while playing in a team setting. Students must be dressed in appropriate athletic attire and sneakers. Variations of course options are: men's lacrosse, co-ed lacrosse and women's lacrosse depending on instructor and facility availability. Check SIS for semester offerings. A course fee applies via SFS bill. **(All semesters)**

**WREC-059****Ice Hockey**

This course is designed for beginning to advanced ice hockey players. Students must provide their own skates, helmet with full face mask, hockey stick and gloves. Course objectives: To learn the basics of equipment, safety, skating acceleration, stick handling, skating agility (forward and backward), and basic drills. The advanced classes (Power Skating) are NOT for beginners! These classes will cover advanced hockey skills, including: Shooting, passing for accuracy, advanced drills, defensive zone coverage and competitive play. If the class is above average in ability, a session on Power Plays and Penalty Kills may be added. There is NO body checking allowed in class. All penalties during class will be penalty shots. A course fee applies via SFS bill. **(All semesters)**

**WREC-062****Ice Skating**

This course is designed for beginner-advanced ice skaters. Instructional emphasis will be placed on safely learning the life-long activity of ice skating. Early in the semester, students will be introduced to aspects of basic use and care of equipment and safety implications. Once basic skills have been obtained, students will progress as follows: Gliding and snow plough stop; forward glide and sculling; backward glide and sculling; forward cross-overs; short jumps/turns; two foot spins; forward chasses; Killian hold; backward chasses waltz hold; foxtrot hold; forward drag, bunny hop and lunge; forward arabesque; combination jumps and spins; Sal chow and basic program development. Students may use their own skates or can rent skates at the rink. A course fee applies via SFS bill. **(All semesters)**

**WREC-065****Juggling**

This course is designed to acquaint students with the art of juggling in theory and practice while at the same time conditioning their minds and bodies. Course concentrates on three- and four-ball juggling patterns and is geared to accommodate all levels of learners. Instructor will teach one-on-one as well as group demonstration. Clubs, rings, combination cigar boxes, scarves, club swinging and 5 ball juggling will be taught (where appropriate to advanced students). Personal instruction will be supplemented with juggling movies, literature and video taping. The goal of the course is not only for each student to achieve maximum juggling ability, but also to increase their mental concentration and physical coordination. A course fee applies via SFS bill. **(All semesters)**

**WREC-068****Racquetball**

Racquetball is designed to teach skill development from beginners to advanced level players. Focus for the beginner is on skill development and refinement, while intermediates to advanced focus on perfecting the strokes and competitive strategies. Activity level is high. Students will have the opportunity to develop overall fitness elements. The basic course objectives are: skill understanding, enhancement of the social/emotional components, CV fitness, basic shots, equipment, warm up/cool down, training and game strategies. This course meets 1-2xweek in the SLC racquetball courts. Racquets and balls are provided. Eye guards are required and may be purchased locally. All students must bring their RIT ID to every class. A course fee applies via SFS bill. **(All semesters)**

**WREC-071****Skiing and Snowboarding**

Participation in this program may be for Wellness activity credit or just for fun (audit). Students must register for this class on SIS during RIT's enrollment period (for wellness credit or as an audit). Bristol Mountain will determine the cost of the class in late fall. The packaged fee for this class includes both lift ticket, equipment rental and optional lessons. Ski/snowboard rental is included for this class. Class begins with a required pre-trip meeting before the Holiday break (date and location are TBD and will be announced) followed by skiing/snowboarding in January. Students receive one wellness activity credit by participating in 20 hours of either skiing or snowboarding. Class begins the first week in January after the Holiday break. RIT does not provide transportation although carpooling opportunities exist. Fees are subject to Bristol Mountain. Directions at the SLC lobby. Course fees are via SFS bill and is TBD. **Note:** This class is downhill skiing and snowboarding with rental and lessons are optional.

**WREC-72****Ski/Snowboard/No Rental**

Participation in this program may be for Wellness activity credit or just for fun (audit). Students must register for this class on SIS during RIT's enrollment period (for wellness credit OR as an audit). Bristol Mountain will determine the cost of the class in late fall. The packaged fee for this class includes lift ticket and optional lessons. No Ski/snowboard rental is included for this class (students must have your own equipment). Class begins with a required pre-trip meeting before the Holiday break (date and location are TBD and will be announced) followed by skiing/snowboarding in January. Students receive one Wellness activity credit by participating in 20 hours of either skiing or snowboarding. Class begins the first week in January after the Holiday break. RIT does not provide transportation although carpooling opportunities exist. Fees are subject to Bristol Mountain. Directions at the SLC lobby. Course fees are via SFS bill and is TBD. **Note:** this class is downhill skiing and snowboarding with no rental and lessons are optional.

