2019

2019-2020 Graduate Bulletin

Rochester Institute of Technology

Preparing you for an outstanding educational experience

Graduate Bulletin | 2019-20

RIT

Rochester Institute of Technology
2019–20 Academic Calendar

† The Add/Drop period is the first seven class days, excluding Sundays and holidays, of the Fall, Spring, and full Summer terms.

* Friday of the 11th week of classes.

** 80% point in time

Fall Semester (2191)

August 17 - 19
International Student Move-in and Orientation

August 20 - 25
New Student Move-in and Orientation

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

August 31
Saturday classes begin

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

September 3
Last day of Add/Drop period†

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

October 14 - 15
October Break (no classes)
University open

November 8
Last day to drop from classes with a grade of "W" *

November 27
No classes
University closes at 2 p.m.

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

November 30
No Saturday classes

December 2
Day, evening, and online classes resume

December 7
Saturday classes resume
Last Saturday classes

December 9
Last day, evening, and online classes

December 10
Reading Day

Dec. 11, 12, 13, 16, 17, 18
Final exams

December 19
Residence halls close at 10 a.m.

Dec. 19 - Jan. 12
Break between fall and spring Semesters

December 20
Final grades due

December 24
University closes at 2 p.m.

December 25 - January 1
University closed

Spring Semester (2195)

January 6
Residence halls open

January 13
Day, evening, and online classes begin
First day of Add/Drop period†

January 18
Saturday classes begin

January 20
Martin Luther King Jr. Day (no classes)
University open

January 21
Last day of Add/Drop period†

January 22
First day to drop from classes with a grade of "W"

March 8 - 15
Spring Break (no classes)
University open

March 14
No Saturday classes

March 16
Day, evening, and online classes resume

March 21
Saturday classes resume

April 3
Last day to drop from classes with a grade of "W" *

April 25
Last Saturday classes

April 27
Last day, evening, and online classes

April 27
Reading Day

April 29, 20, May 1, 4, 5, 6
Final exams

May 8
Final grades due
Convocation and Commencement ceremonies

May 9
Commencement ceremonies

May 7 - 13
Break between Spring Semester and Summer Term

12-week Summer Term (2198)

May 14
Day, evening, and online classes begin
First day of Add/Drop period†

May 16
Saturday classes begin

May 21
Last day to Add/Drop classes†

May 22
First day to drop from classes with a grade of "W"

May 25
Memorial Day (no classes)
University closed

July 3
Independence Day observed
University closed

July 20
Last day to drop from classes with a grade of "W" **

August 1
Last Saturday classes

August 5
Last day, evening, and online classes

August 6
Reading Day

August 7, 10, 11
Final exams

August 13
Final grades due

August 12 - 23
Break between Summer Term and Fall Semester

6-week Summer Term I (2198)

May 14
Day, evening, and online classes begin
First day of Add/Drop period

May 16
Saturday classes begin

May 18
Last day to Add/Drop classes

May 19
First day to drop from classes with a grade of "W"

May 25
Memorial Day (no classes)
University closed

June 16
Last day to drop from classes with a grade of "W" **

June 20
Last Saturday classes

June 24
Last day of classes

June 25, 26
Final exams

June 26
Final grades due

6-week Summer Term II (2198)

June 29
Day, evening, and online classes begin
First day of Add/Drop period

July 1
Last day to Add/Drop classes

July 3
Independence Day observed (no classes)
University closed

July 7
First day to drop from classes with a grade of "W"

July 29
Last day to drop from classes with a grade of "W" **

August 5
Last day, evening, and online classes

August 6
Reading Day

August 7, 10, 11
Final exams

August 13
Final grades due

August 12 - 23
Break between Summer Term and Fall Semester

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Rochester Institute of Technology

About This Bulletin

This *Graduate Bulletin* does not constitute a contract between the university and its students on either a collective or individual basis. It represents RIT's best academic, social, and financial planning at the time of publication. Course and curriculum changes, modifications of tuition, fees, dormitory, meal, and other charges, plus unforeseen changes in other aspects of RIT life, sometimes occur after the *Graduate Bulletin* has been printed but before the changes can be incorporated in a later edition of the same publication. Because of this, Rochester Institute of Technology does not assume a contractual obligation with its students for the contents of this *Graduate Bulletin*. RIT does not discriminate. RIT promotes and values diversity within its workforce and provides equal opportunity to all qualified individuals regardless of race, color, creed, age, marital status, sex, gender, religion, sexual orientation, gender identity, gender expression, national origin, veteran status, or disability.

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Graduate Bulletin 2019–20
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Undergraduate Bulletin 2019–20

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Why Get Your Graduate Degree from Rochester Institute of Technology?

Choices

RIT is one of the nation's top comprehensive universities and sets the national standard for career-oriented education in many technological, scientific, and professional areas of study. With more than 90 graduate programs in high-growth and high-tech career fields including business, computer science and information technology, engineering, science, and art, RIT offers the choices you want in graduate education.

Graduate study options include master's and doctoral degrees, as well as advanced graduate certificates. RIT offers several ways to obtain your graduate degree, including part-time study, evening programs, online learning, accelerated executive education programs, and one-year master's degree options.

Quality

RIT is chartered by the legislature of the state of New York, and is accredited by the Middle States Association of Colleges and Schools. In addition, many of our individual programs and departments have professional accreditation from business and industry organizations.

At RIT, you'll interact with faculty members who have extensive teaching experience and are internationally respected for their contributions in their professional fields. RIT enrolls more than 18,000 students from across the United States and 100 countries.

Selected faculty and student awards, honors, and partnerships

- Alfred P. Sloan Foundation Grants
- Edmund S. Muskie Fellows
- Excellence in Engineering Education Award
- Ford Foundation Grants
- Fulbright Scholars
- National Endowment for the Humanities Awards
- National GEM Fellows
- National Science Foundation Awards
- New York Foundation for the Arts Fellowship
- Pulitzer Prizes
- Ronald McNair Scholars
- Student Academy Awards

Reputation

Fueled by significant support from government, industry, and private donors, RIT offers a unique, career-oriented graduate education tailored to meet your individual needs.

RIT is among the 15 largest private universities in the United States and is consistently recognized by leading college guides, industry publications, and the media. RIT has been cited by *U.S. News & World Report* as the most comprehensive university in the north for academic reputation.

More than 125,000 alumni worldwide include business, industry, and government leaders. Hundreds of top companies and government agencies—from global giants to startup companies—rely on RIT as a source for filling full-time positions and providing ongoing employee development.

Results

RIT graduates are highly sought after by companies of all sizes in virtually every industry in the U.S. and abroad. More than 600 companies visit RIT annually to recruit students, and employment and advancement opportunities for our graduate students remain strong.

Graduate students take advantage of government and industry-sponsored programs and research projects to broaden their experience and increase their visibility with potential employers. Research projects and experiential education often result in permanent employment offers and opportunities for our graduates. Some of our graduate students currently work for such companies as Amazon, Boeing, Fisher Price, Google, Johnson & Johnson, Microsoft, NASA, Toyota, and Xerox.

You want a degree that will be recognized and valued in today's competitive marketplace, and RIT delivers.

Graduate Education at RIT

RIT, founded in 1829, is a privately endowed university in suburban Rochester, NY. It is comprised of nine colleges and two degree-granting units:

College of Art and Design

Saunders College of Business

Golisano College of Computing and Information Sciences

Kate Gleason College of Engineering

College of Engineering Technology

College of Health Sciences and Technology

College of Liberal Arts

National Technical Institute for the Deaf

College of Science

Golisano Institute For Sustainability

School of Individualized Study

For additional information, contact us at:
Rochester Institute of Technology
Office of Graduate Enrollment Services
58 Lomb Memorial Drive
Rochester, NY 14623-5604
(585) 475-2229
gradinfo@rit.edu | rit.edu/grad

A Message from Twyla J. Cummings
Associate Provost and Dean of Graduate Education

The graduate learning experience at RIT is focused and intensive. RIT graduate programs provide a conceptual structure and organization of knowledge in the chosen subject—an understanding essential to leading technological change in the professions. They also build an educational base for life-long learning and for the generation of new knowledge and new insights through research.

The programs themselves are centered in fields that combine both theoretical knowledge and practical applications, especially those which can provide the graduate with a unique niche in the marketplace. Research topics often relate directly to situational concerns, rather than theoretical discourse. Many programs require a dissertation, thesis, or project, and encourage other avenues for professional experience, such as cooperative education and internships in government and industry.

Students often use employers as primary sources for research and special projects. This application-oriented approach attracts faculty who value problem-solving skills in students. Whether a dissertation, thesis, project, or professional portfolio is required of them, our students are encouraged to incorporate both independent study and experiential learning into their programs. Graduate students also may assist in undergraduate education, as teaching, research, or laboratory assistants.

A philosophy supported by campus resources

RIT's international reputation as an applied technological university with a unique connection to the arts and humanities gives graduate students the advantage of working with sophisticated technology and in laboratories found on and off campus. For example, students in microelectronic engineering have access to clean-room facilities that meet industry standards. Students majoring in visual communication design access digital media using a variety of systems and software, including Macintosh, IBM, Silicon Graphics, and Media 100 digital video editing. Our telecommunications technology workstations have been donated by an industry eager to hire students experienced with equipment used in their own laboratories.

Technology also has brought together students in design, crafts, photography, and print and multimedia. In RIT's Electronic Still Photography Laboratory, these disciplines have merged through electronics.

Regardless of the program, RIT encourages and promotes technological innovation in all areas.

Specialized and diverse programs

While technology is integral to all graduate programs, the essence of RIT graduate education is found in the diversity of programs, course offerings, and learning options. Our reputation as an

advanced university is matched by our commitment to offering programs designed to meet the specialized needs of employers. A dozen international corporations—including Eastman Kodak Co., Konica, Agfa Gevaert, Xerox Corp., and Fuji Photo Film Co.—have sponsored the building of laboratories in the Chester F. Carlson Center for Imaging Science, which houses the nation's most comprehensive imaging science programs. Enriched by the perspective provided by the National Technical Institute for the Deaf, one of RIT's colleges, we offer full access to deaf and hard-of-hearing students seeking graduate-level academic programs.

Across campus, graduate students engage in exciting research and stimulating dialogues with faculty and such distinguished visitors as George Bush, Bill Clinton, Joe Torre, Jesse Jackson, Maya Angelou, Annie Leibovitz, Jerry Uelsmann, Cornel West, and Greg Heisler. Saunders College of Business draws prominent figures from the business world—including U.S. Steel CEO Thomas Usher and Robert Bartley, editor and vice president of *The Wall Street Journal*—through the William D. Gasser Distinguished Lectureship in Business.

The university continues to receive international recognition for the quality of its graduate programs. In a recent ranking of national photography programs, *U.S. News & World Report* named RIT's School of Photographic Arts and Sciences in the top five. This publication has also consistently ranked RIT in the top 20 in its master of fine arts category.

Convenient and flexible programs

RIT's diversity also extends to the manner in which courses and programs are scheduled. Many of our graduate programs are available on a part-time, online, or evening basis and are designed for working professionals. Examples of programs offered through online learning include networking and systems administration; environmental, health and safety management; telecommunications engineering technology; imaging science; microelectronics manufacturing engineering; and health systems administration. These programs allow students access to an RIT education without attending classes on campus.

In addition, RIT's executive MBA program offers professionals an opportunity to earn a master's degree by studying on campus Friday and Saturday, every other week, or through online learning. Professionals from California to England visit RIT every year for executive leader master's degree programs in service management, hospitality and tourism management, health systems administration, and packaging science, which combine on-campus residencies with classes using distance-learning technology.

The RIT philosophy and mission

RIT's mission is the education of people for work and life in a democratic, inclusive, and global society. It is integral to the university's mission to be a dynamic center of higher education—one in which technology, the arts and sciences, and other dimensions of human knowledge and civilization are valued, cultivated, and applied.

Throughout its history, the university has been at the forefront in preparing students for professional careers in the STEM disciplines (science, technology, engineering and mathematics). RIT structures itself as an educational resource for all who seek to be competent and enthusiastic lifelong learners, whether they are young adults or professionals seeking to upgrade their skills by studying for an advanced degree. Our goal is that all graduates will understand the ethical, humanitarian, and aesthetic challenges of a diverse workplace and an international community.

The university's educational philosophy emphasizes not only theory—the natural foundation of knowledge—but also the practical workplace application of theories. This dual emphasis is prized by employers and offers graduates upward career mobility and the flexibility for changes in career direction. Another asset of an RIT education is cooperative education, offering students in selected programs the opportunity for paid, professional work experience while completing their degrees.

History of graduate education

Starting in 1955 with the master of fine arts degree, RIT continually has created new graduate programs to meet employers' and students' requests for education in particular functional areas. When surveys in the 1960s indicated the need for sophisticated statistical knowledge, a master of science degree in applied and mathematical statistics was created. More recently, the Golisano Institute for Sustainability began doctoral and master's degrees in sustainability. Other graduate programs have taken similar routes, and all nine RIT colleges exhibit continuous concern for the emerging needs of the business, industrial, and scholarly communities.

To support RIT's continuing endeavor to provide education in emerging career fields, the university has eight doctoral programs in the fields of astrophysical sciences and technology, color science, computing and information sciences, engineering, imaging science, mathematical modeling, microsystems engineering, and sustainability. These degrees are eight of more than 90 graduate degrees now offered by the university.

Sponsored research projects

Externally sponsored projects are a vital and integral component of RIT's educational and research activity. Faculty and students undertake sponsored projects for a variety of important reasons: to add to the body of knowledge, for professional development, and to strengthen academic programs. Sponsored projects enhance the university's academic programs, broaden its research resources, provide opportunities for student participation in

research, strengthen university-industrial partnerships, and serve the wider community.

Moreover, grants and contracts enhance existing resources and provide new opportunities for faculty, staff, and students. External funding comes from federal and state agencies, private foundations, and corporations. RIT's major sponsors include the National Science Foundation, the National Institutes of Health, the U.S. Department of Education, the Department of Defense, the National Aeronautics and Space Administration, and New York state.

Additional information is available through the Office of Sponsored Research Services at 585-475-7985, research@rit.edu, or on their website at rit.edu/research.

Accreditation

RIT is chartered by the New York state legislature and accredited by:

The Commission on Higher Education
Middle States Association of Colleges and Schools
3624 Market Street
Philadelphia, PA 19104-2680
215-662-5606

and

New York State Education Department
Office of College and University Evaluation
5 North Mezzanine
Albany, NY 12234
518-474-2593

In addition to institutional accreditation, many of RIT's academic programs have been granted accreditation by appropriate professional accreditation bodies. Where applicable, specific mention of accreditation is included in program descriptions. Students wishing to review documents describing accreditation should contact the Office of the Senior Vice President for Academic Affairs.

The *Graduate Bulletin* provides comprehensive information on all graduate programs at RIT. I encourage you to explore its contents to find the educational and research opportunities you seek. I look forward to welcoming you to our campus, and wish you success in your chosen program of study.

Twyla J. Cummings

Associate Provost and Dean of Graduate Education

Graduate Programs of Study		Degree and HEGIS Code							
		Adv. Cert	Ph.D.	MBA	ME	MFA	MS	MST	M. Arch
Art, Design, and Architecture									
Architecture	Institute for Sustainability								0202
Ceramics	Art and Design					1009			
Fine Arts Studio	Art and Design					1002			
Furniture Design	Art and Design					1009			
Glass	Art and Design					1009			
Industrial Design	Art and Design					1009			
Integrative Design	Art and Design						1009		
Media Arts and Technology	Art and Design						0605		
Medical Illustration	Health Sciences and Technology					1299			
Metals and Jewelry Design	Art and Design					1009			
Printmaking	Art and Design	1009							
Visual Arts–All Grades (Art Education)	Art and Design							0831	
Visual Communication Design	Art and Design					1009			
Business and Management									
Accounting and Financial Analytics	Business	0703							
Accounting	Business						0502		
Business Administration	Business			0506					
Business Administration–Accounting	Business			0502					
Business Administration–Executive	Business			0506					
Business Administration–Online Executive‡	Business			0506					
Business Analytics	Business						0599		
Computational Finance	Business						0504		
Construction Management‡	Engineering Technology						0599		
Data Science‡	Computing and Information Sciences						0701.00		
Engineering Management	Engineering				0913				
Entrepreneurship and Innovative Ventures	Business						0506		
Environmental, Health and Safety Management‡	Engineering Technology						0420		
Finance	Business						0504		
Global Supply Chain Management	Business						0513.00		
Health Care Finance‡	Health Sciences and Technology	1202							
Health Systems Management‡	Health Sciences and Technology						1202		
Hospitality and Tourism Management	Business						0510.1		
Human Resource Development‡	Business						0515		
Lean Six Sigma‡	Engineering	1701							
Management	Business						0513		
Manufacturing Leadership‡	Engineering						0599		
Media Arts and Technology	Art and Design						0605		
Organizational Learning‡	Business	0515							
Product Development‡	Engineering						0599		
Project Management‡	School of Individualized Study	0506							
Service Leadership and Innovation‡	Business						0599		
Technology Entrepreneurship	Business	0506							
Workplace Learning and Instruction‡	Engineering Technology	0515							
Communications and Digital Media									
Communication and Digital Media‡	Liberal Arts	0605							
Communication and Media Technologies	Liberal Arts						0605		
Health Care Interpretation‡	National Technical Institute for the Deaf						1199		
Media Arts and Technology	Art and Design						0605		
Print Media	Engineering Technology						0699		
Visual Communication Design	Art and Design					1009			
Computing and Information Sciences									
Big Data Analytics	Computing and Information Sciences	0702							
Bioinformatics	Science						0499		
Computational Finance	Business						0504		
Computer Engineering	Engineering						0999		
Computer Science	Computing and Information Sciences						0701		
Computing and Information Sciences	Computing and Information Sciences		1701						
Computing Security‡	Computing and Information Sciences						0799		
Cybersecurity‡	Computing and Information Sciences	0799							
Data Science‡	Computing and Information Sciences						0701.00		
Game Design and Development	Computing and Information Sciences						0799		
Health Informatics‡	Computing and Information Sciences						1217.00		
Human-Computer Interaction‡	Computing and Information Sciences						0799		
Imaging Science‡	Science						1999.20		
Imaging Science	Science		1999.20						
Information Sciences and Technologies‡	Computing and Information Sciences						0699		
Media Arts and Technology	Art and Design						0605		
Networking and Systems Administration‡	Computing and Information Sciences						0702		
Networking, Planning and Design‡	Computing and Information Sciences	0702							
Software Engineering	Computing and Information Sciences						0999		
Visual Communication Design	Art and Design					1009			
Web Development	Computing and Information Sciences	0699							
Engineering and Engineering Technology									
Architecture	Institute for Sustainability								0202
Computer Engineering	Engineering						0999		
Electrical Engineering	Engineering						0909		
Engineering Management	Engineering				0913				

‡ Online option available

Graduate Programs of Study		Degree and HEGIS Code							
		Adv. Cert	Ph.D.	MBA	ME	MFA	MS	MST	M. Arch
Engineering	Engineering		0901						
Environmental, Health and Safety Management‡	Engineering Technology						0420		
Imaging Science‡	Science						1999.20		
Imaging Science	Science		1999.20						
Industrial and Systems Engineering	Engineering				0913		0913		
Lean Six Sigma‡	Engineering	1902							
Manufacturing and Mechanical Systems Integration	Engineering Technology						0913		
Manufacturing Leadership‡	Engineering						0599		
Materials Science and Engineering	Science						0915		
Mechanical Engineering	Engineering				0910		0910		
Microelectronic Engineering	Engineering						0999		
Microelectronics Manufacturing Engineering‡	Engineering				0999				
Microsystems Engineering	Engineering		0999						
Packaging Science	Engineering Technology						4999		
Product Development‡	Engineering						0599		
Software Engineering	Computing and Information Sciences						0999		
Sustainable Engineering	Engineering				0999		0999		
Sustainable Systems	Institute for Sustainability						4904		
Telecommunications Engineering Technology	Engineering Technology						0925		
Vibrations	Engineering	0910							
Environmental Studies and Sustainability									
Architecture	Institute for Sustainability								0202
Environmental Science	Science						0420		
Environmental, Health and Safety Management‡	Engineering Technology						0420		
Packaging Science	Engineering Technology						4999		
Sustainability	Institute for Sustainability		4904						
Sustainable Engineering	Engineering				0999		0999		
Sustainable Systems	Institute for Sustainability						4904		
Game Design and Development									
Game Design and Development	Computing and Information Sciences						0799		
Health Professions and Medical Sciences									
Bioinformatics	Science						0499		
Health Care Finance‡	Health Sciences and Technology								
Health Care Interpretation‡	National Technical Institute for the Deaf						1199		
Health Informatics‡	Computing and Information Sciences						1217.00		
Health Systems Management‡	Health Sciences and Technology						1202		
Medical Illustration	Health Sciences and Technology					1299			
Humanities, Social Sciences, and Education									
Criminal Justice	Liberal Arts						2209		
Engineering Psychology	Liberal Arts	2099							
Environmental Science	Science						0420		
Environmental, Health and Safety Management‡	Engineering Technology						0420		
Experimental Psychology	Liberal Arts						2099		
Health Care Interpretation‡	National Technical Institute for the Deaf						1199		
Human Resource Development‡	Business						0515		
Professional Studies‡	School of Individualized Study						4999		
School Psychology	Liberal Arts						0826		
Science, Technology and Public Policy	Liberal Arts						2102		
Secondary Education of Students Who Are Deaf or Hard of Hearing	National Technical Institute for the Deaf						0803		
Visual Arts–All Grades (Art Education)	Art and Design							0831	
Photography, Film, and Animation									
Film and Animation	Art and Design					1010			
Photography and Related Media	Art and Design					1011			
Science and Math									
Applied and Computational Mathematics	Science						1799		
Applied Statistics‡	Science						1702		
Astrophysical Sciences and Technology	Science		1912				1912		
Bioinformatics	Science						0499		
Chemistry	Science						1905		
Color Science	Science		1999.20				1999.20		
Computational Finance	Business		1999.20				0504		
Data Science‡	Computing and Information Sciences						0701.00		
Environmental Science	Science						0420		
Environmental, Health and Safety Management‡	Engineering Technology						0420		
Imaging Science‡	Science						1999.20		
Imaging Science	Science		1999.20						
Materials Science and Engineering	Science						0915		
Mathematical Modeling	Science		1799						
Packaging Science	Engineering Technology						4999		
Physics	Science						1902.00		
Sustainability	Institute for Sustainability		4904						
Sustainable Systems	Institute for Sustainability						4904		
Undeclared and Individualized Study									
Professional Studies‡	School of Individualized Study						4999		

‡ Online option available

Doctoral Study at RIT

Doctoral programs at RIT are multidisciplinary, cutting-edge, and unique. Our highly interdisciplinary programs were developed out of RIT's unique areas of strengths in imaging, computing, science, engineering, mathematics, and sustainability. Our long history of providing education focused on emerging technologies has led to the development of doctorate level programs that draw upon our expertise and experience in these dynamic disciplines of study.