**WREC-073****Soccer**

Soccer, the sport of all the world, is a game of constant action. Each player involved in this game must be able to perform as an individual, as well as be an essential part of team play. In this class, we will cover fundamentals of ball control, trapping, dribbling, passing, heading, shooting, defensive (zone, man-to-man) techniques, offensive techniques, goal keeping and soccer terms. In this class, we will also discuss how every team is comprised of individual skill, group skill and team tactics. Class format will follow a warm-up session with skill practice, instruction for the day, along with mini-games in a controlled scrimmage situation. Winter offering will be indoors. A course fee applies via SFS bill. **(All semesters)**

**WREC-076****Softball: Slow Pitch**

Co-ed activity class designed for beginner to advanced players of the game of slow-pitch softball. Class will meet outdoors on the turf field or IM field, weather permitting. During inclement weather, class will meet in Clark gym, and play a modified game of softball: Mush-ball. Course consists of basic fundamentals of slo-pitch softball, with "speed up" rules of 3 balls and 2 strikes; including rules, out-field play, infield defensive skills, hitting, pitching techniques, base running, basic game strategies and umpiring. No metal spikes will be allowed. First class: Meets indoors and consists of orientation session and instruction regarding rules of the game. Most other classes: Outdoor drills and skill refinement. A course fee applies via SFS bill. **(All semesters)**

**WREC-079****Swimming/Beginner's Only**

Participation, enjoyment, improvement, knowledge, fitness conditioning and safety, class shares the latest swimming information and techniques. Course procedure includes individual and group instruction. Objectives involve work on skill improvement, safety development, all stroke recommendations, endurance improvement and swimming enjoyment. Course content delivers beginner, intermediate and advanced swimming skill work, freestyle, side, back, breast, fly and elementary back-stroke. In addition to turns and variation, water orientation and entry, stroke mechanics, understanding fitness conditioning, games, diving and safety skills, students explore water enjoyment. Note: This is strictly a beginner's class. A course fee applies via SFS bill. **(All semesters)**

**WREC-082****Tennis**

Participation, enjoyment, and lifetime game appreciation fulfill class expectations. Introduction to beginning fundamentals and skills will be covered. Objectives of the course reflect upon: game skills, rules, etiquette, tennis appreciation, and attaining a level of play that allows competition with comparable players. Court layout, surfaces, scoring, equipment, individual skills (forehand, backhand, serve, the volley, overheads) and footwork allow progression into preliminary games and round robin play. **\*\*Note:** Indoor tennis periodically are now offered in the winter/focuses on tennis drills aimed at increasing cardiovascular strength/breathing and advanced footwork. Students will do circuit training, court positioning, and continuous feeding drills. A course fee applies via SFS bill. **(All semesters)**

**WREC-085****Volleyball**

Course designed for all levels of players of the lifetime recreational and competitive game of volleyball. Course evaluation is based on attendance, effort, improvement and enthusiasm. The basic course outline includes instruction and rehearsal of basic volleyball skills (under hand pass, over head pass, spike and serve); rules; basic formations/positions/strategies; and tournament play. Students will have ample time to practice/refine basic-advanced skills of the game. Tournament play will take place in the form of a random team selection from class to class. Students should dress in athletic wear, with comfortable sneakers and knee pads (if desired). Advanced section offered periodically. A course fee applies via SFS bill. **(All semesters)**

**WREC-088****Water Volleyball**

All students can benefit from the fast moving game of Volleyball. The sport has risen in popularity nationwide. An enhanced volleyball game, players get active in an aquatic setting (shallow, recreational pool) and play water volleyball. Teamwork is explored, basic volleyball skills are practiced as well as basic strategies. The resistance of the water enhances the fitness benefits to this fun and exciting class without the bouncing and impact on the joints. A course fee applies via SFS bill. **(All semesters)**