Our eight doctorate programs focus on the discovery and application of technology to solve problems in society. The interdisciplinary nature of the programs means students will work alongside more than 100 Ph.D. faculty members who are experts in a wide range of fields that are influenced by imaging, computing, science, engineering, and sustainability.

Doctoral programs of study

RIT offers eight doctoral degrees in areas where RIT shares national and international recognition.

Astrophysical sciences and technology: Students in the astrophysical sciences and technology program experience a comprehensive curriculum and a broad range of research opportunities that span forefront topics, such as cosmology and large scale structure, detectors and instrumentation, galaxy structure and evolution, gravitational waves, star and planet formation, supermassive black holes, and numerical general relativity. This program not only focuses on discovery and analysis, but also on the development of the technologies—including the instruments, analysis, and modeling techniques—that will enable the next major strides in astrophysics.

Color science: Color science is the understanding and quantification of color and its perception. It is used in the design and production of most man-made materials including textiles, paints, and plastics, and to specify the properties of diverse natural materials such as skin, plants, and soil. It also provides the scientific foundation for color imaging and has enabled advances in digital photography, electronic display systems, and color printing. The degree program revolves around the activities of the Munsell Color Science Laboratory, the pre-eminent academic laboratory in the U.S. devoted to the study of color science. For more than 30 years its faculty and staff have educated students and conducted cutting-edge research in the field. Since the inception of the program, graduates have been in high demand and enjoy a 100 percent placement rate in industrial and academic positions.

Computing and information sciences: This use-inspired basic research degree is designed to produce independent scholars, well-prepared educators, and cutting-edge researchers poised to excel in their work within interdisciplinary environments and industries. The degree highlights two of the most unique characteristics of the Golisano College—the breadth of its program offerings and its scholarly focus on discovering solutions to real-world problems by balancing theory and practice.

The program focuses on the theoretical and practical aspects of cyberinfrastructure as applied to specific problems across multiple domains. It is a blend of the intra-disciplinary computing knowledge areas and interdisciplinary domain areas.

Engineering: The doctorate program in engineering prepares the next generation of engineering leaders to tackle some of the most daunting and complex problems facing our society. The program's goal is to produce engineering graduates who are subject matter experts in a knowledge domain within an engineering discipline. Instead of restricting graduates to individual engineering fields (e.g., chemical, computer, electrical, industrial, mechanical, etc.) the program provides students with the flexibility to become subject matter experts and engineering innovators in an open-architecture environment, fostering intellectual growth along both interdisciplinary pathways and within the bounds of conventional engineering disciplines. With this approach, the program develops world-class researchers who can capitalize on the most promising discoveries and innovations, regardless of their origin within the engineering field, to develop interdisciplinary solutions for real-world challenges.

Imaging science: Imaging was named one of the top twenty engineering achievements of the 20th Century by the National Academies. Imaging has transformed our ability to see and understand a range of phenomena, keeping us healthy, protecting our security, monitoring the earth, exploring the universe, uncovering and preserving our heritage, enhancing communication, and facilitating our every day lives. The imaging science doctoral program is designed to provide a fundamental understanding of the physical, electro-optical, mathematical, computational, perceptual and statistical foundations of imaging science that are necessary to create, optimize, and apply imaging systems.

Mathematical modeling: Mathematical modeling is the process of developing mathematical descriptions of real-world systems that are used to understand and predict phenomena. Many current problems in science and technology are of such size and complexity that their solutions require sophisticated techniques drawn from computational and applied mathematics as well as the participation of mathematicians on the interdisciplinary teams of scientists that address them. This pioneering interdisciplinary program provides students the education they need to become experts in formulating complex problems mathematically, integrating data with models, devising and implementing algorithms and interpreting solutions, and communicating effectively with experts in various fields.

Microsystems engineering: The integration of entire systems into micron-scale devices and the sensing technology to interface these devices to the real world is the core emphasis of the microsystems engineering doctoral program. These systems are at the core of the next generation of technology. Within the past decade, microsystems (micro-optical, micro-electrical, and micro-mechanical

systems) have emerged as a critical technology worldwide and this dynamic field is positioned for outstanding growth in the future.

Sustainability: The first program in the world to focus on sustainable production, the doctorate in sustainability focuses on sustainable production systems—systems that create goods and services using processes that are non-polluting; conserving of energy and natural resources; economically viable; and safe and healthful for workers, communities, and consumers. This program also serves to advance research and education in alternative-energy development, sustainable design, green product development, industrial ecology, and pollution prevention.

Leaders in research

Research is a driving force in the university, engaging more than 2,700 students in hands-on research opportunities in each of our colleges. These opportunities combine classroom learning with laboratory discovery, which enhances each student's education and builds powerful skills that are applicable in a wide range of career paths.

At the core of our doctoral programs is a focus on research, which is intensive and demanding. It is this successful resolution of societal problems that leads to deep professional and personal fulfillment as new discoveries are made and applications are developed. Ph.D. students from a range of academic backgrounds work with world-renowned faculty who are leaders in their fields of study. A focus on teamwork, research, and the intersection of the disciplines gives students the opportunity to collaborate with others, share ideas, and develop innovative solutions using emerging technologies.

We build on our strengths when creating doctoral programs, emphasize research across disciplines, and rely on our interdisciplinary faculty to produce the next generation of educators and researchers with the ability to develop solutions to real world problems.

RIT Research Centers and Organizations

RIT is home to more than 50 interdisciplinary research centers, institutes, and organizations that bring together faculty and students from across the university. These entities explore a wide range of topics and cover everything from business and entrepreneurship to biomedical sciences, nanolithography, printing, social computing, remanufacturing, microsystems fabrication, environmental sustainability, and visual perception.

- Analog Devices Integrated Microsystems Laboratory
- Astrophysics Science and Technology
- Biomedical Imaging/MRI
- Biomedical Imaging/Ultrasound
- Center for Advanced Device Research
- Center for Advancing the Study of Cyberinfrastructure
- Center for Advancing STEM Teaching, Learning, and Evaluation
- Center for Applied and Computational Math
- Center for Biosciences Education and Technology
- Center for Computational Relativity and Gravitation
- Center for Cybersecurity
- Center for Detectors
- Center for Education Research Partnerships
- Center for Electronic Manufacturing and Assembly
- Center for Excellence in Lean Enterprise
- Center for Innovation and Entrepreneurship
- Center for Integrated Manufacturing Studies
- Center for Nanolithography Research
- Center for Quality and Applied Statistics
- Center on Access Technology
- Chester F. Carlson Center for Imaging Science
- Digital Imaging and Remote Sensing Laboratory
- Image Permanence Institute
- Imaging Products Laboratory
- International Center for Hearing and Speech Research
- IT Collaboratory
- Laboratory for Advanced Communication Technology
- Laboratory for Computer-Human Interaction
- Laboratory for Digital Image Restoration
- Laboratory for Environmental Computing and Decision Making
- Laboratory for Graphical Simulation, Visualization and Virtual Worlds
- Laboratory for Intelligent Systems
- Laboratory for Multiwavelength Astrophysics
- Laboratory for Printing Materials and Process
- Laboratory for Social Computing
- Laboratory for Wireless Networks and Security
- Manufacturing Technologies Program
- Multidisciplinary Vision Research Laboratory
- Munsell Color Science Laboratory
- NanoPower Research Laboratory
- National Center for Remanufacturing and Resource Recovery
- Print Research and Imaging Systems Modeling Laboratory
- Printing Applications Laboratory
- Printing Industry Education Program
- Research and Teacher Education Center
- RF/Analog Mixed Signal Laboratory
- RIT Venture Creations Incubator
- Semiconductor and Microsystems Fabrication Laboratory
- Sustainable Systems Research Center
- Systems Modernization and Sustainment Center
- Thermal Analysis and Microfluidics Laboratory

College of Art and Design

Todd Jokl, Dean
rit.edu/artdesign

Programs of Study

The College of Art and Design offers the most comprehensive graduate imaging programs in the world, encompassing design, science, technology, engineering, management, crafts, fine arts, and art education. Six of our visual arts programs are among the top 12 in the nation. The college is a diverse, world-class collaboration of five schools: American Crafts, Art, Design, Film and Animation, and Photographic Arts and Sciences. Its scope gives students a perspective that can be found nowhere else—a place where some students create fine art using centuries-old methods while others push the edges of digital creativity. At no other university can students explore so many different aspects of the imaging fields to a high level of professional excellence. In addition, the college offers expertise in the professional operations of running a studio or gallery.

Both graduate students and our alumni have received numerous prestigious awards:

- Photojournalism alumni have won 13 Pulitzer Prizes.
- Students have won the Graduate Film Honorarium of the Princess Grace Award.
- A computer graphics design alumnus was awarded a Golden Globe.
- An emerging filmmaker received the overall grand prize in the Adobe Flash Point Student Design Contest for multimedia projects.
- Computer graphics design students have won Adobe Design Achievement Awards.
- Computer graphics design alumni won an Emmy at the 31st Annual Sports Emmy awards.
- Graphic design alumni have received awards of excellence from the Society of Technical Communications, both locally and internationally.
- A computer graphics design graduate received honors from *Communication Arts* and *I.D.* magazines for her interactive thesis project.
- An industrial design student received an award from Volvo of North America for his winning child car seat in the Design for Automobile Safety Competition at the World Traffic Safety Symposium.
- Current students and alumni have been peer-selected speakers at the Society for Photographic Education's national conference.
- A fine arts studio alumna won the Dedalus Fellowship in painting and sculpture.
- Fine arts studio students and alumni have been selected for Artist in Residencies at Salem Art Works.
- Fine arts studio students and alumni have presented at the National Conference for Cast Iron Art.

Admission requirements

Admission to graduate programs in the College of Art and Design requires a combination of academic performance and creative visual skills that are evaluated via a portfolio review.
Faculty review each student's portfolio to evaluate creative

visual skills as well as the potential for success in the student's selected program.

Portfolio requirements: The following MFA programs require the submission of a portfolio that is used to assess applicants' performance and academic capabilities: ceramics, film and animation, fine arts studio, glass, industrial design, metals and jewelry design, furniture design, photography and related media, and visual communication design. The MST in art education also requires a portfolio.

Financial aid and scholarships

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Faculty

The college's world-class faculty are noted for their excellence, from creating award-winning sculptures and visual communications to receiving international recognition as innovators in their fields. They excel in the practice of their profession, using state-of-the-art equipment and studio facilities supporting both course work and research. Their role as mentors is evidenced in the national awards won by their students.

Policy regarding student work

The schools for American Crafts, Art, and Design reserve the right to retain student work for educational use or exhibition for a period of time not to exceed one and a half semesters beyond the year the object has been made.

Facilities

The college has extensive facilities and resources:

- Professional imaging environment for the still and moving image, including 30 fully equipped photographic studios, 20 fully equipped black and white and color darkrooms, five photo-oriented labs, professional printing lab, graduate studios, and a one of a kind lending cage with extensive collection of cameras and related equipment.
- Image Permanence Institute, recognized as a world leader in the education, research, and preservation of images and cultural property.
- Extensive professional 16mm film, digital video, and digital cinema field production equipment, including newly renovated film and animation facilities, 60 digital film editing stations, three animation labs, two stop-motion studios, two sound stages, and prop shop.
- Over a dozen specialized instructional and research labs for immersive study in the media sciences, supporting cross-disciplinary work in applied color science, 3D print materials, package printing, and new media publishing.
- Wallace Library, rich in photography, graphic arts publications, and contemporary periodicals in design, arts, crafts for study, and research; ARTstor, an online image collection; and electronic reserve course materials.
- Cooperative efforts with George Eastman Museum, with access to its collections of photography, rare books, motion pictures, and technology.
- Library of the Kodak Research Laboratories.
- The Melbert B. Cary Jr. Graphic Arts Collection, containing more than 20,000 volumes of rare books, with resources that illustrate fine printing, the history of printing, book design and illustration, papermaking, binding, and other aspects of the graphic arts.
- Bevier Gallery and the William Harris Gallery, the college's on-campus exhibition spaces.
- The Vignelli Center for Design Studies houses the extensive professional archive of Massimo and Lella Vignelli, and offers exhibition space and archival study classrooms for the examination of Modernist design history, theory, and criticism.
- Fully equipped studios for designing, forming, and finishing utilitarian and sculptural objects in clay, glass, metals and wood, including CNC routers and metal cutters. The Sands Family Studios wing houses state-of-the-art hot glass, large-scale metal fabricating, and specialized ceramic kiln areas.
- Individual fine arts studio spaces located within the painting, sculpture, and one of the world's leading non-toxic printmaking facilities.
- RIT City Art Space (formerly known as Gallery r) is the College of Art and Design's new exhibition and gathering place in downtown Rochester. Located in the historic Sibley building near Rochester Contemporary Art Center and Eastman School of Music, RIT City Art Space hosts a variety of exhibitions, events, and projects by RIT students, faculty, and alumni. RIT City Art Space actively participates in the First Friday city-wide gallery night initiative and is free and open to the public.
- The college houses archives, as well as exhibition and display spaces. Exhibitions regularly feature the work of contemporary painters, designers, photographers, illustrators, graphic artists, filmmakers, and faculty and student work.
- A comprehensive art library and a variety of educational resources are available in RIT's library.

Study options

Nonmatriculated students:

Students who have a baccalaureate degree and who wish to take particular courses may be admitted as nonmatriculated students to courses for which they are qualified. They may receive graduate credit, but it may not be submitted toward degree requirements. Students deficient in admission requirements or competence maybe required to take undergraduate courses, as advised, to qualify for admission.

School for American Crafts

Ceramics, MFA

www.rit.edu/study/ceramics-mfa
Jane Shellenbarger, Associate Professor
jmssac@rit.edu

Program overview

The MFA in ceramics develops your intellectual and artistic thinking through an extensive curriculum. You will rigorously examine the work of historical and contemporary artists and craftspeople as you expand your knowledge of the techniques of ceramics design. In-depth critiques give you a deep understanding of your own work as well as your peers to enhance your artistic expression and personal voice. Earning your MFA in ceramics will deepen your understanding of aesthetics, forming processes, and fine art theory.

The ceramics program focuses on artistic development through intensive teaching of the aesthetics and techniques of ceramic design. Graduate studio courses, seminar courses, and in-depth critiques, in conjunction with thesis planning and implementation, provide students with a deep understanding of not only their own work but the work of other students and their peers. Students examine the creativity, perceptions, aesthetics, and criticism of the work of contemporary artists and craftspeople in courses and discussions. Thesis reviews track students' progress towards the final thesis presentation, which is completed when a formal critique and evaluation is performed by the thesis committee.

Curriculum

Ceramics, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CCER-601	Ceramics Graduate Studio	12
STAR-701	Technology in Studio	3
STAR-702	Studio Art Research	3
STAR-714	Ideation and Series	3
	Free Electives	6
	Professional Elective	3
Second Year		
CCER-601	Ceramics Graduate Studio	12
STAR-706	Business Practices for Studio Artists	3
STAR-718	Research Methods and Publication	3
STAR-790	Research and Thesis	3
STAR-890	These	6
	Free Elective	3
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the MFA program in ceramics, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in a field of arts, sciences, or education.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work. Undergraduate degrees should include 50 semester hours in studio courses.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Submit a portfolio. (Please refer to Graduate Portfolio Requirements for more information.)

Additional information

Studio residency program

The School for American Crafts offers a Studio Residency program for students in ceramics, furniture design, glass, and metals and jewelry design. Residence positions are limited and are awarded after the review of all applicants' portfolios, transcripts, and references. An interview is required. Accepted residents are required to register for one independent study credit during each semester of residence.

Accepted residents are expected to be present in their assigned studio during class hours and to contribute up to 10 hours of work per week in the main studio. These work hours are coordinated and overseen by the faculty in the resident's discipline. In exchange, the school will provide workspace, access to facilities, and supportive instruction. The resident is invited to participate in the full range of studio activities.

Participants may be those seeking additional studio experience prior to undergraduate or graduate study, early career professionals, or teachers on leave who wish to work again in an academic studio environment. The faculty in each discipline will make decisions concerning appropriate candidates.

Inquiries should be made to the Studio Residency Program, School for American Crafts, College of Art and Design, Rochester Institute of Technology, 73 Lomb Memorial Drive, Rochester, NY 14623-5603.

Furniture Design, MFA

www.rit.edu/study/furniture-design-mfa
Andy Buck, Professor
585-475-2636, aabsac@rit.edu

Program overview

The furniture design master's program is structured to support each student's individual interests and aesthetic development. While engaging in the design and construction of a range of furniture objects, students are challenged to advance aesthetic, conceptual, and design sensibilities while simultaneously strengthening their building techniques and construction strategies. Students are exposed to a broad range of contemporary practices and creative approaches to design and art making in support of experimentation, critical reflection, and the development of a personal aesthetic and design philosophy.

The first year of the MFA in furniture design exposes students to a broad range of critical issues related to the conception and production of art, serves to inspire and provoke their critical reflection, and facilitate the development of a preliminary thesis topic. In the second year students propose and fully engage in a thesis project, which culminates in a major exhibition in the spring.

Curriculum

Furniture Design, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CWFD-601	Furniture Design Graduate Studio	12
STAR-701	Technology in Studio	3
STAR-702	Studio Art Research	3
STAR-714	Ideation and Series	3
	Free Electives	6
	Professional Elective	3
Second Year		
CWFD-601	Furniture Design Graduate Studio	12
STAR-706	Business Practices for Studio Artists	3
STAR-718	Research Methods and Publication	3
STAR-790	Research and Thesis	3
STAR-890	Thesis	6
	Free Elective	3
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the MFA program in furniture design, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in a field of arts, sciences, or education.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work. Undergraduate degrees should include 50 semester hours in studio courses.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Submit a portfolio. (Refer to Graduate Portfolio Requirements for more information.)

Additional information

Studio Residency program

The School for American Crafts offers a Studio Residency program for students in ceramics, furniture design, glass, and metals and jewelry design. Residence positions are limited and are awarded after the review of all applicants' portfolios, transcripts, and references. An interview is required. Accepted residents are required to register for one independent study credit during each semester of residence.

Accepted residents are expected to be present in their assigned studio during class hours and to contribute up to 10 hours of work per week in the main studio. These work hours are coordinated and overseen by the faculty in the resident's discipline. In exchange, the school will provide workspace, access to facilities, and supportive instruction. The resident is invited to participate in the full range of studio activities.

Participants may be those seeking additional studio experience prior to undergraduate or graduate study, early career professionals, or teachers on leave who wish to work again in an academic studio environment. The faculty in each discipline will make decisions concerning appropriate candidates.

Inquiries should be made to the Studio Residency Program, School for American Crafts, College of Art and Design, Rochester Institute of Technology, 73 Lomb Memorial Drive, Rochester, NY 14623-5603.

Glass, MFA

www.rit.edu/study/glass-mfa
David Schnuckel, Assistant Professor
585-475-2650, dassac@rit.edu

Program overview

Develop your personal creative voice through intensive research, discussion, critique, and experimentation in glass. In the glass master's degree you are given full access to a complete glass facility and individual studio space. Graduate studio courses, seminar courses, and in-depth critiques give you a deeper understanding of the craft as you design pieces that flourish your personal expression.

The MFA in glass is a two-year program of study. An individual studio space serves to strengthen your technique and practice in designing pieces that reflect your personal expression of the medium. Graduate studio courses, seminar courses, and in-depth critiques are offered in conjunction with thesis planning and implementation to provide you with a deep understanding of glass. In addition to course work and creative production, you are exposed to a broad range of critical issues related to the conception and production of art, to inspire and provoke critical reflection and facilitate the development of a thesis exhibition and supporting documentation.

Curriculum

Glass, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CGLS-601	Glass Graduate Studio	12
STAR-701	Technology in Studio	3
STAR-702	Studio Art Research	3
STAR-714	Ideation and Series	3
	Free Electives	6
	Professional Elective	3
Second Year		
CGLS-601	Glass Graduate Studio	12
STAR-706	Business Practices for Studio Artists	3
STAR-718	Research Methods and Publication	3
STAR-790	Research and Thesis	3
STAR-890	Thesis	6
	Free Elective	3
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the MFA program in glass, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in a field of arts, sciences, or education.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work. Undergraduate degrees should include 50 semester hours in studio courses.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Submit a portfolio. (Refer to Graduate Portfolio Requirements for more information.)

Additional information

Studio Residency program

The School for American Crafts offers a Studio Residency program for students in ceramics, furniture design, glass, and metals and jewelry design. Residence positions are limited and are awarded after the review of all applicants' portfolios, transcripts, and references. An interview is required. Accepted residents are required to register for one independent study credit during each semester of residence.

Accepted residents are expected to be present in their assigned studio during class hours and to contribute up to 10 hours of work per week in the main studio. These work hours are coordinated and overseen by the faculty in the resident's discipline. In exchange, the school will provide workspace, access to facilities, and supportive instruction. The resident is invited to participate in the full range of studio activities.

Participants may be those seeking additional studio experience prior to undergraduate or graduate study, early career professionals, or teachers on leave who wish to work again in an academic studio environment. The faculty in each discipline will make decisions concerning appropriate candidates.

Inquiries should be made to the Studio Residency Program, School for American Crafts, College of Art and Design, Rochester Institute of Technology, 73 Lomb Memorial Drive, Rochester, NY 14623-5603.

Metals and Jewelry Design, MFA

www.rit.edu/study/metals-and-jewelry-design-mfa
Leonard Urso, Professor
585-475-6114, sac@rit.edu
Carlos Caballero-Perez, Graduate Director
585-475-6114, sac@rit.edu

Program overview

The MFA in metals and jewelry design is a professional degree for practicing artists, craftspeople, or designers who desire to leave a lasting impression on their fields through a devotion to their work and the high standards of discipline and artistic ideals. This jewelry design degree challenges conventional thinking. In this major, you'll improve your knowledge and experience working with different theories and materials while you are challenged to think unconventionally in order to redefine industry standards.

The MFA in metals and jewelry design is generally a two-year, full-time program that involves the presentation of a thesis, which includes written documentation and a formal exhibition of a body of work.

The program provides students with broad exposure to metal working techniques, expands knowledge of applied design, strengthens perceptual and philosophical concepts, and develops an individual mode of expression. This sequence leads to a master's thesis, inaugurated by the student and overseen by the faculty. The program is structured on the basis of individual needs, interests, and background preparation, as may be determined through faculty counseling.

Curriculum

Metals and Jewelry Design, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CMTJ-601	Metals and Jewelry Design Graduate Studio	12
STAR-701	Technology in Studio	3
STAR-702	Studio Art Research	3
STAR-714	Ideation and Series	3
	Free Elective	6
	Professional Elective	3
Second Year		
CMTJ-601	Metals and Jewelry Design Graduate Studio	12
STAR-706	Business Practices for Studio Artists	3
STAR-718	Research Methods and Publication	3
STAR-790	Research and Thesis	3
STAR-890	Thesis	6
	Free Elective	3
Total Semester Credit Hours		**60**

Admission requirements

To be considered for the MFA program in metals and jewelry design, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in a field of arts, sciences, or education.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work. Undergraduate degrees should include 50 semester hours in studio courses.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Submit a portfolio. (Refer to Graduate Portfolio Requirements for more information.)

Additional information

Studio Residency program

The School for American Crafts offers a Studio Residency program for students in ceramics, furniture design, glass and metals and jewelry design. Residence positions are limited and are awarded after the review of all applicants' portfolios, transcripts, and references. An interview is required. Accepted residents are required to register for one independent study credit during each semester of residence.

Accepted residents are expected to be present in their assigned studio during class hours and to contribute up to 10 hours of work per week in the main studio. These work hours are coordinated and overseen by the faculty in the resident's discipline. In exchange, the school will provide workspace, access to facilities, and supportive instruction. The resident is invited to participate in the full range of studio activities.

Participants may be those seeking additional studio experience prior to undergraduate or graduate study, early career professionals, or teachers on leave who wish to work again in an academic studio environment. The faculty in each discipline will make decisions concerning appropriate candidates.

Inquiries should be made to the Studio Residency Program, School for American Crafts, College of Art and Design, Rochester Institute of Technology, 73 Lomb Memorial Drive, Rochester, NY 14623-5603.

School of Art

Fine Arts Studio, MFA

www.rit.edu/study/fine-arts-studio-mfa
Elizabeth Kronfield, Professor
585-475-5762, edkfaa@rit.edu

Program overview

As you pursue a masters in fine arts you'll explore the role of contemporary art through painting, printmaking, sculpture, and expanded forms.

The MFA in fine arts studio is a rigorous two-year program comprised of major studio courses; studio electives such as glass, ceramics, film, and photography; theory and research seminars; as well as thesis credits.

The program is committed to collaboration and interdisciplinary approaches both within the four major fine arts areas of study and the entire College of Art and Design. The program's structure allows for personal growth, experimentation, collaboration, and unique, non-discipline specific results to occur in the thesis. Courses are meant to concentrate on creative visual work while also thinking about making and sustaining a dialogue.

Curriculum

Fine Arts Studio, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
STAR-701	Technology in Studio	3
STAR-702	Studio Art Research	3
STAR-714	Ideation and Series	3
	Major Studio Courses*	12
	Free Electives	6
	Professional Elective	3
Second Year		
STAR-706	Business Practices for Studio Artists	3
STAR-718	Research Methods and Publication	3
STAR-790	Research and Thesis	3
STAR-890	Thesis	6
	Major Studio Courses*	12
	Free Electives	3
Total Semester Credit Hours		**60**

* Students may choose any combination of the following major studio courses: Painting (PAIT-601), Printmaking (PRNT-601), Sculpture (SCUL-601), or Expanded Forms (SCUL-611).

Admission requirements

To be considered for admission to the MFA program in fine arts studio, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college of fine arts.
- Submit a portfolio containing a cohesive body of artwork that demonstrates both technical skill and visualization of conceptual thought. (Refer to Graduate Portfolio Requirements for more information.)
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a personal statement of educational objectives, including why the candidates is interested in earning an MFA, the selection of RIT for the MFA degree, and professional goals to be achieved.
- Submit an artist's statement explaining the intention behind the portfolio.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Non-toxic Printmaking, Adv. Cert.

www.rit.edu/study/non-toxic-printmaking-adv-cert
Glen Hintz, Director, School of Art
585-475-2161, grhfad@rit.edu

Program overview

Technical training and retraining for artists and printmaking professionals seeking a comprehensive working knowledge of non-toxic printmaking techniques, including a study of methodology and aesthetic applications. In the advanced certificate in non-toxic printmaking, you'll learn the fundamentals of print creation, and applied skills for current and emerging industry and career demands. Students incorporate industry best practices and principles through the design and production of printmaking projects.

Curriculum

Non-toxic Printmaking, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PRNT-607	Printmaking I	6
PRNT-608	Printmaking II	6
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in non-toxic printmaking, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a BFA or MFA, or be recognized as a master printer or professional print maker.
- Submit a slide portfolio (between 10-20 slides).
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit three letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Visual Arts–All Grades (Art Education), MST

www.rit.edu/study/visual-arts-all-grades-art-education-mst

Lauren Ramich, Lecturer
585-475-7140, larfaa@rit.edu

Program overview

When does an artist become a teacher? The MST in visual arts-all grades (art education) prepares you to teach the next generation of artists and create art experiences while honing your own artistic skills. This accelerated program gives you a year of hands-on experience that will heavily mirror your life as an art educator. An art education masters prepares you for a career by embedding certifications and job placement support right into the curriculum. You will work with regional schools to find the best fit for your personality, talents, and teaching goals.

The MST in visual arts–all grades (art education) leads to initial/professional New York State certification in visual arts for grades K through 12. This certification allows applicants to teach in New York state public schools. The program features pedagogical studies, studio inquiry, and student teaching. The program prepares students to meet the national, state, and regional need for teachers of the visual arts and is designed for accomplished art educators and advocates for art and learning in all grades. The program is nationally accredited and is for teachers in art education who hold a BFA or BA (art major) degree. Classes begin each August and conclude in May. Graduates of teacher education programs at RIT have a 96 percent pass rate on the New York State Teacher Certification examinations.

Curriculum

Visual Arts-All Grades (Art Education), MST degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ARED-701	Child Development in Art	3
ARED-702	Inclusive Art Education: Teaching Students with Disabilities in the K-12 Art Classroom	3
ARED-703	Multicultural Issues in Art and Education	3
ARED-704	Methods in Teaching and Learning	3
ARED-705	Methods II: Studio Thinking	3
ARED-711	Professional Practices in Art Education	3
ARED-790	Student Teaching	9
ARED-890	Graduate Seminar in Art Education	6
	CAD Studio Elective	3
Total Semester Credit Hours		**36**

Admission requirements

To be considered for admission to the MST program in visual arts–all grades (art education), candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college with a major concentration in art, art education, arts technology education, photography, or new media.
- Submit a portfolio. (Refer to Graduate Portfolio Requirements for more information.)
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a personal statement of educational objectives, including why the candidate is interested in earning an MST, the selection of RIT for the MST degree, and professional goals to be achieved.
- Submit an artist's statement explaining the intention behind the portfolio.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

School of Design

Industrial Design, MFA

www.rit.edu/study/industrial-design-mfa
Alex Lobos, Associate Professor
585-475-7417, aflfaa@rit.edu

Program overview

Form, function, and experience tell a story of considered design and the best possible outcome. The industrial design masters will enhance your career success by further developing your knowledge in design process and technology. This project-based program allows you to explore design theory, design history, and human-centered design. You will conduct unique research on various topics of interest, which will further your understanding of the industry and society. As you conclude your studies, you will obtain hands-on experience on technical competence, analytical thought, sustainability, and transdisciplinary collaboration, all key to fueling your career.

The MFA in industrial design is for career enhancement or redirection. The educational experience is project-oriented, requiring research into design methods and technologies. Cross-disciplinary collaboratives provide an experiential dimension.

The first year of study includes seminar courses in design history and research, which are common to all graduate students in the School of Design. In addition, studio courses involve extensive design work with respect to sustainability, design process, the meaning of artifacts, and critical analysis. Additional course work using three-dimensional software for modeling and fabrication fills out the program.

In the second year students conduct research and develop a thesis project, which is presented in a graduate thesis exhibition or presentation, and is documented in a written thesis report.

Curriculum

Industrial Design, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
IDDE-607	Technology Studio	3
IDDE-701	Design Laboratory I	3
IDDE-702	Design Laboratory II	3
IDDE-703	Function of Form	3
IDDE-704	Form of Function	3
IDDE-705	2D Ideation and Visualization	3
IDDE-706	Integrated Design Visualization	3
IDDE-711	Design Research and Proposals	3
VCDE-701	Design History Seminar	3
	Free Elective	3
Second Year		
IDDE-671	ID Design Studio I	3
IDDE-672	Graduate ID Studio II	3
IDDE-790	Thesis: Research and Planning	6
IDDE-890	Thesis: Implementation and Evaluation	6
	Free Electives	9
	Art History Elective*	3
Total Semester Credit Hours		**60**

*Art History Elective refers to any graduate level Art History course in CAD or the College of Liberal Arts.

Admission requirements

To be considered for admission to the MFA program in industrial design, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a portfolio of work that demonstrates strong design skills, visual sophistication, and aesthetic awareness. (Refer to Graduate Portfolio Requirements for more information.)
- Submit a personal statement of educational objectives detailing the professional goals the candidate wishes to achieve, and the attributes the candidate brings to graduate study.
- Submit three letters of recommendation from academic or professional sources.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 (with balanced sub-scores) is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Integrative Design, MS

www.rit.edu/study/integrative-design-ms
Stan Rickel, Graduate Director
585-475-4745, srrfaa@rit.edu

Program overview

The integrative design program enables students with artistic, technical, engineering, and management backgrounds to study and successfully engage with creative development teams. This one-year design master's degree develops your understanding of the theories, methods, processes of design, and their application in product and service development.

The MS in integrative design establishes a variety of creative design thinking techniques in areas such as systems thinking, brainstorming, immersions, contextual relevance, and empathy–all of which will be used to develop an in-depth understanding of the design process, the product/service life cycle, product/service feasibility, and the integration of social responsibility in product/service design. The program enables students with artistic, technical, engineering, and management backgrounds to study and successfully engage within creative development teams.

Curriculum

Integrative Design, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
INGD-721	Elements and Methods	3
INGD-722	Emotion and Implementation	3
INGD-726	Visualization I: Development	3
INGD-727	Visualization II: Communication	3
INGD-731	Design Studio I: Concepts	3
INGD-732	Design Studio II: Capstone	3
	Free Electives	12
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS in integrative design program, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit three letters of recommendation from academic or professional sources.
- Submit a personal statement of purpose (300-500 words) detailing the attributes you bring to graduate study, including professional goals you wish to achieve.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Visual Communication Design, MFA

www.rit.edu/study/visual-communication-design-mfa
Adam Smith, Associate Professor
585-475-4552, aesfaa@rit.edu

Program overview

This visual communications degree offers a comprehensive opportunity to investigate the intersection of graphic, interaction, and motion design. You will focus on conceptualizing and creating user-centered design wherever there is a screen or digital experience. This can include mobile phones, automotive instrument panels, medical devices, wearables, and more. This major reinforces the importance of user experience design by combining insight from all areas of design. Choose to focus your studies or combine course sequences from communication design, interaction design, motion design, and design studies. By combining historical, communication and aesthetic theory, principles, and creativity, your work will anticipate design evolution and lead innovation.

The MFA in visual communication design focuses on all areas of design, including graphic design, user experience/interaction design, design studies, motion graphics, and 3D digital design. The changing landscape of people's everyday interactions has blurred the lines between respected design fields, giving designers new responsibilities to shape experiences. The MFA program embraces this new technology through its curriculum, which addresses these merging skill sets.

Plan of study

The MFA in visual communication design provides a learning environment for advancement in innovative research, user-centered design, and professional practice focusing on the creative potentials of visual communication through a full spectrum of media. Students may advance their design knowledge and technical skills by choosing an option in communication design, interaction design, or motion and 3D digital design.

The cross-disciplinary nature of the program offers a greater potential to foster innovation and creativity in visual communication design. The program reflects the current views and changes occurring in the professional design field. The skill sets required of graphic, interactive, and digital design have now crossed over and are interrelated.

Curriculum

Visual Communication Design, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
VCDE-701	Design History Seminar	3
VCDE-706	3D Modeling and Motion	3
VCDE-707	Web and UI Design	3
VCDE-708	Typography	3
VCDE-709	Digital Design in Motion	3
VCDE-712	Design Studies Seminar	3
Choose one of the following:		3
VCDE-718	Project Design and Implementation	
VCEE-722	Praxis I	
	Professional Electives	6
	Free Elective	3
Second Year		
VCDE-746	Professional Practices	3
VCDE-790	Thesis Research and Planning	3
VCDE-890	Thesis: Implementation and Evaluation	6
	Professional Electives	9
	Free Electives	9
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the MFA program in visual communication design, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a portfolio of work demonstrating strong design skills, visual sophistication, and aesthetic awareness. (Refer to Graduate Portfolio Guidelines for more information.)
- Submit a personal statement of educational objectives that details attributes the candidate brings to graduate study, including expectations and professional goals they wish to achieve.
- Submit three letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 90 (internet-based) is required. A minimum IELTS score of 6.5 (with balanced sub-scores) is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Portfolio

The portfolio, along with written records of achievements and recommendations, serves to inform the faculty of the applicant's readiness for advanced graduate study. It provides understanding into the applicant's performance to date, ability to create advanced, self-directed work and his/her aesthetic development and maturity. Please visit the Graduate Portfolio Requirements page to learn more about portfolio requirements and submission information.

School of Film and Animation

Film and Animation, MFA

www.rit.edu/study/film-and-animation-mfa

Tom Gasek, Associate Professor
585-475-7403, tdgpph@rit.edu

Program overview

In the MFA program in film and animation, students create live-action production, scripts, 2D, 3D, or stop motion animation that is unique. The School of Film and Animation houses state-of-the-art facilities, including full production facilities. The program is also supported by highly specialized faculty from RIT's photography, imaging science, computer science, information technology, and design programs.

Goals

The program provides students with the opportunity to use animation, filmmaking, and other imaging arts as a means to:

- pursue a career and earn a livelihood.
- enrich their personal lives and society as a whole.
- encourage a sense of community, creativity, scholarship, and purpose.

Plan of study

The MFA in film and animation offers four options:

1. 2D animation concentrates on traditional forms drawn by hand, a mixture of both traditional and digital, or all digital origination. Students may concentrate their studies on stop motion puppet animation.
2. 3D animation courses focus on advanced 3D modeling, lighting, texturing, and animating in a 3D space.
3. Production allows students to develop and refine their creative approach to fictional narrative, documentary, and experimental live action filmmaking.
4. Screenwriting is an opportunity for students to complete short films with a concentration in creating feature, short, and series length screenplays.

All four options require two years of course work and a thesis project. A complete film is required of all first-year students, a complete film or script is required in the second year, and a more ambitious thesis film or feature length script is required in the third year. In the third and final year, students are enrolled part-time and their work is focused only on their thesis project.

Electives

Elective courses are available in animation, film, video, multimedia, screenwriting, printmaking, painting, sculpture, communication design, museum studies, crafts, bookmaking, typography, color photography, new media, studio photography, advertising photography, perception, gaming, computer graphics, art history, and archival preservation and conservation. There are also opportunities for independent studies, internships, and concentrations.

Thesis

Specific instructions pertaining to the thesis are available in the "MFA Guide for Students and Faculty: Policy Regarding Student Work." The School of Film and Animation reserves the right to retain copies of student-produced films to be used for educational purposes, to show to prospective students, and as examples of student productions.

Curriculum

Film and Animation (2D animation option), MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SOFA-603	2D Animation I: Fundamentals	3
SOFA-605	Basic Sound Recording	3
SOFA-610	Graduate Seminar	2
SOFA-611	History and Aesthetics of Animation	3
Choose one of the following:		3
SOFA-615	3D Animation Fundamentals	
SOFA-617	Stop Motion Puppet Fundamentals	
SOFA-622	30 Second Film	3
SOFA-625	Animated Acting Principles	3
SOFA-627	Pre-Production for Animators	3
SOFA-628	Animation Writing and Visual Storytelling	3
Choose one of the following:		3
SOFA-748	Concept and Character Design	
SOFA-623	Stop Motion Master Class	
SOFA-630	Animation Film Language	2
Second Year		
Choose one of the following:		3
SOFA-604	2D Animation II: Mechanics	
SOFA-652	Alternate Frame by Frame	
SOFA-618	Business and Careers in Animation	3
SOFA-676	After Effects for Animators	3
SOFA-717	Animation Workshop	4
SOFA-780	Thesis Preparation Seminar	1
	Free Electives	6
	Professional Electives	6
Third Year		
SOFA-790	Research and Thesis I	4
SOFA-890	Research and Thesis II	4
Total Semester Credit Hours		**65**

Film and Animation (3D animation option), MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SOFA-605	Basic Sound Recording	3
SOFA-610	Graduate Seminar	2
SOFA-611	History and Aesthetics of Animation	3
Choose one of the following:		3
SOFA-603	2D Animation I: Fundamentals	
SOFA-617	Stop Motion Puppet Fundamentals	
SOFA-615	3D Animation Fundamentals	3
SOFA-622	30 Second Film	3
SOFA-625	Animated Acting Principles	3
SOFA-627	Pre-Production for Animators	3
SOFA-628	Animation Writing and Visual Storytelling	3
SOFA-630	Animation Film Language	2
SOFA-695	Advanced 3D Animation	3
Second Year		
SOFA-618	Business and Careers in Animation	3
Choose one of the following:		3
SOFA-675	3D Lighting and Texturing	
SOFA-652	Alternate Frame by Frame	
SOFA-676	After Effects for Animators	3
SOFA-717	Animation Workshop	4
SOFA-780	Thesis Preparation Seminar	1
	Professional Electives	6
	Free Electives	6
Third Year		
SOFA-790	Research and Thesis I	4
SOFA-890	Research and Thesis II	4
Total Semester Credit Hours		**65**

Film and Animation (production option), MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SOFA-602	Production Processes	4
SOFA-605	Basic Sound Recording	3
SOFA-606	Graduate Directing	3
SOFA-610	Graduate Seminar	2
SOFA-613	Graduate Screenwriting	3
SOFA-621	Spring Film	3
SOFA-626	Writing the Short	3
SOFA-678	Cinematography and Lighting	3
	History and Aesthetics Elective	3
Second Year		
SOFA-614	Business and Careers in Film	3
SOFA-721	Fall Film	3
SOFA-733	Hybrid Forms: Theory and Practice	3
SOFA-780	Thesis Preparation Seminar	1
	History and Aesthetics Elective	3
	Professional Electives	9
	Free Electives	6
Third Year		
SOFA-790	Research and Thesis I	4
SOFA-890	Research and Thesis II	4
Total Semester Credit Hours		**63**

Film and Animation (screenwriting option), MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SOFA-602	Production Processes	4
SOFA-605	Basic Sound Recording	3
SOFA-606	Graduate Directing	3
SOFA-610	Graduate Seminar	2
SOFA-613	Graduate Screenwriting	3
SOFA-621	Spring Film	3
SOFA-626	Writing the Short	3
	History and Aesthetics Elective	3
	Professional Elective	3
Second Year		
SOFA-614	Business and Careers in Film	3
SOFA-663	Writing the Feature	3
SOFA-664	Writing the Series	3
SOFA-721	Fall Film	3
SOFA-733	Hybrid Forms: Theory and Practice	3
SOFA-780	Thesis Preparation Seminar	1
	History and Aesthetics Electives	6
	Free Electives	6
Third Year		
SOFA-790	Research and Thesis I	4
SOFA-890	Research and Thesis II	4
Total Semester Credit Hours		**63**

Admission requirements

To be considered for admission to the MFA in film and animation, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit an online portfolio of work that demonstrates the candidate's skills, visual sophistication, and aesthetic awareness. (Refer to Graduate Portfolio Requirements for more information.)
- Submit a two-to-three minute online self-portrait video.
- Submit a personal statement of educational objectives
- Submit two letters of recommendation from academic or professional sources.

- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 (with balanced sub-scores) is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Students who are evaluated to have MFA potential but need additional study in preparation for graduate courses will be advised to take such courses either prior to entrance or during their first year of study.

All correspondence concerning application materials as well as all submissions deadlines should be addressed to the Office of Graduate and Part-time Enrollment.

Portfolio

The review committee is looking for work that is original in concept and content. It does not need to necessarily be motion media, but should be visual or aural. Examples include films/videos, photos, drawings, paintings, sculpture, stop motion puppets, scripts, storyboards, and original music.

Applicants must present what they consider to be the best of their work, not all of their work. Films or videos should total 12 minutes or less. A short, complete piece of work is preferable to a demo reel. If there are no short works then a 12 minute excerpt of a longer piece is acceptable.

Applicants must place their portfolios on a web or FTP site, such as Vimeo or YouTube, that can be easily accessed by RIT faculty for review. Applications should include a URL/web or FTP address to the online portfolio. If the portfolio is placed on a shared web or FTP site that contains other files, be sure the file name contains your full name (which must match the name used on your application materials). When applicable, please include any usernames and/or passwords necessary for access to your portfolio. Please provide an inventory sheet or table of contents with your portfolio, and if it is not obvious, clearly indicate what your combination was to group and collaborative pieces. This can be a separate description or can be included in the portfolio presentation.

Applicants are also required to produce a two-to-three minute self-portrait video to accompany the online portfolio. This should include information about you, such as why you want to attend the School of Film and Animation, the program concentration you wish to pursue, and why. Please include information about one significant accomplishment you have made. Sound and picture quality should be clear. The online portfolio and self-portrait must be mounted on Slideroom.com once a Slideroom account is established.

For more information about portfolio guidelines please visit the graduate portfolio requirements page of the Office of Graduate and Part-time Enrollment.

Additional information

Transfer credit

Graduate-level course work taken prior to admission should be submitted for approval upon entrance into the program. Up to 8 semester credit hours of graduate work with a grade of B or better is transferable and may be counted toward the MFA degree, with the approval of the graduate faculty.

Grades

Students must maintain a B (3.0) average GPA to meet graduation requirements for the MFA. Thesis hours are usually completed over two semesters. Acceptance or rejection of the thesis is made by the candidate's thesis board and the graduate faculty.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Screenings

Screenings are required for all student-produced films and are coordinated through the professor or the thesis chair.

School of Photographic Arts and Sciences

Media Arts and Technology, MS

www.rit.edu/study/media-arts-and-technology-ms
Michael Peres, Professor
585-475-2775, mrppph@rit.edu

Program overview

All businesses and organizations rely on graphic communications to increase their effectiveness in communicating ideas, instructions, and concepts. A graduate with a media masters understands the value of information design and recognizes the many ways it can be used to positively impact the bottom line. In the media arts and technology program, you will learn to leverage emerging technologies to your advantage. With a management focus, technical expertise, and comprehensive knowledge of how to drive the graphics process from concept through completion, you will be an attractive prospect in a wide range of industries, including education, engineering, marketing, research science, human resources, public relations, and more.

The MS degree in media arts and technology is a one-year program that concludes with a capstone project. Students develop relevant knowledge and skills with a technical emphasis and business-oriented approach. Students recognize new ways for operating and identifying emerging technologies to meet and exceed evolving market demands, and for becoming leaders in the improvements of cross-media products and processes. The program provides students with the ability to create meaningful and measurable changes in graphic communications through applied cross-media initiatives. The required capstone project allows students to develop and demonstrate in-depth knowledge in a specific topic area. Led by senior faculty, the capstone project is designed to prepare students to be innovators in the rapidly evolving media landscape.