**WREC-091****Table Tennis**

Table tennis is the 2nd most popular sport in the world. It is a sport played by all ages. At the beginner level it is recreational. At the top level, it is a world class sport requiring years of dedication and top notch training/fitness! It combines technique, speed, spin, power, touch, smarts and concentration. Course content includes: basic strokes, footwork, drills, strategies and rules. Games and matches will also be played, based on practice drills, and then a tournament near the end of the semester. All equipment is provided. Must wear sneakers. This course is designed for beginners who want to learn more about how table tennis is played and practiced. Successful completion of this course can be applied as one activity course credit toward the graduation requirement. A course fee applies via SFS bill. **(All semesters)**

**WREC-094****Curling**

This course will focus on the Olympic sport of curling. Curling is a competition between two teams with 4 players each. The game is played on ice, and the teams take turns pushing a 19.1kg stone towards a series of concentric circles. The object is to get the stone as close to the center of the circles as possible scoring more points than the opposing team. Instruction will cover all rules, equipment, safety, basic-intermediate skills and competitions. All classes will meet off campus (Rochester Curling Club). The core of these classes that meet will take place at the Rochester Curling Club on 71 Deep Rock Rd. (11 minutes from campus). RIT does not provide transportation. For directions call 235-8246 or [www.rochestercurling.com](http://www.rochestercurling.com). A course fee applies via SFS bill. **(All semesters)**

**WREC-095****Cricket**

This course is designed to spread the awareness and get students interested in the amazing sport of cricket. It is directed towards those who wish to broaden their knowledge of the technical skills of the game. Various aspects of the game such as batting, bowling, fielding, and wicket keeping are discussed and practiced. By the end of the course, students would be aware of the various rules and formats of the game, how the game is played and would also be able to play the game of cricket at a recreational level. A course fee applies via SFS bill. **(All semesters)**

**WREC-097****Inline Skating and Ice Skating**

This course is designed to introduce students to the sport of in-line skating and ice skating. Instructional emphasis will be placed on safely learning the lifelong activities of both in-line skating and ice skating. The first half of the course will focus on basic intermediate ice skating skills. The second part of the semester will focus on the skills and enjoyment of in-line skating outdoors. Instruction will be given on skating basics, including: Skating forwards and backwards, turning, cross-overs and braking/stopping. Additional topics include: Discussions on the proper use of protective gear and the proper maintenance of equipment. Students are required to provide their own set of in-line skates, helmets and wrist guards. Ice skates may be rented from the ice rink (nominal fee). A course fee applies via SFS bill. **(All semesters)**

**WREC-098****Team Handball**

The verbal similarity between team handball and the more familiar handball played in a small court causes much confusion when talking about the game of team handball. The similarity of the two sports stops with the name. Team handball is played on a court like basketball. Each team has seven players-six court players and a goalie that plays both offense and defense. The basic objectives are to throw the ball into the goal of the opposing team and to defend one's own goal against attacks by the other team. Team Handball is a rapid, continuous play type of activity. Students will learn the rules, throws and basic strategies of the game while at the same time develop cardiovascular fitness levels. A course fee applies via SFS bill. **(All semesters)**

**Martial Arts****WMAR-001****Karate**

Course designed to help students increase their stamina, flexibility and basic techniques in self-defense. Main course objectives: become more physically fit to enhance self-esteem; develop self-confidence to help students deal with everyday situations; relieve stress by providing an outlet to blow off steam; and to gain self-discipline to enable students develop better study, work and life habits. Course content: calisthenics; stretching; upper body/lower body exercises; kata (a prearranged set of movements which deal with being attacked). Course options include: Level I, Level II, (Advanced). Please note that students must have successfully completed a Karate Level I class before enrolling into the Karate Level II class. A course fee applies via SFS bill. **(All semesters)**

**WMAR-006****Self Defense**

This empowering self defense course, designed for students is designed to help students increase their stamina, flexibility, and basic fundamental techniques needed to feel confident in the ability to protect oneself. In this positive, non-threatening environment, the class will teach proper use of hands and feet as weapons, how to fend off multiple attackers, as well as techniques that can be used against a person with a knife, gun or club. Main course objectives: become more physically fit, enhance self-esteem and gain necessary awareness of potential dangers, develop confidence and self-discipline to help deal with everyday situations, relieve stress, provide resources needed to develop better study, work and life habits. A course fee applies via SFS bill. **(All semesters)**