The curriculum concentrates on the latest technologies, processes, and strategies that allow students to employ knowledge of print, web, mobile, and social media workflows to solve communication problems. The diverse expertise of the faculty assures a breadth of relevant experience while educating students on issues and trends across the graphic communications field. The program aims to create a collaborative environment where students combine course work with access to faculty expertise, staff support, and extensive facilities to extend their current knowledge base.

Plan of study

The program includes 30 credit hours of study and culminates in a capstone project.

Electives

Students may choose elective courses from a variety of courses offered in a range of graduate departments and programs at RIT.

Capstone project

The capstone project requires students to develop and demonstrate extensive knowledge of a specific topic related to graphic communications. Students complete original work in the form of a number of methodologies, including experiments, comprehensive case studies, surveys, focus groups, and research analysis. Outcomes from this experience include innovation of a process, recognizing unmet customer needs, solving cross-media issues, or identifying resources required for business transformation or media solutions.

Curriculum

Media Arts and Technology, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PHMS-721	Implementing Media Business Change	3
PHMS-731	Digital Content Management	3
PHMS-743	Perspectives on Contemporary Media and Communications	3
PHMS-746	Capstone I	3
PHMS-747	Capstone II	3
PPRT-603	Operations Management in the Graphic Arts	3
PPRT-642	Industry Issues and Trends	3
PPRT-703	Cross Media Workflow	3
	Free Electives	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in media arts and technology, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Photography and Related Media, MFA

www.rit.edu/study/photography-and-related-media-mfa
Christine Shank, Associate Professor
585-475-2616, crspph@rit.edu

Program overview

The masters in photography and related media emphasizes a broad interpretation of photography as a conceptual art form, with the intention of inspiring and nurturing the individuality of each student as a creative, productive artist. This photography masters degree program encourages graduate study in photography and related media as a means to personal, aesthetic, intellectual, and career development.

The curriculum provides a focus of study that is continually sensitive to the needs of each student, building upon the strengths each individual brings to the program. Successful completion of the program enables students to seek careers in fields including education, museum or gallery work, or as self-employed visual artists.

Program goals

The program provides students with the opportunity to use the still and moving image as a means to:

- develop as a practicing artist.
- pursue a professional career and earn a livelihood.
- enrich their personal lives and society as a whole.
- create a community of creativity, scholarship, and purpose .

Plan of study

Distribution of work within these guidelines is subject to modification based upon the candidate's background, abilities, and interests. Modifications in this prescribed program thereafter must be approved and recorded.

Electives

Elective courses are available in areas such as, but not limited to, video, printmaking, painting, sculpture, communication design, crafts, bookmaking, graphic design, new media, computer graphics, art history, and archival preservation and conservation. A complete list of graduate electives is available through the student's advisor. There are also graduate electives offered throughout the university. Students also have opportunities to enhance their studies through independent studies and internships.

Thesis

Matriculation from the MFA program is obtained when the student has completed and mounted their graduate thesis exhibition, successfully passed their thesis defense, and submitted their thesis publication. The thesis must be an original body of work appropriate to the major commitment of the degree. The thesis publication is documentation of the thesis project, which must be submitted in digital form. It must contain an extended artist statement and a presentation of the majority of thesis artwork. The thesis defense is a public presentation made by the student, in explanation of thesis project, creative research, and exhibition.

Faculty

Eleven full-time faculty members, all critically regarded for their artistic work in exhibition and publication, contribute to the MFA program. The faculty brings individual expertise and dedication to their work with graduate students, encouraging intellectual inquiry of contemporary art-making practices and aesthetics. The MFA program is supported by a staff of 30 full-time faculty members from the RIT's School of Art and RIT's School of Photographic Arts and Sciences; faculty from the art history department; adjunct faculty members from George Eastman Museum; as well as noted regional, national, and international practitioners, critics, and historians.

Curriculum

Photography & Related Media, MFA degree, typical course sequence

COURSES		SEMESTER CREDIT HOURS
First Year		
PHGR-701	Histories and Aesthetics of Photography I	3
PHGR-702	Histories and Aesthetics of Photography II	3
PHGR-703	Studio Core I	6
PHGR-704	Studio Core II	6
PHGR-716	Integrated Practices I	3
PHGR-717	Integrated Practices II	3
	CAD Studio Elective*	3
	Free Elective	3
Second Year		
PHGR-721	Research Core I	3
PHGR-723	Research Core II	3
PHGR-724	Professional Development for the Emerging Artist	3
PHGR-890	Thesis	12
	Free Electives	9
Total Semester Credit Hours		**60**

*CAD Studio Electives refers to any graduate level course in the College of Art and Design that includes a studio component.

Admission requirements

To be considered for admission to the MFA program in photography and related media, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit a portfolio containing a focused body of artwork that demonstrates visual sophistication, aesthetic awareness, craft, as well as a commitment to purpose and idea. (Refer to Graduate Portfolio Requirements for more information.)
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a personal statement of educational objectives that outlines the selection of RIT for the MFA degree and the candidate's professional goals they wish to achieve.
- Submit an artist statement explaining the intention behind the portfolio submitted.
- Submit a current resume or curriculum vitae.
- Submit three letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 (with balanced sub-scores) is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Optional participation in an interview.

Applicants who are capable of graduate level academic work, as well as artistic visual expression, and who demonstrate an interest in the exploration of new artistic ideas and experiences will be recommended.

Portfolio

The portfolio, along with written records of achievements and recommendations, serves to inform the faculty of the applicant's readiness for advanced graduate study. It provides understanding into the applicant's performance to date, ability to create advanced, self-directed work and his/her aesthetic development and maturity. Please visit the Graduate

Portfolio Requirements page to learn more about portfolio requirements and submission information.

Additional information

Scholarships and graduate assistantships

All accepted applicants are awarded a university scholarship. Level of scholarship support is based on merit of application materials. Concurrently, the MFA program faculty grants graduate assistantships to accepted applicants. Assistantships include a variety of positions, including team teaching introductory photography courses, faculty assistantships in the classroom and with research projects, gallery management, and working in an archive. Upon acceptance into the MFA program, applicants are notified by the MFA director as to level of support for both the university scholarship and the graduate assistantship. Both scholarship and assistantship are renewable in the second year of graduate study if students remain in good standing with the university.

Transfer credit

Graduate-level course work completed prior to admission should be submitted for approval upon entrance into the program. Up to 12 semester hours of graduate work with a minimum grade of a B (3.0) or higher is transferable toward the degree, with the approval of the graduate director.

Grades and maximum time limit

The averageof all grades for graduate credit taken at the university must be at least a B (3.0) to qualify for the degree. University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program.

Policy regarding student work

The School of Photographic Arts and Sciences reserves the right to retain digital copies of original art work from a student's MFA thesis show for inclusion in the MFA Collection, to be used for educational, promotional, and exhibition purposes. Graduates must also submit a copy of the thesis publication to the school's MFA archive.

William Harris Gallery

William Harris Gallery supports the exhibition of graduate thesis work, student work, and the works of contemporary imagemakers. It maintains a calendar of exhibitions, public lectures, and receptions. Importantly, it also provides real world experience for interested graduate students where they learn firsthand about gallery operations, installation, and communications as a gallery manager or staff member.

Faculty

Dean's Office

TODD JOKL, BA, Yale University; MFA, University of Connecticut; Ed.D., Southern Connecticut State University—Dean, Professor

Chris B. Jackson, BFA, Alfred University; MFA, Rochester Institute of Technology—Associate Dean of Graduate Studies; Professor

School for American Crafts

Andy Buck, BA, Virginia Commonwealth University; MFA, Rhode Island School of Design—Graduate Co-Director, School for American Crafts; Professor

Juan Carlos Caballero-Perez, BFA, MFA, Rochester Institute of Technology—Graduate Director, School for American Crafts; Professor

Robin Cass, BFA, Rhode Island School of Design; MFA, State University of New York College of Ceramics at Alfred University—Professor

Richard Hirsch, BS, State University College at New Paltz; MFA, Rochester Institute of Technology—Professor Emeritus

Albert Paley, BFA, MFA, Temple University; Ph.D. (honorary), University of Rochester—Artist-in-Residence, Charlotte Fredericks Mowris Chair in Contemporary Crafts

Michael Rogers, BA, MA, Western Illinois University; MFA, University of Illinois—Professor Emeritus

David Schnuckel, BA, Anderson University; MFA, Rochester Institute of Technology—Assistant Professor

Jane Shellenbarger, BFA, Kansas City Art Institute; MFA, Southern Illinois University at Edwardsville—Undergraduate Program Director, Studio Arts; Associate Professor

Leonard A. Urso, BFA, MFA, State University College at New Paltz—Professor

School of Art

Michael Amy, BA, Vrije Universiteit Brussel (Belgium); MA, Ph.D., New York University—Professor

Donald Arday, BFA, Cleveland Institute of Art; MFA, Syracuse University—Professor

Eileen Feeney Bushnell, BFA, University of Massachusetts at Amherst; MFA, Indiana State University—Professor

Robert Dorsey, BFA, Rochester Institute of Technology; MFA, Syracuse University—Professor

Emily Glass, BFA, State University College at Potsdam; MFA, Kansas State University—Senior Lecturer

Robert Heischman, BFA, Miami University of Ohio; UCFA, Oxford University (England)—Professor Emeritus

Glen R. Hintz, BA, Lafayette College; MS, The Medical College of Georgia—School Director, School of Art and School for American Crafts; Undergraduate Program Director, Medical Illustration; Associate Professor

Elizabeth Kronfield, BFA, Bowling Green State University; MFA, University of Georgia—Graduate Director, Fine Arts Studio; Professor

Heidi Nickisher, BA, University of California at Santa Barbara; MA, California State University, Fullerton; Ph.D., University of Buffalo—Principal Lecturer

Peter Pincus, BFA, MFA, New York State College of Ceramics at Alfred University—Assistant Professor

Lauren Ramich, BFA, MST, MFA, Rochester Institute of Technology—Graduate Director, Visual Arts—All Grades; Lecturer

Luvon Sheppard, BFA, MST, Rochester Institute of Technology—Professor

Alan D. Singer, BFA, The Cooper Union; MFA, Cornell University—Professor

Sarah Thompson, BA, University of California at San Diego; MA, Ph.D., University of California at Santa Barbara—Associate Professor

Clifford Wun, BFA, Rhode Island School of Design; MFA, Maryland Institute College of Art—Associate Professor

School of Design

Deborah Beardslee, BFA, Syracuse University; MFA, Virginia Commonwealth University—Associate Professor

Nancy Bernardo, BA, Valparaiso University; MFA, The School of the Art Institute of Chicago—Associate Professor

Peter Byrne, MFA, York University (Canada)—School Director, School of Design; Professor

Nancy A. Ciolek, BFA, MFA, Indiana State University—Associate Professor Emerita

Daniel DeLuna, BFA, Ball State University; MFA, Pratt Institute—Associate Professor

Carol Fillip, BS, State University of New York at Buffalo; MFA, Rochester Institute of Technology—Undergraduate Program Director, Graphic Design; Associate Professor

Shaun Foster, BBA, University of Wisconsin; MFA, Rochester Institute of Technology—Undergraduate Program Director, 3D Digital Design; Associate Professor

Lorrie Frear, BFA, MFA, Rochester Institute of Technology—Associate Professor

Mitch Goldstein, BFA, Rhode Island School of Design; MFA, Virginia Commonwealth University—Associate Professor

David Halbstein, BA, MA, William Patterson University—Associate Professor

Joyce Hertzson, BFA, Rhode Island School of Design; MFA, Indiana University—Faculty Associate for Recruitment; Professor

Chris B. Jackson, BFA, Alfred University; MFA, Rochester Institute of Technology—Associate Dean of Graduate Studies; Professor

Lorraine Justice, BFA, Edinboro University; MFA, Ph.D., The Ohio State University—Dean Emerita; Professor

Alex Lobos, BA, Universidad Rafael Landivar (Guatemala); MFA, University of Notre Dame—Professor

Bruce I. Meader, BFA, MFA, Carnegie Mellon University—Professor Emeritus

Josh Owen, BA, BFA, Cornell University; MFA, Rhode Island School of Design—Undergraduate Program Director, Industrial Design; Distinguished Professor

Alejandro Perez Sanchez, BS, Art Institute of California; MFA, Academy of Art University—Assistant Professor

R. Roger Remington, BFA, Rochester Institute of Technology; MS, University of Wisconsin—Massimo and Lella Vignelli Distinguished Professor of Design

Stan Rickel, BID, Pratt Institute; MID, Syracuse University—Graduate Director, Integrative Design and Industrial Design; Associate Professor

Marla Schweppe, BA, University of Kansas; MA, The Ohio State University—Professor

Amos Scully, BFA, Rochester Institute of Technology; MFA, California College of Arts and Crafts—Associate Professor

Kim Sherman, BS, State University College at Cortland; MFA, Rochester Institute of Technology—Principal Lecturer

Adam Smith, BFA, MFA, Rochester Institute of Technology—Undergraduate Program Director, New Media Design; Graduate Director, Visual Communication Design; Associate Professor

Michael Strobert, BFA, MFA, Rochester Institute of Technology—Graduate Co-Director, Visual Communication Design; Lecturer

Marissa Tirone, B.Arch, University of Kentucky; M.Arch, Cornell University—Senior Lecturer

Melissa Warp, BFA, University of Minnesota; MFA, Rochester Institute of Technology—Lecturer

Tim Wood, BFA, Memphis College of Art; MFA, Rochester Institute of Technology—Assistant Professor

School of Film and Animation

Ambarien Alqadar, BA, Jamia Millia University (India); MFA, Temple University—Assistant Professor

Cat Ashworth, BFA, Arizona State University; MA, State University of New York at Buffalo—Professor

Jack Beck, BA, Denison University; MFA, University of Iowa—Interim Co-Director, School of Film and Animation; Undergraduate Program Director, Production; Associate Professor

Mari Jaye Blanchard, BFA, Massachusetts College of Art & Design; MFA, University of Pennsylvania—Assistant Professor

Adrianne Carageorge, BA, Florida State University; MFA, Ohio University—Professor Emerita

Frank Deese, BA, MFA, University of California, Los Angeles—Assistant Professor

Tom Gasek, BFA, Rochester Institute of Technology; MFA, Art Institute of Boston at Lesley University—Graduate Director, Film and Animation; Associate Professor

Brian Larson, BFA, Colorado State University; MFA, Miami International University—Interim Co-Director, School of Film and Animation; Undergraduate Program Director, Animation; Associate Professor

Stephanie Maxwell, BA, University of California at Los Angeles; MFA, San Francisco Art Institute—Professor

Peter Murphey, BFA, Massachusetts College of Art; MFA, The Art Institute of Boston—Senior Lecturer

Atia Newman, BFA, National College of the Arts, Lahore (Pakistan); MFA, Pratt Institute—Associate Professor

Mark Reisch, BFA, Savannah College of Art and Design; Certificate in Advanced Studies of Animation, AnimationMentor.Com; MFA, Rochester Institute of Technology—Assistant Professor

David Sluberski, BA, State University College at Fredonia—Senior Lecturer

Malcolm Spaull, BS, St. Lawrence University; MFA, Rochester Institute of Technology—Professor Emeritus

Frank J. Romano, BA, City University of New York—Professor Emeritus

School of Photographic Arts and Sciences

Roberley Ann Bell, BFA, University of Massachusetts at Amherst; MFA, State University of New York College of Ceramics at Alfred University—Professor

Frank Cost, BS, Eisenhower College; MS, Rochester Institute of Technology—Undergraduate Program Director, Visual Media; James E. McGhee Distinguished Professor

Gregory Halpern, BA, Harvard University; MFA, California College of the Arts—Associate Professor

Angela M. Kelly, Diploma, Trent Polytechnic; Ed. Diploma, Mary Ward College; MA, Columbia College—Professor

Dan Larkin, BFA, Rochester Institute of Technology; MFA, Bard College—Associate Professor

Therese Mulligan, BA, University of Missouri-Kansas City; MA, Michigan State University; Ph.D., University of New Mexico—School Director, School of Photographic Arts and Sciences; Professor

Laurie O'Brien, BA, San Francisco State University; MFA, California Institute of the Arts—Associate Professor

Willie Osterman, BFA, Ohio University; MFA, University of Oregon—Undergraduate Program Director, Fine Art Photography; Professor

Ahndraya Parlato, BA, Bard College; MFA, California College of the Arts—Lecturer

Michael R. Peres, BA, Bradley University; BS, MS, Rochester Institute of Technology—Associate School Director, School of Photographic Arts and Sciences; Graduate Director, Media Arts and Technology; Professor

Christine Shank, BFA, Miami University; MFA, Texas Woman's University—Graduate Director, Photography and Related Media; Associate Professor

Josh Thorson, BA, University of Minnesota-Twin Cities; MFA, Bard College; Ph.D, Rensselaer Polytechnic Institute— Assistant Professor

Ken White, BA, Princeton University; MA, MFA, University of New Mexico—Associate Professor

Carole Woodlock, BFA, Alberta College of Art (Canada); MFA, Concordia University—Professor

Catherine Zuromskis, BA, Harvard College; MA, University of New York at Stony Brook; MA, Ph.D., University of Rochester—Associate Professor

Saunders College of Business

Jacqueline R. Mozrall, Dean
rit.edu/business

Programs of study

Online learning option available.

Success in the 21st century business environment requires leadership and management attuned to rapid changes in technology and increasingly vigorous global competition. Astute problem solvers who have gained a systems perspective must be able to convert product development and management challenges into competitive advantages. Saunders College of Business offers a portfolio of comprehensive, vigorous programs of study. Our innovative, multidisciplinary curriculum—embedding an international perspective and current technology throughout—produces graduates able to convert managerial learning into pragmatic business applications.

Entrepreneurship at RIT

Entrepreneurs are major drivers of economic growth. They combine original, imaginative ideas with creativity and a healthy dose of tenacity. They're resourceful, inventive, and ambitious. At RIT, entrepreneur's ideas are transformed into reality.

At the heart of the university's entrepreneurship initiatives is the Simone Center for Innovation and Entrepreneurship. The center promotes, nurtures, and expands innovation and entrepreneurship through a three-pronged approach that combines interdisciplinary entrepreneurial curriculum, experiential learning, and entrepreneurship programs. The center offers:

- minors and concentrations in entrepreneurship, and innovation and commercialization, as well as courses in strategic growth and business creativity.
- cooperative education opportunities for students to advance a business concept through the RIT Student Business Lab or work for a startup company. Students also can earn credit through consulting opportunities with pre-seed and startup ventures.
- entrepreneurship programs such as the RIT Business Plan Competition, Tiger Tank, the RIT Entrepreneur's Conference, various workshops, a speakers series, and an extensive alumni network.
- Venture Creations Incubator provides assistance in evaluating business opportunities, developing business plans, and offering mentoring and guidance to new ventures.

Admission requirements

The college offering the program makes all decisions on graduate admission. Please refer to each individual program for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarship

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Faculty

Our faculty members combine teaching excellence, innovative research, and personalized attention to meet student needs. Our setting, in a technological university embarked on creative business partnering and entailing joint programs across colleges, opens unique opportunities for all partners—industry leaders, faculty, and students.

Facilities

RIT is a national leader in incorporating computer technology into the classroom. Students have access to extensive resources and utilize the same business software used by Fortune 100 companies worldwide. The college's classrooms and study areas all feature wireless access.

The Business Analytics Lab houses Saunders Bloomberg Financial Markets technology, where students gain real-world business, finance, and macroeconometrics experience in the classroom.

Saunders's Redcom Active Learning Collaboratory, learning activities are student-center and supported through digital and traditional displays, reconfigurable desk arrangements for teamwork or presentations, and information sharing within and across students and teams.

Accreditation

Saunders College of Business is accredited by the Association to Advance Collegiate Schools of Business (AACSB International).

Accounting, MS

www.rit.edu/study/accounting-ms

Matthew Cornwell, Assistant Director of Student Services and Outreach
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Program overview

RIT's accounting master's degree pulls together important areas of technology, finance, strategy, and compliance to help you advance your accounting career. In addition to gaining the technological skills needed to design, operate, and control accounting information systems–skills that are highly sought after by employers–you also will be prepared to sit for the Certified Public Accountancy (CPA) exam, which our graduates consistently score higher on than state and national averages.

The master of science in accounting is designed to satisfy New York state requirements for students with an undergraduate degree in accounting to sit for the CPA exam and attain CPA licensure. Students may complete the program on a full- or part-time basis, with the full-time program beginning exclusively in the fall semester.

Curriculum

Accounting, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ACCT-645	Accounting Information and Analytics	3
ACCT-707	Advanced Accounting	3
ACCT-708	Advanced Topics in Auditing and Assurance	3
ACCT-710	Tax Analysis and Strategy	3
ACCT-738	Information Systems Auditing and Assurance Services	3
ACCT-740	Comparative Financial Statement Analysis	3
ACCT-790	Field Exam Prep	0
ACCT-795	Financial Accounting Theory and Research	3
	Electives	9
Total Semester Credit Hours		**30**

Electives

Accounting

COURSE	
ACCT-641	Cases in Forensic Accounting and Fraud Examination
ACCT-704	Corporate Financial Reporting I
ACCT-705	Corporate Financial Reporting II
ACCT-706	Cost Management
ACCT-709	Basic Taxation
ACCT-711	Internal Auditing
ACCT-758	Seminar in Accounting

Economics

COURSE	
ESCB-705	Economics and Decision Modeling
ESCB-758	Seminar in Economics

Finance

COURSE	
FINC-605	Financing New Ventures
FINC-722	Financial Management II
FINC-725	Securities and Investment Analysis
FINC-740	Options and Futures
FINC-742	Financial Modeling and Analysis
FINC-758	Seminar in Finance
FINC-760	Finance in a Global Environment
FINC-761	Stock Market Algorithmic Trading
FINC-772	Equity Analysis
FINC-773	Debt Analysis
FINC-774	Advanced Derivatives
FINC-780	Financial Analytics

Management Information Systems

COURSE	
MGIS-650	Introduction to Data Analytics and Business Intelligence
MGIS-710	Information Systems Concepts
MGIS-711	Managing Service Systems
MGIS-712	Service-Oriented Information Systems
MGIS-715	Information Technology and Globalization
MGIS-720	Information Systems Design
MGIS-725	Data Management and Analytics
MGIS-730	Information Systems Project Management
MGIS-735	Design and Information Systems
MGIS-745	Information Systems Development
MGIS-755	Information Technology Strategy and Management
MGIS-758	Seminar in Management Information Systems
MGIS-760	Integrated Business Systems
MGIS-761	Business Process Analysis and Workflow Design

Admission requirements

To be considered for admission to the MS program in accounting, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit scores from the GMAT or GRE. (GMAT preferred for international applicants and those applying for scholarships.)
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Completed applications for admission should be on file in the Office of Graduate and Part-time Enrollment Services at least four weeks prior to registration for the next academic semester for students from the United States, and up to 10 weeks prior for international students applying for student visas.

For further information about specific GMAT/GRE waiver opportunities, tips on personal statements, and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Additional information

Deferment

Accepted students can defer enrollment for up to one year. After one year, a new application must be submitted and will be re-evaluated based on the most current admission standards.

Accounting and Financial Analytics, Adv. Cert.

www.rit.edu/study/accounting-and-financial-analytics-adv-cert

Matthew Cornwell, Assistant Director of Student Services and Outreach
585-475-6916, mcornwell@saunders.rit.edu

Program overview

Today's accounting and finance professionals are now expected to serve as business partners and experts who can use data analytics to inform recommendations on business strategy. The advanced certificate in accounting and financial analytics provides knowledge in data science and statistical analysis so that accounting and finance professionals can mine and analyze data to apply it in ways that benefit and improve business operations and outcomes.

The advanced certificate in accounting and financial analytics instills data skills in finance and accounting professionals and enables them to operate effectively in the modern data-centric environment. You will learn how to access, interpret, analyze, and report business data by using tools, as well as use visualization as a decision-making tool in functional business areas. Courses completed in the certificate program can be applied later to the master's degree in business analytics, or can be used as a valuable add-on for students pursuing master's degrees in fields such as finance, accounting, management, applied statistics, and computer science.

Curriculum

Accounting and Financial Analytics, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-645	Accounting Information and Analytics	3
FINC-780	Financial Analytics	3
MGIS-650	Introduction to Data Analytics and Business Intelligence	3
Choose one of the following:		3
BANA-680	Data Management for Business Analytics	
MGIS-725	Data Management and Analytics	
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in accounting and financial analytics, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement and writing sample.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Business Administration, MBA

www.rit.edu/study/business-administration-mba

Matthew Cornwell, Assistant Director of Student Services and Outreach
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Program overview

Earning your master of business administration degree gives you the freedom to customize the program to meet your career goals. Choose from a range of concentrations including business analytics, management information systems, supply chain management, as well as joint concentrations with other RIT colleges, such as engineering management and health systems administration.

The MBA program requires 48 semester credit hours and consists of 16 courses, 11 of which are devoted to core functional areas, and five are dedicated to concentration areas and electives. An MBA concentration is a sequence of three courses in one discipline, giving you in-depth knowledge in a chosen topic.

Concentrations

Students may choose from a variety of concentrations that best fit their career goals. Popular concentrations includes finance, marketing, and entrepreneurship. You may choose from a number of joint concentrations offered in partnership with RIT's other colleges. Students may also create a custom concentration using any graduate courses offered at RIT (subject to prerequisites and program director review and approval). A concentration is defined as three MBA electives in an area of specialization. (MBA concentrations do not appear on a student's transcript.) Students must take one concentration.

Curriculum

Business Administration, MBA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ACCT-603	Accounting for Decision Makers	3
DECS-743	Operations and Supply Chain Management	3
ESCB-705	Economics and Decision Modeling	3
FINC-721	Financial Analysis for Managers	3
MGIS-650	Introduction to Data Analytics and Business Intelligence	3
MGIS-735	Design and Information Systems	3
MGMT-735	Management of Innovation in Products and Services	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-759	Competitive Strategy	3
MGMT-775	Corporate Social Responsibility and Business Ethics	3
MKTG-761	Marketing Concepts and Commercialization	3
	MBA Concentration	9
	Electives	6
Total Semester Credit Hours		**48**

Concentrations

Accounting

COURSE	
Choose three of the following:	
ACCT-641	Cases in Forensics Accounting and Fraud Examination
ACCT-645	Accounting Information and Analytics
ACCT-650	Financial Reporting for Government and Not-for-Profit Entities
ACCT-704	Corporate Financial Reporting I
ACCT-705	Corporate Financial Reporting II
ACCT-706	Cost Management
ACCT-707	Advanced Accounting
ACCT-708	Advanced Topics in Auditing and Assurance
ACCT-709	Basic Taxation
ACCT-710	Tax Analysis and Strategy
ACCT-711	Internal Auditing
ACCT-738	Information Systems Auditing and Assurance Services
ACCT-740	Comparative Financial Statement Analysis
ACCT-758	Seminar in Accounting*
ACCT-795	Financial Accounting Theory and Research

* Topics may vary.

Business Analytics

COURSE	
BANA-680	Data Management for Business Analytics
Choose two of the following:	
BANA-780	Advanced Business Analytics
BANA-785	Business Analytics Experience
FINC-780	Financial Analytics
MGIS-725	Data Management and Analytics
MGIS-760	Integrated Business Systems
MKTG-768	Marketing Analytics
STAT-747	Principles of Statistical Data Mining

Digital Marketing

COURSE	
MKTG-772	Internet Marketing: Strategy & Tactics
MKTG-768	Marketing Analytics
Choose one of the following:	
MKTG-758	Seminar in Marketing
MKTG-762	Strategic Marketing Management
MKTG-763	Buyer Behavior
MKTG-773	Database Marketing
MKTG-778	Commercialization and Marketing of New Products
MKTG-799	Independent Study Marketing

Entrepreneurship

COURSE	
MGMT-720	Entrepreneurship and New Venture Creation
MGMT-730	Technology Entrepreneurship
Choose one of the following:	
FINC-605	Financing New Ventures
MGMT-610	Global Entrepreneurship

Finance

COURSE	
FINC-725	Securities and Investment Analysis
Choose two of the following:	
FINC-605	Financing New Ventures
FINC-722	Financial Management II
FINC-740	Options and Futures
FINC-742	Financial Modeling and Analysis
FINC-758	Seminar in Finance*
FINC-760	Finance in a Global Environment
FINC-774	Advanced Derivatives

* Topics may vary.

Innovation Management

COURSE	
MGMT-743	Advanced Topics in Technology Management
Choose two of the following:	
BLEG-745	Legal and Ethical Issues in Technology-intensive Environments
DECS-744	Project Management
HRDE-742	Leading Change
MGMT-720	Entrepreneurship and New Venture Creation
MGMT-741	Managing Organizational Change
MKTG-776	Product and Brand Management

International Business

COURSE	
INTB-710	Global Business Analytics
Choose any two of following:	
FINC-760	Finance in a Global Environment
INTB-730	Cross-Cultural Management
INTB-750	Global Marketing Management
INTB-758	Seminar in Global Business*
INTB-780	Global Issues and Strategies
MGMT-610	Global Entrepreneurship

* Topics may vary.

Management and Leadership

COURSE	
MGMT-741	Managing Organizational Change
Choose two of the following:	
BLEG-745	Legal and Ethical Issues in Technology-intensive Environments
HRDE-722	Talent Development
HRDE-742	Leading Change
INTB-730	Cross-Cultural Management
MGMT-710	Managing for Environmental Sustainability
MGMT-720	Entrepreneurship and New Venture Creation
MGMT-750	Human Resource Management
MGMT-755	Negotiations
MGMT-756	Power and Influence
MGMT-758	Seminar in Management*
MGMT-763	Behavioral Skills for Managers and Professionals

* Topics may vary.

Management Information Systems

COURSE	
MGIS-720	Information Systems Design
Choose two of the following:	
MGIS-725	Data Management and Analytics
MGIS-730	Information Systems Project Management
MGIS-755	Information Technology Strategy and Management
MGIS-760	Integrated Business Systems
MGIS-761	Business Process Analysis and Workflow Design

Marketing

COURSE	
MKTG-762	Strategic Marketing Management
MKTG-763	Buyer Behavior
Choose one of the following:	
MKTG-758	Seminar in Marketing*
MKTG-768	Marketing Analytics
MKTG-772	Internet Marketing: Strategy & Tactics
MKTG-773	Database Marketing
MKTG-778	Commercialization and Marketing of New Products
MKTG-799	Independent Study Marketing

* Topics may vary.

Project Management

COURSE	
DECS-744	Project Management
Choose two of the following:	
BUSI-711	Advanced Project Management
BUSI-712	International Project Management
HRDE-742	Leading Change
MGMT-741	Managing Organizational Change

Supply Chain Management

COURSE	
DECS-744	Project Management
ISEE-703	Supply Chain Management*
Choose one of the following:	
DECS-745	Quality Control and Improvement
HRDE-742	Leading Change
ISEE-682	Lean Six Sigma Fundamentals
MGIS-760	Integrated Business Systems
MGIS-761	Business Process Analysis and Workflow Design
MGMT-741	Managing Organizational Change
MGMT-743	Advanced Topics in Technology Management
STAT-621	Statistical Quality Control

* Students must successfully complete Project Management (DECS-743) before enrolling in Supply Chain Management (ISEE-703).

Customized concentration options

In addition to the above concentrations, students may complete a three-course concentration from other RIT colleges, with program director approval. MBA students may currently complete concentrations in communication and media technologies, environmentally sustainable management, health systems administration, human resource development, engineering management, or public policy.

Additional options may be pursued, but must receive approval from the program director.

Double concentrations

Students may elect to complete two concentrations. No more than one course may be used to fulfill the requirements of both concentrations.

Admission requirements

To be considered for admission to the MBA program, candidates must fulfill the following requirements:

- Complete a graduate application,
- Hold a baccalaureate degree from an accredited institution,
- Have a working knowledge of algebra and statistics,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE) (GMAT preferred),
- Submit a personal statement, and
- Submit a current resume.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Applications are accepted for fall, spring, and summer semesters. Students may complete their studies on a full- or part-time basis.

For further information about program specific GMAT/GRE waiver opportunities, tips on personal statements, and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Completed applications for admission should be on file in the Office of Graduate and Part-time Enrollment at least four weeks prior to registration for the next academic semester for students from the United States, and up to 10 weeks prior for international students applying for student visas.

Additional information

Non-degree course enrollment

Students with a cumulative GPA of 3.0 (B grade) or better may be eligible to apply to take up to two approved graduate courses before being fully admitted to the MBA Program. Students can complete the required non-degree application through Saunders. Graduate credits earned as a non-degree student may be applied to the student's degree program.

Academic standards

Graduate students must maintain a grade of B (3.0) or better for all courses. Grades of all repeated MBA courses will be counted in the GPA computation. The policy on probation and suspension is explained in the Registration and Degree Requirements section of this bulletin.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program.

Orientation

All new students are required to attend an orientation session prior to beginning their studies. Course selection, career planning, program planning, and academic advising are discussed during orientation.

Waiver policy/transfer credit

The MBA normally requires 48 credit hours, however, students may be able to waive some MBA foundation courses. Prior academic preparation must be from an institution accredited by AACSB International or partner institution and the course work must be equivalent to RIT's MBA foundation courses. Prior course work must be completed within the last five years, with a grade of B (3.0) or better. Foundation courses may be waived either outright or through an examination.

A maximum of 9 credit hours may be awarded as transfer credit from other graduate programs. The courses must be relevant to the MBA program, taken within the last five years at an institution accredited by AACSB International, and the student must have earned a grade of B (3.0) or better.

Credits for waiver, transfer, or undergraduate courses are not counted in the GPA computation. Students must request transfer/waiver credit.

Placement

The Office of Cooperative Education and Career Services offers individualized career counseling, provides critical job leads, coordinates employers' annual campus recruiting visits, maintains an extensive online job listing, and sponsors two annual career fairs.

Cooperative education

Cooperative education in the MBA program is optional. Co-op experience affords students the opportunity to obtain a paid position for three to six months and gain valuable work experience. Academic credit is not granted, but formal recording of the co-op experience is made on the student's transcript. Students in good academic standing are eligible for co-op after completing the foundation course, and a substantial portion of their concentration courses. They also must attend a series of co-op and career services workshops. RIT does not guarantee co-op placements.

Deferment

Accepted students can defer enrollment for up to one year. After one year, a new application must be submitted and will be re-evaluated based on the most current admission standards.

Business Administration–Accounting, MBA

www.rit.edu/study/accounting-mba

Matthew Cornwell, Assistant Director of Student Services and Outreach
585-475-6916, mcornwell@saunders.rit.edu

Program overview

Accountants serve a strategic role in business that goes beyond number crunching and financial reporting. They provide a foundation for corporate strategy, serve as business advisors, and understand how to leverage cutting-edge technologies. The MBA in accounting provides a broad-based education of business and technology, while focusing on career skills that can be applied to any business in the world. In addition to gaining the technological skills needed to design, operate, and control accounting information systems–skills that are highly sought after by employers–you also will be prepared to sit for the Certified Public Accountancy (CPA) exam, which graduates consistently score higher on than state and national averages.

In addition to the educational preparation for a career leading to top management, the MBA in accounting fulfills the educational requirements that allow students to sit for the New York State Certified Public Accountancy exam. The program stresses the skills necessary for the design, operation, and control of accounting information systems.

Plan of study

The program offers two tracks, one for students with an undergraduate degree in accounting and one for students who have an undergraduate degree in a field outside of business, economics, statistics, or accounting.

Curriculum

Business Administration-Accounting, MBA degree (for applicants with an undergraduate degree in accounting), typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-707	Advanced Accounting	3
ACCT-708	Advanced Topics in Auditing and Assurance	3
ACCT-738	Information Systems Auditing and Assurance Services	3
ACCT-795	Financial Accounting Theory and Research	3
BLEG-731	Commercial Law and Professional Skills	3
MGMT-735	Management of Innovation in Products and Services	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-759	Competitive Strategy	3
MKTG-761	Marketing Concepts and Commercialization	3
	Accounting, Economics, Finance, or Management Information Systems Elective	3
Total Semester Credit Hours		**30**

Business Administration-Accounting, MBA degree (for applicants with no previous business, economics, or statistics course work), typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-603	Accounting for Decision Makers	3
ACCT-704	Corporate Financial Reporting I	3
ACCT-709	Basic Taxation	3
BLEG-730	Business Legal Concepts	3
BLEG-731	Commercial Law and Professional Skills	3
DECS-743	Operations and Supply Chain Management	3
ESCB-705	Economics and Decision Modeling	3
FINC-721	Financial Analysis for Managers	3
MGIS-650	Introduction to Data Analytics and Business Intelligence	3
MGMT-735	Management of Innovation in Products and Services	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-775	Corporate Social Responsibility and Business Ethics	3
MKTG-761	Marketing Concepts and Commercialization	3
	Accounting, Economics, Finance, or Management Information Systems Elective	3
Second Year		
ACCT-645	Accounting Information and Analytics	3
ACCT-705	Corporate Financial Reporting II	3
ACCT-706	Cost Management	3
ACCT-707	Advanced Accounting	3
ACCT-708	Advanced Topics in Auditing and Assurance	3
ACCT-710	Tax Analysis and Strategy	3
ACCT-738	Information Systems Auditing and Assurance Services	3
ACCT-795	Financial Accounting Theory and Research	3
MGMT-759	Competitive Strategy	3
	Accounting, Economics, Finance, or Management Information Systems Elective	3
Total Semester Credit Hours		**72**

Electives

Students must choose elective courses from accounting, economics, finance, or management information systems.

COURSE	
ACCT-641	Cases in Forensic Accounting and Fraud Examination
ACCT-650	Financial Reporting for Government and Not-for-Profit Entities
ACCT-711	Internal Auditing
ACCT-740	Comparative Financial Statement Analysis
ACCT-758	Seminar in Accounting
ESCB-758	Seminar in Economics
FINC-605	Financing New Ventures
FINC-722	Financial Management II
FINC-725	Securities and Investment Analysis
FINC-740	Options and Futures
FINC-742	Financial Modeling and Analysis
FINC-758	Seminar in Finance
FINC-760	Finance in a Global Environment
FINC-761	Stock Market Algorithmic Trading
FINC-772	Equity Analysis
FINC-773	Debt Analysis
FINC-774	Advanced Derivatives
FINC-780	Financial Analytics
MGIS-710	Information Systems Concepts
MGIS-711	Managing Service Systems
MGIS-712	Service-Oriented Information Systems
MGIS-715	Information Technology and Globalization
MGIS-720	Information Systems Design
MGIS-725	Data Management and Analytics
MGIS-730	Information Systems Project Management
MGIS-735	Design and Information Systems
MGIS-745	Information Systems Development
MGIS-755	Information Technology Strategy and Management
MGIS-758	Seminar in Management Information Systems
MGIS-760	Integrated Business Systems
MGIS-761	Business Process Analysis and Workflow Design

Admission requirements

To be considered for admission to the business administration-accounting MBA, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Have working knowledge of algebra and statistics.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit scores from the GMAT or GRE. (GMAT preferred for international applicants and those applying for scholarships.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

- Completed applications for admission should be on file with Graduate Admissions at least four weeks prior to registration for the next academic semester for students from the United States, and up to 10 weeks prior for international students applying for student visas.

For further information about specific GMAT/GRE waiver opportunities, tips on personal statements, and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Additional information

Deferment

Accepted students can defer enrollment for up to one year. After one year, a new application must be submitted and will be re-evaluated based on the most current admission standards.

Business Administration–Executive, MBA

www.rit.edu/study/business-administration-executive-mba

Amanda Williams, Assistant Director, Admissions and Recruitment
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Program overview

The executive MBA is a challenging program designed to accelerate the careers of experienced, high-performing professionals with six or more years of business experience. It is ideal for creative, innovative individuals with established careers who are looking for proven and effective methods and strategies to propel them further up the career ladder or transition into a new field. Students master executive skills such as strategic and cross–functional thinking, utilizing data to drive decision making, client consulting, and leadership. They learn from knowledgeable and professional instructors and from the motivated and diverse peer group enrolled in the program. The curriculum encourages analytical thinking and problem solving, and places a strong emphasis on collaboration and group interaction.

The executive MBA curriculum focuses on core business concepts, providing fundamental skills, knowledge, and perspectives in accounting, statistics, leadership, finance, negotiations, and economics. The program develops skills in cross-functional analysis with an emphasis on strategy, marketing, technology, and international business. Interdisciplinary examples, case analyses, and an applied orientation are key components of the program. Students attend classes for 15 months on alternate weekends (all day Friday and Saturday). In addition, all students attend a three-day orientation at the start of the program and a seven-to-10-day international study trip in their last semester. There is one online course each semester.

The program reinforces practical experience through domestic and international client consulting projects; personal coaching in career development planning, communications, and team building; a competitive business simulation model; and the international study trip.

Curriculum

Executive MBA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
Residency		
MGMT-806	Team Building and Ethics	1
Courses		
ACCT-801	Accounting and Organizational Goals	2
ACCT-802	Managerial Accounting	2
DECS-810	Statistical Analysis for Managers	2
DECS-864	Systems Support for Operations	2
DECS-875	Business Simulation	2
ESCB-840	Microeconomics & Pricing	2
FINC-845	Valuation and Capital Budgeting	2
FINC-846	Financial Planning and Analysis	2
FINC-850	International Finance	2
INTB-820	International Business	2
INTB-825	International Study Seminar	2
MGMT-800	Leadership Development I	1
MGMT-801	Leadership Development II	1
MGMT-805	Current Topics Seminar	2
MGMT-810	Leadership	2
MGMT-818	Strategic Thinking I	2
MGMT-819	Strategic Thinking II	2
MGMT-860	Executive Leadership Series	2
MGMT-861	Managing Technology, Innovation and Research	2
MGMT-889	Capstone Consulting Project I	3
MGMT-890	Capstone Consulting Project II	3
MKTG-851	Marketing Strategy	2
MKTG-865	Managing New Product Commercialization	2
Total Semester Credit Hours		**47**

Admission requirements

To be considered for admission to the executive MBA program, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum of six years of professional work experience.
- Participate in an interview with a representative of the executive MBA team.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit three letters of recommendation from a current employer.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

Sponsorship

Employers sponsoring students must permit candidates to attend scheduled classes, the orientation program, and the international trip, which takes place in the student's final semester. Business owners or individuals may sponsor themselves.

Business Administration–Online Executive, MBA

www.rit.edu/study/business-administration-online-executive-mba

Amanda Williams, Assistant Director, Admissions and Recruitment
585-475-2729, awilliams@saunders.rit.edu

Program overview

The online executive MBA is designed for mid-to-upper level professionals seeking to hone their business and leadership skills in order to enhance their performance, assume greater responsibilities, and effectively position themselves for future opportunities. The flexibility of the online format cultivates collaboration yet allows for distance learning. At RIT, we know that executives want more than a simple transfer of business and management theory and concepts. They want a high level of engagement with faculty and especially with their peers. They want the opportunity to discuss, argue, compete, and collaborate with other seasoned managers on strategic and topical issues and projects. These are the essential features of the online executive MBA, and ones that have direct and immediate applicability to student's own professional development.

The executive MBA is a challenging cohort-based program designed to accelerate the careers of mature, high-performing professionals with significant business experience. It is ideal for creative, innovative individuals with established careers who are looking for proven and effective methods and strategies to propel them further up the career ladder. Students master executive skills such as strategic and cross–functional thinking, client consulting, and leadership. They learn from knowledgeable and professional instructors and from the successful, motivated, diverse peer group enrolled in the program. The curriculum encourages analytical thinking and problem solving, and places a strong emphasis on collaboration and group interaction. Students leave the program with a solid network of influential peers.

Plan of study

The curriculum focuses on core business concepts, providing fundamental skills, knowledge, and perspectives in accounting, statistics, leadership, finance, negotiations, and economics. The program develops skills in cross-functional analysis with an emphasis on strategy, marketing, technology, and international business. Interdisciplinary examples, case analyses, and an applied orientation are key components of the program. Students attend classes for 15 months on alternate weekends (all day Friday and Saturday). In addition, all students attend a three-day orientation at the start of the program and a seven-to-10-day international study trip in their last semester. There is one online course each semester.

The program reinforces practical experience through domestic and international client consulting projects; personal coaching in career development planning, communications, and team building; a competitive business simulation model; and the international study trip.

Curriculum

Online Executive MBA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
Residency		
MGMT-806	Team Building and Ethics	1
Courses		
ACCT-801	Accounting and Organizational Goals	2
ACCT-802	Managerial Accounting	2
DECS-810	Statistical Analysis for Managers	2
DECS-864	Systems Support for Operations	2
DECS-875	Business Simulation	2
ESCB-840	Microeconomics & Pricing	2
FINC-845	Valuation and Capital Budgeting	2
FINC-846	Financial Planning and Analysis	2
FINC-850	International Finance	2

COURSE		SEMESTER CREDIT HOURS
INTB-820	International Business	2
INTB-825	International Study Seminar	2
MGMT-800	Leadership Development I	1
MGMT-801	Leadership Development II	1
MGMT-805	Current Topics Seminar	2
MGMT-810	Leadership	2
MGMT-818	Strategic Thinking I	2
MGMT-819	Strategic Thinking II	2
MGMT-860	Executive Leadership Series	2
MGMT-861	Managing Technology, Innovation and Research	2
MGMT-889	Capstone Consulting Project I	3
MGMT-890	Capstone Consulting Project II	3
MKTG-851	Marketing Strategy	2
MKTG-865	Managing New Product Commercialization	2
Total Semester Credit Hours		**47**

Admission requirements

To be considered for admission to the online executive MBA program, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum of six years of professional work experience and hold advanced technical, managerial, or executive responsibilities.
- Participate in an interview with a representative of the executive MBA team.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit three letters of recommendation from a current employer.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Certain countries are subject to comprehensive embargoes under US Export Controls, which prohibit virtually ALL exports, imports, and other transactions without a license or other US Government authorization. Learners from Syria, Sudan, North Korea, the Crimea region of the Ukraine, Iran, and Cuba may not register for RIT online courses. Nor may individuals on the United States Treasury Department's list of Specially Designated Nationals or the United States Commerce Department's table of Deny Orders. By registering for RIT online courses, you represent and warrant that you are not located in, under the control of, or a national or resident of any such country or on any such list.