**WMAR-011****Kali Level I**

This course is a study of Filipino Indigenous Martial Arts used in Pre-Hispanic colonial periods of the Philippines known as Kali, Arnis and Eskrima. The practice of this art was trained in the guise of cultural dances and theatrical plays to hide the Martial applications from the colonial powers. This course will explore the system's unique training method that begins with weapons and transfers the same movement to empty handed defensive applications using a three-dimensional thought provoking process of deciphering and understanding body mechanics. Class includes skills through the use of double/single sticks in place of blades and use of these tools to develop plyometric and twoman dynamic drills. Student must provide their own rattan sticks (Instructor will provide purchasing information). A course fee applies via SFS bill. **(All semesters)**

**WMAR-016****Kung Fu Shaolin**

Welcome to the Duteau Northern Shaolin Kung Fu Wu Su Academy. Typical classes are 1-2 hours, depending on the class-where all students work together. Most classes start with exercises, which are followed by the introduction of basic technique and their application. Students progress throughout the semester learning more advanced skills and gain more self-discipline and confidence. Kung Fu is an excellent method of getting in shape. Students will feel a definite improvement in overall well-being as they develop their offensive and defensive abilities. Students can also learn the philosophy, history and analysis of Kung Fu techniques. Varied levels offered. Check SIS for more detailed course offerings. A course fee applies via SFS bill. **(All semesters)**

**WMAR-021****Kung Fu Open Practice**

This class is designed to provide extra practice time for students outside of their regular class and to give students the opportunity to receive more individual instruction on techniques they have questions about or feel they need help with. Typically class will run for about an hour and 20 minutes, starting out with a set of warm-up exercises, which will then be followed by a review of techniques or 1-on-1 bouts with a senior instructor present. The format of the class is open, providing the opportunity for previous students to rejoin and refresh on techniques they may have learned several semesters, or years ago. All are welcome to register. A course fee applies via SFS bill. **(All semesters)**

**WMAR-026****Kung Fu Rank Test Review**

A typical review class will be about 1 hour and 20 minutes. The class consists mainly of lectures of philosophy, history, and analysis of Kung Fu techniques. This class is required for any students wishing to test for their first rank, but would be beneficial for any student wishing to learn more in the depth knowledge of this style of Kung Fu. A course fee applies via SFS bill. **(All semesters)**

**WMAR-031****Kung Fu Self Defense**

This self defense class is designed to teach students the physical and mental techniques/attitudes they need to protect themselves both on campus and off. During class students will learn a variety of self-defense applications and techniques that can be used anywhere and in any situation. Over the course of the semester students will gain an increase in physical fitness, self-confidence, and awareness, which will better enable them to deal with any situations they may encounter—whether walking back to the dorms late at night or walking home to your off-campus apartment, you'll learn how to stay safe and out of danger. The techniques taught in this course will be based in Shaolin Kung Fu. A course fee applies via SFS bill. **(All semesters)**

**WMAR-036****Tai Chi Slow Paced**

This course is designed to teach 24 forms of Tai Chi movements with popular meditation ideas. Focus on creating strong internal energy and strength. Pursue and maintain good health, the “qi” sensations. Learn to balance the body with gentle movements that improve health conditions with each progressive section. Tai Chi was created 400 years ago and repeats simple movements again and again in certain frequency, allowing students to develop a special routine for maximal energy, skills and string internal power for application in defense and self-healing. First time learners are welcomed. A course fee applies via SFS bill. **(F, S)**

**WMAR-041****Tai Chi Fast Paced**

This fast-paced Tai Chi class will focus on all 88 forms of Tai Chi movements. Students will have the opportunity to obtain the strength, knowledge and capabilities that will bring them to the level of “mastering.” Activities during class sessions involve pushing hands in continuous and fluid movements and teaches the release of tensions created by opposing forces thereby enhancing internal strength. This practice simulates devotional fighting in real life. First time learners welcome! A course fee applies via SFS bill. **(All semesters)**

**WMAR-050****Qigong**

This martial arts course focuses on internal energy exercise based on practices from 2,000 years ago. The powerful combination of slow movement, breathing, postures and meditation practices allow the body to open energy channels instantly, thus dramatically healing disease that conventional medicine has failed to overcome. Students will focus on using health energy to pursue success, peace and happiness. Basic course content: Flying Crane Qigong (combines movement with mental concentration); Fragrance Qigong (repeats simple movements in specific frequency for maximal biophysical energy); and Qigong Meditation (involves applying physical pressure to transform bad energy to good energy) to heal at a subconscious state. A course fee applies via SFS bill. **(All semesters)**