Business Analytics, MS

www.rit.edu/study/business-analytics-ms

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Program overview

Today's businesses collect an incredible amount of data from nearly every customer touch point, from point-of-sale transactions, customer service interactions, social media feedback, search engine entries, market research activities, sales data, demographic information, and more. As of now, only a tiny portion of this data is analyzed. By getting a business analytics master's degree, you will become skilled in using big data to create powerful solutions to help companies increase sales, reach new customers, develop new products, enhance customer experiences, and more. You will acquire a broad and in-depth training in multiple disciplines related to business analytics, including management information systems (MIS), marketing, accounting, finance, management, and engineering. The program prepares you to enter one of today's top business careers.

The business analytics program is career-focused. It was developed in conjunction with top employers, such as Intuit, Excellus, and PriceWaterhouse, with a curriculum designed to help students understand and connect contemporary analytics technologies with today's business practices. Students are prepared for positions in such areas as marketing research, analytics, and consulting; digital analytics; web intelligence and analytics; accounting and financial analytics and risk management; supply chain analytics; customer analytics; and consulting.

International Students: F-1 OPT STEM 17-Month Work Extension

International students receiving the MS in business analytics degree qualify to apply for a 24-month work extension to their OPT (Optional Practical Training) period. This extension means that students could be eligible for up to two and a half years of work in the United States.

The extension is exclusive to qualifying STEM (science, technology, engineering or math) focused programs. The MS in business analytics program qualifies for an F-1 OPT STEM Extension, under the CIP Code 27.0103-Analysis and Functional Analysis in the 2012 STEM-Designated Degree Program List published by the U.S. Immigration and Customs Enforcement (ICE) office. For more information, please visit the U.S. Citizenship and Immigration Services (USCIS) webpages: Understanding F-1 OPT Requirements and Questions and Answers: Extension of Optional Practical Training Program for Qualified Students.

Curriculum

Business Analytics, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
BANA-680	Data Management for Business Analytics	3
BANA-780	Advanced Business Analytics	3
BANA-785	Business Analytics Experience*	3
FINC-780	Financial Analytics	3
MGIS-650	Introduction to Data Analytics and Business Intelligence	3
MKTG-768	Marketing Analytics	3
	Analytics Elective*	6
	Free Elective*	6
Total Semester Credit Hours		**30**

* The Business Analytics Experience (BANA-785), one analytics elective, and one free elective are completed during the summer.

Analytics Electives

COURSE	
ACCT-645	Accounting Information and Analytics
MGIS-720	Information Systems Design
MGIS-725	Data Management and Analytics
MGIS-735	Design and Information Systems
STAT-641	Applied Linear Models - Regression
STAT-745	Predictive Analytics
STAT-747	Principles of Statistical Data Mining
STAT-773	Time Series Analysis and Forecasting
STAT-784	Categorical Data Analysis

Admission requirements

To be considered for admission to the MS program in business analytics, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit scores from the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE) (GMAT preferred).
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

For further information about tips on personal statements and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Computational Finance, MS

www.rit.edu/study/computational-finance-ms

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Program overview

The computational finance program produces quantitative analysts who design and implement financial models used by banks and investment companies to generate profits and reduce risk. Computational analytics experts also support other industries and business functions that reach beyond banking and finance. The computational finance masters help you expand your skills into fields that are in great demand and feature high salaries. The program is designed for students interested in computational or quantitative finance careers in banking, finance, and a growing number of industries.

The MS in computational finance is designed for students interested in computational or quantitative finance careers in banking, finance, and a growing number of additional industries. Professionals in these fields use their strengths in business, modeling, and data analysis to understand and use complex financial models.

The program addresses a vital and growing career field, reaching beyond banking and finance. Typical job titles include risk analyst, research associate, quantitative analyst, quantitative structured credit analyst, credit risk analyst, quantitative investment analyst, quantitative strategist, data analyst, senior data analyst, fixed income quantitative analyst, and financial engineer.

Computational finance is an excellent career option for technically-oriented professionals in the fields of business, math, engineering, economics, statistics, and computer science. Programming knowledge is highly preferred.

Plan of study

The curriculum offers integration of finance, mathematics, and computing. The required mathematics courses have substantial financial content and the experiential computational finance course, which students take during the summer, makes use of skills learned in mathematics, analytics, and finance courses are taken up to that point. The program is a full-time, 12- to 17-month curriculum beginning in the fall or spring. The program ends with a required non-credit comprehensive exam based on the courses completed by the student.

International Students: F-1 OPT STEM 17-Month Work Extension
International students receiving the MS in computational finance degree qualify to apply for a 24-month work extension to their OPT (Optional Practical Training) period. This extension means that students could be eligible for up to two and a half years of work in the United States.

The extension is exclusive to qualifying STEM (science, technology, engineering or math) focused programs. The MS in computational finance program qualifies for an F-1 OPT STEM Extension, under the CIP Code 27.0305-Financial Mathematics in the 2012 STEM-Designated Degree Program List published by the U.S. Immigration and Customs Enforcement (ICE) office. For more information please visit the U.S. Citizenship and Immigration Services (USCIS)webpages: Understanding F-1 OPT Requirements and Questions and Answers: Extension of Optional Practical Training Program for Qualified Students.

Curriculum

Computational Finance, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ACCT-603	Accounting for Decision Makers	3
FINC-671	Survey of Finance	3
FINC-772	Equity Analysis	3
FINC-773	Debt Analysis	3
FINC-774	Advanced Derivatives	3
FINC-791	Computational Finance Exam Preparatory	0
FINC-795	Computational Finance Experience	3
MATH-735	Mathematics of Finance I	3
MATH-736	Mathematics of Finance II	3
	Analytics Electives	6
	University Electives	6
Total Semester Credit Hours		**36**

Analytics electives*

ACCT-645	Accounting Information and Analytics
BANA-780	Advanced Business Analytics
FINC-780	Financial Analytics
MGIS-650	Introduction to Data Analytics and Business Intelligence
MGIS-725	Data Management and Analytics
MGIS-760	Integrated Business Systems
MKTG-768	Marketing Analytics
STAT-611	Statistical Software
STAT-747	Principles of Statistical Data Mining
STAT-773	Time Series Analysis and Forecasting
STAT-784	Categorical Data Analysis

* Additional electives are available with approval.

University electives

ACCT-7##	Any 700-level ACCT course
BANA-6##	Any 600-level BANA course
BANA-7##	Any 700-level BANA course
CSCI-654	Foundations of Parallel Computing
CSCI-721	Data Cleaning and Preparation
DECS-7##	Any 700-level DECS course
MATH-601	Methods of Applied Mathematics
MATH-605	Stochastic Processes
MATH-711	Advanced Methods in Scientific Computing
MATH-712	Numerical Methods for Partial Differential Equations
MATH-741	Partial Differential Equations I
MATH-742	Partial Differential Equations II
MGIS-6##	Any 600-level MGIS course
MGIS-7##	Any 700-level MGIS course
STAT-756	Multivariate Analysis

Admission requirements

To be considered for admission to the MS program in computational finance, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a personal statement of educational objectives. Statement should indicate any mathematical and programming knowledge held by the candidate as well as their professional interests, and why these make the candidate suitable for the program.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

For further information about tips on personal statements and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Entrepreneurship and Innovative Ventures, MS

www.rit.edu/study/entrepreneurship-and-innovative-ventures-ms

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Program overview

RIT's well renowned resources in business, science, technology, engineering, and the arts make it the center of innovation. You are encouraged to take advantage of these resources, including the Simone Center for Innovation and Entrepreneurship, as you learn to bring new ideas to the marketplace. You will graduate with the business and technical expertise needed to thrive in both large incumbent firms as well as new start-up ventures.

The MS degree in entrepreneurship and innovative ventures focuses on the entrepreneurial and innovation process, by which inventions or creative new ideas are brought to market. Graduates achieve a unique combination of technical and business expertise that is especially relevant to start-up ventures or professionals supporting small business start-ups.

Plan of study

The program requires students to complete 30 credit hours consisting of six required core courses designed to increase a student's knowledge of accounting, organizational behavior and leadership, technology management, entrepreneurship, marketing, and product commercialization; two innovation courses that increase student's knowledge of managing the innovation process; and two elective courses that provide students with additional background in areas of interest.

International Students: F-1 OPT STEM 24-Month Work Extension

International students receiving the MS in entrepreneurship and innovative ventures degree qualify to apply for a 24-month work extension to their OPT (Optional Practical Training) period. This extension means that students could be eligible for up to two and a half years of work in the United States.

The extension is exclusive to qualifying STEM (science, technology, engineering or math) focused programs. The MS in entrepreneurship and innovative ventures program qualifies for an F-1 OPT STEM Extension, under the CIP Code 27.0305-Financial Mathematics in the 2012 STEM-Designated Degree Program List published by the U.S. Immigration and Customs Enforcement (ICE) office. For more information please visit the U.S. Citizenship and Immigration Services (USCIS)webpages: Understanding F-1 OPT Requirements and Questions and Answers: Extension of Optional Practical Training Program for Qualified Students.

Curriculum

Entrepreneurship and Innovative Ventures, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
FINC-605	Financing New Ventures	3
MGMT-720	Entrepreneurship and New Venture Creation	3
MGMT-730	Technology Entrepreneurship	3
MGMT-755	Negotiations	3
MGMT-765	Applied Venture Creation	3
	Open Graduate Electives	9
	Program Electives	6
Total Semester Credit Hours		**30**

Program electives

COURSE	
DECS-744	Project Management
MGMT-610	Global Entrepreneurship
MGMT-735	Management of Innovation in Products and Services
MKTG-772	Internet Marketing: Strategy & Tactics
MKTG-778	Commercialization and Marketing of New Products

Admission requirements

To be considered for admission to the MS program in entrepreneurship and innovative ventures, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.25 to have GMAT requirement waived*.
- Submit scores from GMAT or GRE (GMAT preferred). Scores cannot be more than five years old.
- Submit an essay based on one of the following topics: (1) describe an ethical dilemma you have faced and how you resolved it; (2) explain what you have learned from a managerial, leadership, or team experience that was not completely successfully; or (3) describe your greatest professional achievement and how you added value to your organization. The essay should be typed, double-spaced, and two pages in length.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

* The GMAT may be waived if an applicant has a GPA of 3.25 or higher, or they can present evidence of professional work experience of six or more years. Students who cannot submit a GMAT, GRE, or one of the two waiver requirements may be considered for admission on a case-by-case basis.

For further information about program specific GMAT/GRE waiver opportunities, tips on personal statements, and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Finance, MS

www.rit.edu/study/finance-ms

Matthew Cornwell, Assistant Director of Student Services and Outreach
585-475-6916, mcornwell@saunders.rit.edu

Program overview

Encompassing corporate finance, investment management, banking, insurance, consulting, and more, the finance master's degree unlocks the world of finance and prepares you for managerial careers in corporate finance, investment analysis and portfolio management, financial consulting, and financial institutions. The program is specifically designed to prepare you to take the Chartered Financial Analysts (CFA) exam – the most respected and recognized investment management designation in the world. A highly flexible program, students can choose electives in a wide range of areas such as analytics to enhance your marketability and increase your job prospects.

The MS degree in finance prepares students for managerial careers in corporate finance, investment analysis and portfolio management, financial consulting, and financial institutions. Courses prepare students to sit for the Certified Financial Analyst exam. To complete the program in one year, full-time students must begin their studies in the fall semester.

Curriculum

Finance, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-603	Accounting for Decision Makers	3
FINC-721	Financial Analysis for Managers	3
FINC-725	Securities and Investment Analysis	3
FINC-740	Options and Futures	3
FINC-790	Field Exam Preparatory	1
	Finance Electives	12
	General Electives	6
Total Semester Credit Hours		**31**

Finance electives

FINC-722	Financial Management II
FINC-732	Portfolio Management
FINC-742	Financial Modeling and Analysis
FINC-758	Seminar in Finance
FINC-760	Finance in a Global Environment
FINC-761	Stock Market Algorithmic Trading
FINC-772	Equity Analysis
FINC-773	Debt Analysis
FINC-780	Financial Analytics

General electives (in addition to Finance electives listed above)

ACCT-704	Corporate Financial Reporting I
ACCT-705	Corporate Financial Reporting II
ACCT-706	Cost Management
ACCT-709	Basic Taxation
DECS-782	Statistical Analysis for Decision Making
ESCB-705	Economics and Decision Modeling
FINC-605	Financing New Ventures
MGIS-650	Introduction to Data Analytics and Business Intelligence
MGIS-710	Information Systems Concepts
MKTG-768	Marketing Analytics

Admission requirements

To be considered for admission to the MS program in finance, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0.
- Submit scores from GMAT or GRE (GMAT preferred for international applicants and those applying for scholarships).
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Completed applications for admission should be on file with Graduate Admissions at least four weeks prior to registration for the next academic semester for students from the United States, and up to 10 weeks prior for international students applying for student visas.

For further information about tips on personal statements and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Additional information

Deferment

Accepted students may defer enrollment for up to one year. After one year, a new application must be submitted and will be re-evaluated based on the most current admission standards.

Global Supply Chain Management, MS

www.rit.edu/study/global-supply-chain-management
Zhi Tang, Associate Professor
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Program overview

Supply chain management professionals are the engineers of business. Products and services are becoming ever more complex to manage as they become more globally integrated and reliant on technology. Operations, from product creation to consumer purchasing, need to be efficient for companies to be competitive as they turn raw materials into consumer goods and services and deliver them to customers. In the MS in global supply chain management, you will obtain global supply chain skills and knowledge underscored by strong analytical, quantitative, and leadership skills needed to not only design innovative solutions and predict future trends but also to become a leader in the fast-moving business landscapes in the global supply chain system.

Rooted in the strong technology and analytical traditions of RIT's Saunders College of Business, global supply chain management is an interdisciplinary program that integrates concepts from supply chain, operation management, analytics, data visualization, industrial engineering, global business, and management. Our curriculum prepares students for a successful career in supply chain management, planning and logistics, procurement and sourcing through course work and real business projects.

International Students: F-1 OPT STEM 24-Month Work Extension
International students receiving the MS in business analytics degree qualify to apply for a 24-month work extension to their OPT (Optional Practical Training) period. This extension means that students could be eligible for up to two and a half years of work in the United States.

The extension is exclusive to qualifying STEM (science, technology, engineering or math) focused programs. The MS in global supply chain management program qualifies for an F-1 OPT STEM Extension, under the CIP Code 27.0103-Analysis and Functional Analysis in the 2012 STEM-Designated Degree Program List published by the U.S. Immigration and Customs Enforcement (ICE) office. For more information, please visit the U.S. Citizenship and Immigration Services (USCIS) webpages: Understanding F-1 OPT Requirements and Questions and Answers: Extension of Optional Practical Training Program for Qualified Students.

Curriculum

Global Supply Chain Management, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
DECS-743	Operations and Supply Chain Management	3
DECS-750	Supply Chain Analysis	3
INTB-710	Global Business Analytics	3
INTB-755	Export and Global Sourcing	3
MGMT-755	Negotiations	3
MGMT-791	Graduate Project OR Global Supply Chain Management Elective if student opts for Comprehensive Exam	3
	Global Supply Chain Management Electives	12
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in global supply chain management, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.25 for GMAT waiver*.
- Submit scores from GMAT or GRE (GMAT preferred). Scores cannot be more than five years old.
- Submit a personal statement: Please submit a typed, double-spaced, two-page statement about why this Saunders graduate program is a good fit for your future career. Include information on what draws you to the program and how you will leverage your past academic and professional work experience to be an active, engaged, and successful student in our college.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

* The GMAT may be waived if an applicant has a GPA of 3.25 or higher, or they can present evidence of professional work experience of six or more years. Students who cannot submit a GMAT, GRE, or one of the two waiver requirements may be considered for admission on a case-by-case basis.

For further information about program specific GMAT/GRE waiver opportunities, tips on personal statements, and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Hospitality and Tourism Management, MS

www.rit.edu/study/hospitality-and-tourism-management-ms

Matthew Cornwell, Assistant Director of Student Services and Outreach
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Program overview

Draw conclusions about models and theories associated with hospitality and tourism in a global environment; and analyze, evaluate, and apply hospitality and tourism data from diverse sources in this dynamic degree program. With a master's degree in hospitality and tourism management, you'll be prepared for multiple mid-level service management and training director positions as you create and present new hospitality and tourism services through effective interpersonal, oral, and written communication. Graduates are ready to step into multiple service management and training director positions.

The MS degree in hospitality and tourism management prepares students to step into numerous mid-level hospitality and tourism management and government policy positions. The program is focused on hospitality business planning, branding, economic management, and development of quality processes to deliver exceptional leadership within many service and corporate settings and at post-secondary academic institutions. The program also provides research-oriented training in the theory and methodologies pertaining to hospitality and tourism to prepare graduates for advanced study at the doctoral level.

Plan of study

The program may be taken on a full- or part-time basis. The length of time required to earn a degree varies according to the student's undergraduate preparation and the number of graduate courses taken per semester. To earn the MS degree, students must complete a minimum of 30 credit hours. The curriculum is a combination of required core courses in hospitality and tourism management and elective courses chosen by the student to meet career interests and objectives. Course offerings generally are scheduled for evenings or via online learning to facilitate part-time students.

Core courses

Core courses explore essential hospitality and tourism business issues such as teamwork, strategic organizational change, financial and service performance metrics, development and marketing of resorts and attractions, and branding. Each course not only introduces the service philosophy but also examines the real differences in hospitality-service management outcomes necessitated by the adoption of a new service paradigm.

Electives

Elective courses provide students with an opportunity to individualize their graduate program in line with their career and professional interests, and are available in areas such as resorts and attractions, travel and tourism, conventions and events, technology, and human resource development, to name a few. With the approval of the department chair or program director students are allowed to take a selection of elective courses from outside the program. Courses may be taken from the service leadership and innovation program, the human resource development program, and Saunders College of Business. Students are cautioned to observe course prerequisites in their selections.

All elective courses must be graduate-level. If previous course work exists, students may request a transfer of credits. A limited number of credit hours may be taken as independent study or practicum courses.

Project/Capstone/Thesis options

Students must successfully complete a graduate project or comprehensive exam as a culminating experience allowing for demonstration of competencies in theory and applications for the discipline. Students work with the program adviser and/or program faculty to determine a topic for the graduate project and must arrange a faculty mentor for the project. The comprehensive exam option is open to all students. Students may request the thesis option, but it must be approved and students must secure a faculty mentor.

Curriculum

Hospitality and Tourism Management (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communications	3
HSPT-730	Strategic Hospitality & Tourism Branding	3
HSPT-740	Economic Performance Analysis for Hospitality & Tourism	3
HSPT-750	Strategic Processes and Assessment of Hospitality and Tourism Industries	3
SERQ-710	Service Design Fundamentals	3
	Electives	6
Second Year		
HSPT-797	Capstone Project in Hospitality and Tourism	3
	Elective	3
Total Semester Credit Hours		**30**

Hospitality and Tourism Management (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
HSPT-730	Strategic Hospitality & Tourism Branding	3
HSPT-740	Economic Performance Analysis for Hospitality & Tourism	3
HSPT-750	Strategic Processes and Assessment of Hospitality and Tourism Industries	3
HSPT-795	Comprehensive Examination	0
SERQ-710	Service Design Fundamentals	3
	Professional Electives	15
Total Semester Credit Hours		**30**

Hospitality and Tourism Management (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communications	3
SERQ-710	Service Design Fundamentals	3
HSPT-730	Strategic Hospitality & Tourism Branding	3
HSPT-740	Economic Performance Analysis for Hospitality & Tourism	3
HSPT-750	Strategic Processes and Assessment of Hospitality and Tourism Industries	3
	Electives	6
Second Year		
HSPT-790	Research Thesis	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in hospitality and tourism management, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.

- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent). Foundation course work with a GPA of 3.0 or higher (if required).
- Submit a current resume or curriculum vitae.
- Submit two professional letters of recommendation
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- After a review by the program chair, applicants whose prior undergraduate work has been in areas other than hospitality or tourism may be required to complete additional courses. Students may choose elective courses with the approval of the program director.

Additional information

Part time study

The program may be completed on a full- or part-time basis. The length of time required to earn the degree varies according to the student's undergraduate preparation and the number of graduate courses taken per semester.

Human Resource Development, MS

www.rit.edu/study/human-resource-development-ms

Matthew Cornwell, Assistant Director of Student Services and Outreach
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Program overview

By incorporating a global focus into the master's of human resources degree, RIT ensures that our graduates can maximize human potential, increase productivity, and retain great talent. You will be able to successfully plan and execute corporate strategy related to human capital, develop workplace talent, retain valuable employees, and much more. Whether you're starting a career in human resources or enhancing your competencies in training, instructional design, performance management, and employee development, you'll graduate as a strategic leader of the human potential in your organization.

Human development is at the heart of workplace development in any organization. The MS in human resource development provides the next level of learning in creating a strategy for human capital. The program teaches professionals to leverage specific essential competencies to create a flexible workforce that adapts to change and aligns with strategic organizational goals so that human resource professionals can grow talent and remain competitive in the 21st century.

Plan of study

The degree requires a minimum of 33 credit hours. Students are required to complete a comprehensive exam at the conclusion of their course work. Students who wish to complete a graduate project or thesis in place of the exam must have the approval of the faculty and department chair.

Electives

Electives are chosen by the student and are used to fulfill their career interests. Courses may be taken in other graduate-level programs, with permission. A limited number of credit hours (not counted toward another degree) may be considered for transfer credit from another college or university.

Curriculum

Human Resource Development (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
GRCS-701	Research Methods	3
HRDE-710	Foundations in Human Resource Development	3
HRDE-711	Program Evaluation and Design	3
HRDE-712	Performance Analysis and Development	3
HRDE-743	Training for Global Organizations	3
HRDE-785	Strategic HRD	3
HRDE-795	Comprehensive Examination	0
	Electives or Concentration Courses	9
	Electives	6
Total Semester Credit Hours		**33**

Human Resource Development (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communications	3
HRDE-710	Foundations in Human Resource Development	3
HRDE-711	Program Evaluation and Design	3
HRDE-712	Performance Analysis and Development	3
HRDE-743	Training for Global Organizations	3
HRDE-797	Graduate Capstone Project	3
	Electives or Concentration Courses	9
	Elective	3
Total Semester Credit Hours		**33**

Human Resource Development (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communications	3
HRDE-710	Foundations in Human Resource Development	3
HRDE-711	Program Evaluation and Design	3
HRDE-712	Performance Analysis and Development	3
HRDE-743	Training for Global Organizations	3
HRDE-798	Research Thesis	3
	Electives or Concentration Courses	9
	Elective	3
Total Semester Credit Hours		**33**

Concentration

WORKPLACE LEARNING AND INSTRUCTION		SEMESTER CREDIT HOURS
Choose three of the following:		
HRDE-720	Theories of Organizational Development	3
HRDE-721	Organizational Learning and Knowledge Management	3
HRDE-722	Talent Development	3
HRDE-723	Group Dynamics and Facilitation Skills	3

Electives

HRDE-715	Human Performance Design and Development
HRDE-720	Theories of Organizational Development
HRDE-721	Organizational Learning and Knowledge Management
HRDE-722	Talent Development
HRDE-740	Strategic HRD for Global Organizations
HRDE-742	Leading Change
HRDE-745	Information Systems in HRD
HRDE-765	Diversity in Global Workplace
HRDE-780	Internship
HRDE-789	Special Topics
HRDE-799	Independent Study
SERQ-710	Service Design Fundamentals
SERQ-712	Breakthrough Thinking, Creativity, and Innovation
SERQ-720	Service Scenario and Strategy Development
SERQ-722	Customer Centricity
SERQ-723	Service Analytics
SERQ-730	Project Management in the Service Sector
SERQ-732	Assessment of Service Quality
SERQ-735	Data Mining In the Service Sector
SERQ-740	Leading Innovation
SERQ-745	Social Psychology of Service
SERQ-747	Design Thinking and Creativity
SERQ-787	Service Design and Implementation

Admission requirements

To be considered for admission to the MS program in human resource development, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited college or university.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent) (or evidence of relevant professional performance).
- Submit two letters of recommendation from academic or professional sources.
- Submit a writing sample designated by the department.
- Participate in an interview with a faculty member (when required by department).
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- All required admission materials must be submitted and reviewed by faculty prior to the completion of 9 credit hours of graduate work in the program.

Additional information

Advising

Upon matriculation, each student is assigned an advisor who will work with the student to develop a plan of study.

Management, MS

www.rit.edu/study/management-ms

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Program overview

Designed both for students without business experience or those who have earned an undergraduate business degree, the MS in management prepares professionals for management roles within a range of industries. The management masters features four tracks – global management and supply chain management, product and service development, leadership, and a flexible option – that enable you to customize your degree to meet your career goals. Through real-world experience, you'll be prepared for a rewarding career in management.

Tracks

The **global management and supply chain management track** prepares students to be effective business leaders in today's global economy. Course work provides a background in significant aspects of managing and operating a multi-national business, including international competitive strategy, cross-cultural human resource management, global marketing, and global logistics and operation management.

The **product and service development track** develops skills needed to manage the technology development process, coordinate R&D and marketing functions of an organization, and capture value from the commercialization process with business model innovation. Career opportunities range from critical analysis positions, technology and new product project manager positions, brand managers, and functional management occupations like CIO, CTO, and CEOs of technology start-ups.

The **leadership track** develops individual leadership styles and skills needed to manage and lead people and organizations. It positions students for advancement to an executive-level managerial position.

Students also have the opportunity to customize their program. By using elective courses, students may choose graduate courses in a number of exciting fields across all of RIT's colleges. The program prepares students for leadership positions and careers in management.

The **flexible track** is aimed at professionals with a specific industry and/or technology focus and provides the necessary business skills to become a leader in their desired field. The track gives students the flexibility to take science, technology, and art courses from other RIT colleges, allowing them to manage in specialized industries with a technology-oriented focus.

Curriculum

Management (global management and supply chain management option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
DECS-743	Operations and Supply Chain Management	3
INTB-710	Global Business Analytics	3
INTB-780	Global Issues and Strategies	3
MGMT-735	Management of Innovation in Products and Services	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-755	Negotiations	3
MGMT-791	Graduate Project or Business Elective†	3
	Seminar in Ethics/Corporate Social Responsibility*	0
	Supply Chain Management Elective	3
	Business Elective	3
	Free Elective	3
Total Semester Credit Hours		**30**

* May be waived if student has already completed an ethics/corporate social responsibility course.
† Students must complete a graduate project or a comprehensive exam plus an additional business elective.

Management, MS degree, (leadership option), typical course sequence

COURSE		SEMESTER CREDIT HOURS
MGMT-735	Management of Innovation in Products and Services	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-741	Managing Organizational Change	3
MGMT-755	Negotiations	3
MGMT-763	Behavioral Skills for Managers and Professionals	3
MGMT-791	Graduate Project or Business Elective†	3
	Seminar in Ethics/Corporate Social Responsibility*	0
	Leadership Elective	3
	Business Elective	3
	Free Elective	6
Total Semester Credit Hours		**30**

* May be waived if student has already completed an ethics/corporate social responsibility course.
† Students must complete a graduate project or a comprehensive exam plus an additional business elective.

Management, MS degree, (product and service development option), typical course sequence

COURSE		SEMESTER CREDIT HOURS
MGMT-720	Entrepreneurship and New Venture Creation	3
MGMT-735	Management of Innovation in Products and Services	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-743	Advanced Topics in Technology Management	3
MGMT-755	Negotiations	3
MGMT-791	Graduate Project or Business Elective†	3
	Seminar in Ethics/Corporate Social Responsibility*	0
	Business Elective	3
	Free Electives	6
	Product and Service Development Elective	3
Total Semester Credit Hours		**30**

* May be waived if student has already completed an ethics/corporate social responsibility course.
† Students must complete a graduate project or a comprehensive exam plus an additional business elective.

Management, MS degree, (flexible option), typical course sequence

COURSE		SEMESTER CREDIT HOURS
DECS-744	Project Management	3
MGMT-735	Management of Innovation in Products and Services	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-755	Negotiations	3
MGMT-791	Graduate Project or Business Elective†	3
Choose one of the following:		3
MGIS-650	Introduction to Data Analytics and Business Intelligence	
MGIS-735	Design and Information Systems	
Choose one of the following:		3
ACCT-603	Accounting for Decision Makers	
FINC-758	Seminar in Finance	
	Seminar in Ethics/Corporate Social Responsibility*	0
	Free Electives	9
Total Semester Credit Hours		**30**

* May be waived if student has already completed an ethics/corporate social responsibility course.
† Students must complete a graduate project or a comprehensive exam plus an additional business elective.

Admission requirements

To be considered for admission to the MS program in management, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.5 for GMAT waiver*.
- Submit scores from GMAT or GRE (GMAT preferred). Scores cannot be more than five years old.
- Submit an essay based on one of the following topics: (1) describe an ethical dilemma you have faced and how you resolved it; (2) explain what you have learned from a managerial, leadership, or team experi-

ence that was not completely successfully; or (3) describe your greatest professional achievement and how you added value to your organization. The essay should be typed, double-spaced, and two pages in length.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

* The GMAT may be waived if an applicant has a GPA of 3.25 or higher, or they can present evidence of professional work experience of six or more years. Students who cannot submit a GMAT, GRE, or one of the two waiver requirements may be considered for admission on a case-by-case basis.

For further information about program specific GMAT/GRE waiver opportunities, tips on personal statements, and additional guidance on how to submit a successful application, please visit Saunders College of Business Admissions Requirements.

Organizational Learning, Adv. Cert.

www.rit.edu/study/organizational-learning-adv-cert

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Program overview

The advanced certificate in organizational learning provides students with an in-depth understanding of how people learn. Courses cover the theories of instructional design, including the use of technology and its impact on curriculum design, and the development of courses for both classroom and online learning. The certificate is appropriate for chief knowledge officers, training directors, personnel new to the teaching field, and those who wish to embark on a career in teaching or training.

Curriculum

Organizational Learning, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HRDE-710	Foundations in Human Resource Development	3
HRDE-720	Theories of Organizational Development	3
HRDE-721	Organizational Learning and Knowledge Management	3
HRDE-722	Talent Development	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in organizational learning, candidates must fulfill the following requirements:
- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Service Leadership and Innovation, MS

www.rit.edu/study/service-leadership-and-innovation-ms

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Program overview

Today's global economy requires visionary management, a 360-degree view of customers, and breakthrough service strategies. The MS degree in service leadership and innovation allows those who work in any industry to transform their organization through novel ways of thinking, problem-solving, and projecting the future. By learning how to see and capitalize on opportunities that others miss, graduates of the program are positioned to take employees, and themselves, to new levels of success in a constantly changing world.

Plan of study

Thesis/Capstone/Exam options
All students must complete a thesis, capstone project, or comprehensive exam as a culminating experience, which allows for the demonstration of competencies for theory and application material for the discipline. Students will be informed by the program advisor and/or program faculty as to which option is most appropriate based on career goals and objectives. In the program the default is to complete the comprehensive examination upon completion of required and elective course work. If a student seeks to complete a thesis or capstone project, this alternative option is possible if the faculty advisor and department chair agrees with the student in their ability to complete this strategy.

Curriculum

Service Leadership and Innovation (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
SERQ-710	Service Design Fundamentals	3
SERQ-712	Breakthrough Thinking, Creativity, and Innovation	3
SERQ-720	Service Scenario and Strategy Development	3
SERQ-723	Service Analytics	3
SERQ-740	Leading Innovation	3
	Concentration Course or elective	3
Second Year		
SERQ-787	Service Design and Implementation	3
SERQ-795	Comprehensive Exam	0
	Concentration Courses or electives	6
	Elective	3
Total Semester Credit Hours		**33**

Service Leadership and Innovation (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communications	3
SERQ-710	Service Design Fundamentals	3
SERQ-712	Breakthrough Thinking, Creativity, and Innovation	3
SERQ-720	Service Scenario and Strategy Development	3
SERQ-723	Service Analytics	3
SERQ-740	Leading Innovation	3
Second Year		
SERQ-797	Capstone Project	3
	Concentration Courses or electives	9
Total Semester Credit Hours		**33**

Service Leadership and Innovation (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communications	3
SERQ-710	Service Design Fundamentals	3
SERQ-720	Service Scenario and Strategy Development	3
SERQ-740	Leading Innovation	3
SERQ-723	Service Analytics	3
SERQ-712	Breakthrough Thinking, Creativity, and Innovation	3
Second Year		
SERQ-790	Research Thesis	3
	Concentration Courses or electives	9
Total Semester Credit Hours		**33**

Concentration

COURSE		SEMESTER CREDIT HOURS
Higher Education		
EDLI-753	The Student Experience in Higher Education	3
EDLI-754	Critical Systems in Higher Education	3
EDLI-757	Organization and Leadership in Higher Education	3

Electives

COURSE	
HRDE-711	Program Evaluation and Design
HRDE-712	Performance Analysis and Development
HRDE-715	Human Performance Design and Development
HRDE-720	Theories of Organizational Development
HRDE-721	Organizational Learning and Knowledge Management
HRDE-722	Talent Development
HRDE-740	Strategic HRD for Global Organizations
HRDE-742	Leading Change
HRDE-743	Training for Global Organizations
HRDE-745	Information Systems in HRD
HRDE-780	Internship
SERQ-722	Customer Centricity
SERQ-730	Project Management in the Service Sector
SERQ-732	Assessment of Service Quality
SERQ-735	Data Mining in the Service Sector
SERQ-745	Social Psychology of Service
SERQ-747	Design Thinking and Creativity
SERQ-787	Service Design and Implementation

Admission requirements

To be considered for admission to the MS in service leadership and innovation, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent), or evidence of relevant professional performance.
- Submit two letters of recommendation from academic or professional sources.
- Submit a writing sample designated by the department.
- Participate in an interview with a faculty member (when required by department).
- International applicants whose native language is not English must submit scores from the TOEFL or IELTS exams. A minimum score of 88 on the TOEFL or 6.5 on the IELTS exams is required (requirements on sub-scores on each component of the TOEFL or IELTS may also apply). The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Upon arrival at RIT, international students may be asked to take an English language proficiency exam. Those who do not meet the mini-

mum standard will be required to take additional English language courses.
- All required admission materials must be submitted and reviewed by faculty prior to the completion of 9 semester credit hours of graduate course work in the program.

Service Leadership and Innovation, Adv. Cert.

www.rit.edu/study/service-leadership-and-innovation-adv-cert

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Program overview

The advanced certificate in service leadership and innovation provides a curriculum that focuses on the elements of system design and future scenarios to develop strategy, and on organizing plans to achieve future aspirations. This certificate is appropriate for CEO and COO's oriented to helping their organizations achieve sustainable growth capitalizing on their human potential as well as those interested in evolving into these roles within a human resource department.

Curriculum

Service Leadership and Innovation, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SERQ-710	Service Design Fundamentals	3
SERQ-720	Service Scenario and Strategy Development	3
SERQ-730	Project Management in the Service Sector	3
SERQ-735	Data Mining in the Service Sector	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in service leadership and innovation, candidates must fulfill the following requirements:
- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement and writing sample.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Technology Entrepreneurship, Adv. Cert.

www.rit.edu/study/technology-entrepreneurship-adv-cert

Matthew Cornwell, Assistant Director of Student Services and Outreach
585-475-6916, mcornwell@saunders.rit.edu

Program overview

Today's entrepreneur faces a highly competitive and constantly changing marketplace driven by continuous innovation in technology, business models, execution, and strategy. In order to succeed, the new entrepreneur must develop an understanding of these dynamics and how their interplay creates value for a new venture.

The advanced certificate in technology entrepreneurship features three required courses plus one elective. In its entirety, the curriculum provides the skills and knowledge an entrepreneur needs to successfully navigate the process of starting a new venture and managing technical innovation.

Curriculum

Technology Entrepreneurship, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MGMT-720	Entrepreneurship and New Venture Creation	3
MGMT-730	Technology Entrepreneurship	3
FINC-605	Financing New Ventures	3
Choose one of the following:		3
MGMT-610	Global Entrepreneurship	
MGMT-765	Applied Venture Creation	
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in technology entrepreneurship, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement and writing sample.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Faculty

Dean's Office

Jacqueline Reynolds Mozrall, BS, Rochester Institute of Technology; MS, North Carolina State University; Ph.D., University of New York at Buffalo—Dean; Professor

Qiang (John) Tu, BS, MS, Xi'an Jiaotong University (China); Ph.D., University of Toledo—Senior Associate Dean; Professor

Lisa Boice, BA, MBA, Long Island University; JD, Hofstra University School of Law—Assistant Dean for Student Services

Finance and Accounting

Steven C. Gold, BA, BS, Rutgers University; MA, Ph.D., State University of New York at Binghamton—Professor, Interim Department Chair

Emily Cokeley, BS, Bethany College; BS, State University College at Brockport; Ph.D., Syracuse University—Visiting Lecturer

John Curran, BA, University of Rochester; MS, Syracuse University—Lecturer

Philip C. Gelsomino II, BS, MS, Rochester Institute of Technology; CPA, New York—Lecturer

Chun-Keung (Stan) Hoi, BA, MS, North Texas State University; Ph.D., Arizona State University—Professor

Zhijian (James) Huang, B.Eng., Shanghai Jiaotong University (China); MS, Michigan State University; M.Eng., Cornell University; Ph.D., Pennsylvania State University—Assistant Professor

Archana Jain, B.Comm., M.Comm., University of Rajasthan (India); MBA, Ph.D., University of Memphis—Assistant Professor

Stephen LaGrou, BA, State University College at Geneseo; MBA, State University of New York at Buffalo; JD, City University of New York School of Law—Senior Lecturer

Suzanne McCaffrey, BS, University of Maryland, College Park; MS, University of Mississippi—Visiting Lecturer

Leonid (Leo) Pugachev, Ph.D., University of Oklahoma—Assistant Professor

Ashok J. Robin, B.Comm, University of Madras (India); MBA, Ph.D., State University of New York at Buffalo—Madelon and Richard Rosett Chair for Research; Professor

Qian Song, B.Sc ., M.Sc ., Qingdao University (China); Ph.D., Washington State University—Associate Professor

Daniel D. Tessoni, BBA, St. John Fisher College; MS, Clarkson College of Technology; Ph.D., Syracuse University; CPA, New York—Associate Professor

Dilin Wang, BS, University of Alaska Fairbanks; MS, State University of New York at Buffalo; Ph.D., Oregon State University—Assistant Professor

Ke-an Wu, BS, Jiangxi University of Finance and Economics (China); MS, Catholic University Leuven (Belgium); Ph.D., University of Oregon—Assistant Professor

Rong Yang, BS, MS, Tianjin University of Finance and Economics (China); MBA, Ph.D., Rutgers University—Professor

Hao Zhang, BA, MA, Xiamen University (China); Ph.D., State University of New York at Buffalo—Associate Professor

Management

Shalini Khazanchi, BS, South Gujarat University (India); MBA, University of Pune (India); Ph.D., University of Cincinnati—Department Chair; Professor

Robert J. Barbato, BA, Le Moyne College; Ph.D., Michigan State University—Professor

Steven Carnovale, BS, Ph.D., Rutgers University—Assistant Professor

Richard DeMartino, BA, Roanoke College; MPA, Ph.D., University of Virginia—Simone Chair for Innovation and Entrepreneurship; Professor

John E. Ettlie, BS, MS, Ph.D., Northwestern University—Benjamin Forman Chair for Research; Professor

Kenan Guler, Ph.D., Rutgers University—Assistant Professor Visiting

Clyde E. Hull, BA, Yale University; MB, MBA, Ph.D., Indiana University—Head of Accreditation and Curriculum Improvement; Professor

H. Andy Lawrence, BS, EMBA, Rochester Institute of Technology—Lecturer

Martin Lawlor, BA, State University of New York at Buffalo; MBA, Rochester Institute of Technology—Director, Online EMBA; Senior Lecturer

Ezekiel Leo, BA, University of California, Berkeley; Ph.D., University of Illinois at Urbana-Champaign—Assistant Professor

Stephen Luxmore, BA, MA, University of Guelph (Canada); Ph.D.; University of Toronto (Canada)—Principle Lecturer

Molly McGowan, BA, State University College at Geneseo; MPA, State University College at Brockport—Lecturer

A. Erhan Mergen, BS, Middle East Technical University (Turkey); MS, Ph.D., Union College—Professor

dt ogilvie, BA, Oberlin College; MBA, Southern Methodist University; Ph.D., University of Texas at Austin—Distinguished Professor of Urban Entrepreneurship; Professor

Joy Olabisi, BS, Georgia Institute of Technology; MS, Ph.D., University of Michigan—Associate Professor

Michael E. Palanski, BS, Grove City College; MA, Covenant Theological Studies; Ph.D., Binghamton University—Associate Professor

Sandra L. Rothenberg, BS, Syracuse University; MS, Ph.D., Massachusetts Institute of Technology—Director, Saunders College Institute of Business Ethics; Professor

Ettore Spadafora, Ph.D., University of South Carolina—Assistant Professor

William J. Stevenson, BSIE, MBA, Ph.D., Syracuse University—Associate Professor

Shawn Sturgeon, Ph.D., University of Cincinnati—Director of Accreditation and Assessment; Lecturer

Zhi Tang, BA, Shandorun University (China); MA, Fudon University (China); Ph.D., University of Alabama—Professor

Robert B. Vlosky, MBA, Wake Forest University—Visiting Lecturer

John D. Ward, BS, Georgia Institute of Technology; MS, Purdue University—Principle Lecturer

Management Information Systems, Marketing, and Digital Business

Sean William Hansen, BA, Harvard University; MBA, Ph.D., Case Western Reserve University—Department Chair-Associate Professor

Duygu (Kayiran) Adkevelioglu, BS, MS, Bilkent University (Turkey)—Assistant Professor

Quang (Neo) Bui, BS, MS, Brigham Young University; Ph.D., Bentley University—Assistant Professor

Sorim Chung, BJ, MA, University of Missouri, Columbia; MA, Ph.D., University of California, Riverside—Assistant Professor

Deborah Colton, BA, State University of New York at Buffalo; MBA, Rochester Institute of Technology; Ph.D., University of South Carolina—Associate Professor

Laurie Dwyer, BS, St. Lawrence University; MBA, Rochester Institute of Technology—Principle Lecturer

Neil Hair, BS, University of Wales (United Kingdom); MS, Sheffield Hallam University (United Kingdom); Ph.D., Cranfield University (United Kingdom)—Associate Professor

V. Myles Landers, BS, Berry College; Ph.D., The University of Alabama—Assistant Professor

Saiwu Lin, MS, University of Arizona—Lecturer

Manlu Liu, BS, Jiangsu University (China); MS, Zhejiang University; MBA, The Hong Kong University of Science & Technology (Hong Kong); Ph .D ., University of Arizona—Associate Professor

Richard Mislan, BS, Rochester Institute of Technology; MS, Ferris State University; Ph.D., Nova Southeastern University—Lecturer

Emi Moriuchi, BA, Manchester Metropolitan University (United Kingdom); MA, Hawaii Pacific University; Ph.D., University of Manchester (United Kingdom)—Assistance Professor

Rajendran (Raj) Sriramachandra Murthy, BE, University of Madras (India); MBA, Ph.D., Southern Illinois University—Associate Professor

Victor J. Perotti, BS, MA, MS, Ph.D., The Ohio State University—Professor

Bryan A. Reinicke, BA, College of Wooster; MBA, Kent State University; Ph.D., Indiana University—Associate Professor

Qiang (John) Tu, BS, MS, Xi'an Jiaotong University (China); Ph.D., University of Toledo—Senior Associate Dean; Professor

Keith Weber, MS, California State University, Fullerton—Lecturer

International Hospitality and Service Innovation

Department of Hospitality and Tourism Management

William H. Dresnack, BS, Long Island University; MS, State University of New York at Binghamton; JD, University of Buffalo—Interim Department Chair; Professor

Edward Ganster, BS, MS, Rochester Institute of Technology— Lecturer

Lorraine E. Hems, BS, Nazareth College of Rochester; MS, Rochester Institute of Technology; CS, CWE—Lecturer

Jerrie (Yu-chin) Hsieh, BS, National Taiwan Normal University (Taiwan); MS, Ph.D., Purdue University—Graduate Program Director; Associate Professor

Muhammet Kesgin, BSc, MSc, Akdeniz University (Turkey); Ph.D., Coventry University (United Kingdom)—Associate Professor

Richard M. Lagiewski, BS, MS, Rochester Institute of Technology; Ph.D., Edinburgh Napier University (Scotland)—Assistant Professor

Karthik Namasivayam, BA, Madras University (India); MS, Ph.D., Cornell University—Professor

Carol B. Whitlock, BS, MS, Pennsylvania State University; Ph.D., University of Massachusetts; RD, CDN, CFS—Professor

Department of Service Systems

Malarvizhi Hirudayaraj, BA, Fatima College (Trinidad and Tobago); B.Ed., Madurai Kamaraj University (India); MA, Stella Maris College (India); M.Phil., University of Madras (India); Ph.D., Southern Illinois University—Associate Professor

Jennifer Matic, BA, Grand Valley State University; MS, Rochester Institute of Technology; Ph.D., University of Bath (United Kingdom)—Assistant Professor

Torrence E. Sparkman, BS, University of Illinois at Chicago; M.Div., Trinity Evangelical Divinity School; Ph.D., University of Illinois at Urbana-Champaign—Associate Professor

Phillippa Thiuri, BA, Mount Holyoke College; M.Ed., Harvard University; Ph.D., Boston College—Lecturer

Linda Underhill, RD, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Associate Professor

Distinguished Professorships

Eugene Fram Chair in Critical Thinking

Established: 2012

Donor: Anonymous

Purpose: Designed to provide campus-wide leadership in cross-disciplinary approaches to critical thinking.