**WMAR-056****Aikido**

Aikido was founded by Master Morihei Uyeshiba as a synthesis primarily of Aiki-jitsu, Aiki-ken, Judo and founder's philosophy of peaceful reconciliation of conflict. One of the founder's students, Koichi Tohei Sensei, founded a branch school called the Ki-Society, which emphasizes the development of personal “ki” through Aikido practice. RIT aikido traces its lineage back to the original Hombu dojo in Japan. The objective of this course is to provide physical conditioning by educating and coordinating the whole body-mind-spirit system. Basic ideas and techniques will be taught. The four basic principles to be presented: ‘Keep one-point,’ ‘Relax completely,’ ‘Keep weight under-side,’ and ‘Extend Ki.’ A course fee applies via SFS bill. **(All semesters)**

**WMAR-066****Sparring**

This exciting Martial Arts course is designed to help students increase their stamina, flexibility and basic techniques in self defense, with emphasis on controlled fighting bouts (two students matching their skills against each other). Main course objectives: develop confidence through physical fitness, relieve tension by providing a healthy forum for stress relief and gain the self discipline to enable students to lead a more productive lifestyle. Course content: calisthenics, stretching, and punching and kicking drills (include bag work and sparring with other students) to promote the development of footwork, distancing timing, focus and strategies needed to be a skillful fighter. A course fee applies via SFS bill. (All semesters)

**WMAR-071****Brazilian Capoeira**

This exciting martial art course is one of the few, if not the only one still in existence, native to Americans, developed in Brazil by the descendants of African slaves brought there by the Portuguese during the era of the Atlantic Slave trade. Capoeira is characterized by dynamic body play, kicking, sweeping, takedowns, aggressive feinting and head butt movements. It is played within a circle of onlookers and fellow participants, called a "Roda." The game is played when two contestants enter the circle and begin to "ginga" ("to swing" in Portuguese), launching various attacks, counters and initiating defense. A course fee applies via SFS bill. (All semesters)

## Military Sciences

**WMIL-001****Air Force ROTC Physical Training**

This course is designed to help the individual establish a physical readiness program. "Physical Readiness" are those factors that determine one's ability to perform heavy, physical work and those that help maintain good health and appearance. Factors/components of readiness: muscular strength, muscular endurance and cardio-respiratory endurance. Major goals of the course: To physically challenge students and help students develop self-confidence, discipline and spirit. Students will work to develop physical readiness to a degree that will enable them to achieve or exceed the physical readiness standard established by the U.S. Air Force. Must be enrolled in RIT ROTC Air Force. There is no course fee.

**WMIL-006****Air Force Leadership Lab**

The ROTC course is an Air Force Leadership Lab. Formerly Air Force Physical Training II, this revised course is designed to provide the students with a foundational understanding of the benefits, privileges and opportunities as well as responsibilities associated with an Air Force commission. Students will also be introduced to Air Force customs, courtesies, environment, drill, flight movement and ceremonies. Prerequisite is enrollment in the RIT ROTC Air Force program. There is no course fee.

**WMIL-018****Army Conditioning Drills**

This course is designed to help the individual establish a physical readiness program. Physical Readiness are those factors that determine one's ability to perform heavy, physical work and those that help maintain good health and appearance. Factors/components of readiness: muscular strength, muscular endurance and cardio-respiratory endurance. Major goals of course: To physically challenge students and help them develop self-confidence, discipline and spirit. Students will work to develop readiness to a degree that will enable them to achieve or exceed the physical readiness standard established by the U.S. Army Evaluation will be determined by the use of the Army's Physical Readiness Test. Must be enrolled in RIT ROTC Army. No course fee applies.

**WMIL-021****Army Leadership Lab ROTC**

Prerequisite: Successful completion of Army Conditioning Drills (must be enrolled in Army ROTC). Course offered fall and spring semesters. No course fee applies.

**WMIL-024****Navy Drill ROTC U of R**

This course is designed to help the individual establish a physical readiness program. Physical Readiness are those factors that determine one's ability to perform heavy, physical work and those that help maintain good health and appearance. Factors/components of readiness: muscular strength, muscular endurance and cardiorespiratory endurance. Major goals of the course: to physically challenge students and help them develop self-confidence, discipline and spirit. Students will work to develop physical readiness to a degree that will enable them to achieve or exceed the physical readiness standard established by the U.S. Naval Sciences. Must be enrolled in U of R ROTC Navy. There is no course fee. Call 275-4275 at the U of R for more information.



























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