Held by: Jennifer L. Schneider, CIH

J. Warren McClure Research Professorship in Marketing

Established: 1977

Donor: Mr. and Mrs. J. Warren McClure

Purpose: To perpetuate Mr. McClure's professional interest in the field of marketing

Held by: Rajendran Sriramachandra Murthy, Ph.D.

Madelon and Richard Rosett Chair

Established: 2000

Donor: Madelon and Richard Rosett

Purpose: To support a professorship of a nationally prominent scholar in any field of business

Held by:Hao Zhang

Benjamin Forman Chair for Collaborative Research

Established: 2008

Donor: Maurice Foreman in honor of his father, Benjamin Forman

Purpose: To support a professorship of a nationally prominent scholar in

Research, Teaching, or Collaboration

Held by: Vic Perotti

Benjamin Forman Chair for Research

Established: 2008

Donor: Maurice Foreman in honor of his father, Benjamin Forman

Purpose: To support a professorship of a nationally prominent scholar in Research, Teaching, or Collaboration

Held by: Michael Palanski

Benjamin Forman Chair for Teaching Excellence

Held by: John Ward
Executive Education Professorships
Held by: John Ettlie and Ashok Robin

Daniel D. Tessoni Endowed Chair in Accounting

Established: 2015
Donor: Friends and Alumni of Dan Tessoni and Saunders College of Business

Purpose: To honor Daniel D. Tessoni for his teaching contributions and his lifelong impact on students
Held by: Daniel Tessoni, Ph.D.

Golisano College of Computing and Information Sciences

Anne R. Haake, Dean
rit.edu/computing

Programs of Study

Online learning option available.

The Golisano College of Computing and Information Sciences is one of the most comprehensive computing colleges in the United States. The college offers 18 baccalaureate and master's degrees in a variety of computing disciplines, as well as a doctorate in computing and information sciences. With its focus on inter-departmental and intercollege cooperation, the college directs its energy and effort toward discovering new, innovative methods and research opportunities in solving complex, present-day and future computing challenges.

The college's programs address the growing need for experts in the fields of computational science, human-computer interaction and accessibility, gaming, simulation, computing security, edutainment, management of complex information technology infrastructures,and software engineering. These programs offer the most current thinking in computing and information sciences and technology, and are supported by extensive laboratory facilities and outstanding faculty.

Admission requirements

Each college makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarships

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Faculty

The college's faculty is a dedicated group of teacher-scholars performing use-inspired research with an emphasis on student involvement and career preparation. Faculty members provide leadership by implementing innovative teaching techniques and anticipating and meeting the needs of students and our industrial partners. Many have significant industrial experience in addition to outstanding academic credentials.

Research

The Golisano College supports research across disciplines and is a leader in innovation in a variety of computing fields. Students and faculty partner on cutting edge research that is often multi-disciplinary and which positions students for success in their chosen field of study. Research focuses include accessibility, human-computer interaction, health IT, computing security, and game design and development, among others.

Facilities

The college houses extensive laboratories dedicated to the study and research of computing. There are more than 2,000 workstations and more than 50 classrooms, labs, and studio labs for the study of every major computing platform. Labs are available to students for 16 to 18 hours a day. Network, wireless, and Web access also are available throughout the college, ensuring that our students have the tools necessary to complete their assignments and projects.

The college's dedicated Security Lab is isolated from the rest of the campus's networks to allow the in-depth study of viruses, firewalls, and other computer vulnerabilities. Additional labs include an Entertainment Lab for 3D modeling, game and interactive media development; the Center for Accessibility and Inclusion Research (CAIRLab); and an Artificial Intelligence lab dedicated to the understanding of human reactions and processing.

Big Data Analytics, Adv. Cert.

cs.rit.edu/

Hans-Peter Bischof, Graduate Program Director
585-475-5568, hpb@cs.rit.edu

Program overview

Big data is noted for its volume, varieties of data types, and rapid accumulation. Big data has become a catchphrase to describe data collections that are so large they are not amenable to processing or analysis using traditional database and software techniques. The advanced certificate in big data analytics is a multidisciplinary program intended for professionals with BS degrees in computing or other diverse fields such as finance, retail, science, engineering, or manufacturing—areas where knowledge of how to analyze big data is necessary. The advanced certificate is also meant for students who would like a formal qualification in this area. The program allows professionals with a bachelor's degree to enhance their career opportunities and professional knowledge with targeted graduate course work in a focused area without making a commitment to an MS program.

Plan of study

The goal of the program is to develop expertise in managing and analyzing big data. The program consists of two required courses and two elective courses selected by the student in topic areas related to big data.

Curriculum

Big data analytics, advanced certificate, typical course sequence

COURSE		CR. HRS.
Required Courses		
CSCI-620	Introduction to Big Data	3
CSCI-720	Big Data Analytics	3
Electives*–Choose two of the following:		**6**
CSCI-621	Database System Implementation	
CSCI-622	Secure Data Management	
CSCI-652	Distributed Systems	
CSCI-654	Foundations of Parallel Computing	
CSCI-721	Data Cleaning and Preparation	
CSCI-729	Topics in Data Management	
ISTE-724	Data Warehousing	
ISTE-780	Data-driven Knowledge Discovery	
	Open Elective*	
Total Credit Hours		**12**

* Students who wish to take graduate elective courses not listed must obtain approval from their faculty adviser.

Admission requirements

To be considered for admission to the advanced certificate in big data analytics, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in science, computing, engineering, or a related major.
- Applicants with undergraduate degrees from foreign colleges and universities are required to submit GRE scores. GRE scores from other students may be requested.
- Submit a personal statement of educational objectives outlining the applicant's research/project interests, career goals, and suitability to the program.
- Submit two letters of recommendation from academic or professional sources.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent)
- Have acceptable college level credit or practical experience in probability and statistics, computer programming in a high-level language, and database systems.

Additional information

Study options

This certificate is intended for part-time study; therefore, RIT cannot issue I-20 paperwork.

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed at www.rit.edu/emcs/financialaid/gedt/big-data-analytics.html.

Computer Science, MS

cs.rit.edu/

Hans-Peter Bischof, Graduate Program Director
585-475-5568, hpb@cs.rit.edu

Program overview

The MS in computer science is designed for students who have an undergraduate degree (or minor) in computer science, as well as those who have a strong background in a field in which computers are applied, such as engineering, science, or business.

The degree is offered on a full- or part-time basis. Full-time students take three or four courses per semester and may be able to complete the course work in three semesters. Full-time students who are required to take additional bridge courses may be able to complete the course work in four semesters. Part-time students take one or two courses per semester and may be able to complete the course work in four to five semesters. The time required to complete a master's project is one semester. To complete a master's thesis, two semesters is typical.

Plan of study

The program consists of 30 credit hours of course work, which includes one core course, three courses in a cluster, four electives, and a thesis or project. For those choosing to complete a project in place of a thesis, students complete one additional elective.

Clusters

Students select three cluster courses from the following areas:

Computer graphics and visualization

The computer graphics and visualization cluster provides the technical foundations for graduate studies in computer graphics and image understanding. Areas for further study include graphics programming, rendering and image synthesis, computer animation and virtual reality, image processing and analysis, and data visualization.

Data manangement

The data management cluster studies the foundational data management and knowledge discovery challenges prevalent in design, analysis, and organization of data. The courses cover general database issues including database design, database theory, data management, and data mining.

Distributed systems

This area studies systems formed from multiple cooperating computers, including the analysis, design, and implementation of distributed systems, distributed middleware, and computer networking protocols, including security.

Intelligent systems

Intelligent systems encompasses the study of algorithms and architectures that enable effective decision making in complex environments. Courses cover computer vision, robotics, virtual theater, sensor networks, data mining, document recognition, and the theoretical foundations of decision-making (e.g. Markov chains and the properties of voting protocols).

Languages and tools

The languages and tools cluster combines language design and implementation together with architecture and the use of software development tools. Students specializing in this cluster gain a broad understanding of theoretical and applied knowledge.

Security

The security cluster spans topics from networking to cryptography to secure databases. By choosing different domains in which to study security students gain a broad understanding of both theoretical and applied knowledge.

Theory

The theory cluster studies the fundamentals of computation, which includes complexity theory to determine the inherent limits of computation, communication, and cryptography and the design and analysis of algorithms to obtain optimal solutions within those limits.

Electives

Electives provide breadth of experience in computer science and applications areas. Students who wish to include courses from departments outside of computer science need prior approval from the graduate program director. Refer to the course descriptions in the departments of computer science, engineering, mathematical sciences, and imaging science for possible elective courses.

Master's thesis/project

Students may choose the thesis or project option as the capstone to the program. Students who choose the project option must register for the Project course (CSCI-788). Students participate in required in-class presentations that are critiqued. A summary project report and public presentation of the student's project (in poster form) occurs at the end of the semester.

Curriculum

Computer science (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
CSCI-665	Foundations of Algorithms	3
CSCI-790	Thesis	6
	Cluster Courses	9
	Elective Courses	12
Total Semester Credit Hours		**30**

Computer science (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
CSCI-665	Foundations of Algorithms	3
CSCI-788	Project/Colloquium	3
	Cluster Courses	9
	Elective Courses	15
Total Semester Credit Hours		**30**

Clusters

Computer graphics and visualization

COURSE	
CSCI-610	Foundations of Computer Graphics*
CSCI-711	Global Illumination
CSCI-712	Computer Animation: Algorithms and Techniques
CSCI-713	Applied Perception in Graphics and Visualization
CSCI-714	Scientific Visualization
CSCI-715	Applications in Virtual Reality
CSCI-716	Computational Geometry
CSCI-719	Topics in Computer Vision

* Required course

Data manangement

COURSE	
CSCI-620	Introduction to Big Data*
CSCI-621	Database System Implementation
CSCI-622	Secure Data Management
CSCI-720	Big Data Analytics
CSCI-721	Data Cleaning and Preparation
CSCI-729	Topics in Data Management

* Required course

Distributed systems

COURSE	
CSCI-651	Foundations of Computer Networks*
CSCI-652	Distributed Systems
CSCI-654	Foundations of Parallel Computing
CSCI-662	Foundations of Cryptography
CSCI-759	Topics in Systems
CSCI-762	Advanced Cryptography

* Required course

Intelligent systems

COURSE	
CSCI-630	Foundations of Intelligent Systems*
CSCI-631	Foundations of Computer Vision
CSCI-632	Mobile Robot Computing
CSCI-633	Biologically Inspired Intelligent Systems
CSCI-731	Advanced Computer Vision
CSCI-732	Image Understanding
CSCI-735	Foundations of Intelligent Security Systems
CSCI-736	Neural Networks and Machine Learning
CSCI-737	Pattern Recognition
CSCI-739	Topics in Intelligent Systems

* Required course

Languages and tools

COURSE	
CSCI-641	Advanced Programming Skills
CSCI-740	Programming Language Theory
CSCI-742	Compiler Construction*
CSCI-746	Software Development Tools
CSCI-749	Topics in Language and Tools

* Required course

Security

COURSE	
CSCI-622	Secure Data Management
CSCI-642	Secure Coding
CSCI-651	Foundations of Computer Networks*
CSCI-662	Foundations of Cryptography
CSCI-729	Topics in Data Management
CSCI-734	Foundations of Security Measurement and Evaluation
CSCI-735	Foundations of Intelligent Security Systems
CSCI-739	Topics in Intelligent Systems
CSCI-759	Topics in Systems
CSCI-762	Advanced Cryptography
CSCI-769	Topics in Theory

* Required course

Theory

COURSE	
CSCI-662	Foundations of Cryptography
CSCI-664	Computational Complexity
CSCI-716	Computational Geometry
CSCI-740	Programming Language Theory
CSCI-749	Topics in Language and Tools
CSCI-761	Topics in Advanced Algorithms
CSCI-762	Advanced Cryptography
CSCI-769	Topics in Theory

Admission requirements

To be considered for admission to the MS in computer science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE. Applicants with undergraduate degrees from foreign colleges and universities are required to submit GRE scores. GRE scores from other students may be requested.
- Submit a personal statement of educational objectives outlining the applicant's research/project interests, career goals, and suitability to the program.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Prerequisites

Applicants must satisfy prerequisite requirements in mathematics (differential and integral calculus, probability and statistics, discrete mathematics, and computer science theory) and computing (experience with a modern high-level language [e.g., C++, Java], data structures, software design methodology, introductory computer architecture, operating systems, and programming language concepts).

Additional information

Bridge courses

If an applicant lacks any prerequisites, bridge courses may be recommended to provide students with the required knowledge and skills needed for the program. If any bridge courses are indicated in a student's plan of study, the student may be admitted to the program on the condition that they successfully complete the recommended bridge courses with a grade of B (3.0) or better (courses with lower grades must be repeated). Generally, formal acceptance into the program is deferred until the applicant has made significant progress in this additional course work. Bridge program courses are not counted as part of the 30 credit hours required for the master's degree. During orientation, bridge exams are conducted. These exams are the equivalent to the finals of the bridge courses. Bridge courses will be waived if the exams are passed.

Faculty

Faculty members in the department are actively engaged in research in the areas of artificial intelligence, computer networking, pattern recognition, computer vision, graphics, visualization, data management, theory, and distributed computing systems. There are many opportunities for graduate students to participate in these activities toward thesis or project work and independent study.

Facilities

The computer science department provides extensive facilities that represent current technology, including:

- a graduate lab with more than 15 Mac's and a graduate library;
- specialized labs in graphics, computer vision, pattern recognition, security, database, and robotics; and

- six general purpose computing labs with more than 100 workstations running Linux, Windows, and OS X; plus campus-wide wireless access.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Computing and Information Sciences, Ph.D.

rit.edu/gccis/phd

Pengcheng Shi, Director; Associate Dean for Research and Scholarship
585-475-6147, pengcheng.shi@rit.edu

Program overview

The doctoral program in computing and information sciences is designed to produce independent scholars, well-prepared educators, and cutting-edge researchers poised to excel in their work in computing and interdisciplinary academic, industrial, or government environments. The degree highlights two of the most unique characteristics of the Golisano College: its breadth of program offerings and its scholarly focus on discovering solutions to real-world problems by balancing theory and practice.

The program focuses on the theoretical and practical aspects of cyberinfrastructure as applied to specific problems across multiple domains. It is a blend of intra-disciplinary computing knowledge areas and interdisciplinary domain areas.

Cyberinfrastructure

Cyberinfrastructure (CI) is the comprehensive integration of hardware, data, networks, and digitally-enabled sensors to provide secure, efficient, reliable, accessible, usable, and interoperable suites of software and middleware services and tools. The doctorate program plays a leadership role in CI research by providing human-centered tools for the science and engineering communities. These tools and services focus on such areas as high performance computing, data analysis and visualization, cyber-services and virtual environments, and learning and knowledge management.

Intra-disciplinary knowledge

There are three intra-disciplinary computing knowledge areas: infrastructure, interaction, and informatics.

Infrastructure comprises aspects related to hardware, software (both system software and applications), communications technology, and their integration with computing systems through applications. The focus is on the best organization of these elements to provide optimal architectural solutions. On the hardware side it includes system-level design (e.g., for system-on-a-chip solutions) and their building block components. On the software side it covers all aspects of systems and applications software development, including specification and design languages and standards; validation and prototyping, and multi-dimensional Quality-of-Service management; software product lines, model-driven architectures, component-based development, and domain-specific languages; and product estimation, tracking, and oversight. The communications subtopic includes sensor networks and protocols; active, wireless, mobile, configurable, and high-speed networks; and network security and privacy, quality of service, reliability, service discovery, and integration and inter-networking across heterogeneous networks. At the system level there are issues related to conformance and certification; system dependability, fault tolerance, verifiable adaptability, and reconfigurable systems; real-time, self adaptive, self-organizing, autonomic systems. Some of the specialties available in this area are networks and security, digital systems and VLSI, software design and productivity, and systems software.

Interaction refers to topics related to the combined action of two or more entities (human or computational) that affect one another and work together when facilitated by technology. It encompasses several subtopics relating to how people and technology interact and interface. Several common threads weave through all of these areas, many of which rely heavily and build upon foundations in the social and behavioral sciences with an emphasis on understanding human and social/organiza-

tional phenomena. To some extent, these fields follow an engineering approach to the design of interactions in which solutions are based on rules and principles derived from research and practice, but require analyses that go beyond the analytical approach. From this perspective, solutions can be measured and evaluated against goals and intended outcomes. However, while efficiency and effectiveness are often the watchwords of these fields in practice, this is also where science meets art in computing. Creative design and sensitivity to human needs and aesthetics are critical. Some of the specialties available in this area are human-computer interaction, computer-based instructional systems, and access technologies.

Informatics is the study of computational/algorithmic techniques applied to the management and understanding of data-intensive systems. It focuses on the capture, storage, processing, analysis, and interpretation of data. Topics include algorithms, complexity, and discovery informatics. Data storage and processing require investigation into tools and techniques for modeling, storage, and retrieval. Analysis and understanding require the development of tools and techniques for the symbolic modeling, simulation, and visualization of data. The increased complexity of managing vast amounts of data requires a better understanding of the fundamentals of computation. These fundamentals include complexity, theory to determine the inherent limits of computation, communication, cryptography, and the design and analysis of algorithms to obtain optimal solutions within the limits identified. Some of the specialties available in this area are core informatics, discovery informatics, and intelligent systems.

Interdisciplinary domains

The program focuses on domain-specific computing, or the interaction between computing and non-computing disciplines, in the areas of science, engineering, medicine, arts, humanities, and business. By incorporating domain-specific computing, the research conducted in this program applies computing and information science principles to the solution of problems in application domains that lie outside the scope of the traditional computing discipline. The research requirement incorporates fundamental concepts in cyberinfrastructure that are necessary for understanding the problems commonly encountered in advancing scientific discovery and product development in cross-disciplinary domains.

Active research areas

Computing

- Algorithm and theory
- Artificial intelligence and machine learning
- Communication and networking
- Computer vision and pattern recognition
- Data management and analytics
- Education research
- Game design
- Graphics and visualization
- Human-computer interaction
- Natural language processing
- Pervasive and Mobile Computing
- Programming languages
- Security and privacy
- Software engineering

Domain applications

- Accessibility and inclusion
- Biomedical computing
- Cognitive sciences
- Computational astrophysics
- Computational finance
- Geographic information system
- Imaging and image informatics
- Service sciences
- Social computing

Plan of study

The program requires a minimum of 60 credit hours beyond the baccalaureate level comprised of graduate-level course work, including seminar attendance and research credits.

Required courses

Students complete 18 credit hours of required foundation and core elective courses and 2 credit hours of teaching skills courses.

Electives

Elective courses provide foundation support of the student's dissertation research area. These courses come from cyberinfrastructure courses, domain courses, and other electives.

Dissertation and research

Students are required to conduct original research that leads to peer-reviewed publications.

Assessments

Each student must pass three assessment examinations in the following order:

1. Research potential assessment: qualifying exam

Completed after the first year, this assessment evaluates the research tasks students have worked on in their first year in the program. Passing this assessment will qualify students to continue in the doctoral program.

2. Thesis proposal defense: candidacy exam

This is an oral examination completed after the thesis proposal is written. Formal admission to candidacy will be granted after successfully passing the research potential assessment requirement and having a research proposal approved by the dissertation committee. The dissertation committee will have a minimum of four members including the student's adviser.

3. Dissertation defense

This is the final examination. The dissertation defense includes the dissertation committee and an optional external reader from outside RIT. The exam consists of a formal, oral presentation of the thesis research by the student, followed by questions from the audience.

Curriculum

Computing and information sciences, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CISC-810	Research Foundations	3
CISC-820	Quantitative Foundations	3
CISC-830	Cyberinfrastructure Foundations	3
CISC-890	Dissertation and Research	6
	Infrastructure Core Elective	3
	Interaction Core Elective	3
	Informatics Core Elective	3
Second Year		
CISC-890	Dissertation and Research	7
CISC-807	Teaching Skills Workshop	2
	Graduate Electives	9
Third Year		
CISC-890	Dissertation and Research	18
Fourth Year and beyond		
CISC-890	Dissertation and Research	0
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the doctorate program in computing and information sciences, candidates must fulfill the following requirements:

- Complete a graduate application,
- Hold a baccalaureate degree or its equivalent,*
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Record Examination (GRE)†,
- Submit a statement of purpose, containing, but not limited to, research experiences and interests, motivation to pursue doctorate, and long-term goals,
- Submit a recent curriculum vitae or resume,
- Submit at least two letters of academic and/or professional recommendation. Referees should send recommendation letters by email to gradinfo@rit.edu or via postal service directly to the Office of Graduate and Part-time Enrollment.
- Submit professional or research paper sample(s), if available.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 88 (internet-based) is required.

* Since the program encompasses a wide variety of disciplines, students with diverse backgrounds (e.g.: engineering, science, humanities, fine arts, business, and disciplines with sufficient computing backgrounds) are encouraged to apply. Applicants should have the following minimum course work requirements: one full year of study in programming and computing concepts; strong mathematical background in subjects such as discrete mathematics, and probability and statistics; and aptitude, vision, and experience (if applicable) in computing and information sciences related research.
† Basic exam score; taken within last five years.

Interview

An interview by one or more members of the doctoral program faculty and/or admissions committee may be required for candidates considered for admission prior to final selection. This interview may be conducted via telephone.

Additional information

Residency requirement

One year of full-time residency is required.

Transfer credit

Students with previous graduate course work, or a master's degree in a computing and information sciences discipline or in a related domain-specific discipline, may be granted up to 9 credit hours towards the degree requirements. The transfer credit evaluation will not be made until after the research potential assessment. Consideration for transfer credit will include the appropriateness to the student's intra- and inter-disciplinary program of study and research interests.

Assistantships

Assistantships, which include tuition and stipend, are available and awarded on a competitive basis.

Computing Security, MS

rit.edu/gccis/computingsecurity

Sumita Mishra, Graduate Program Director
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Program overview

Developers of computing systems and practitioners in all computing disciplines need an understanding of the critical importance of building security and survivability into the hardware and software of computing systems they design, rather than trying to add it on once these systems have been designed, developed, and installed.

The MS in computing security gives students an understanding of the technological and ethical roles of computing security in today's society and its importance across the breadth of computing disciplines. Students can develop a specialization in one of several security-related areas by selecting technical electives under the guidance of a faculty adviser. The program enables students to develop a strong theoretical and practical foundation in secure computing, preparing them for leadership positions in both the private and public sectors of the computing security industry, for academic or research careers in computing security, or to pursue a more advanced degree in a computing discipline.

Plan of study

The program is designed for students who have an undergraduate computing degree in an area such as computing security, computer science, information technology, networking, or software engineering, as well as those who have a strong background in a field in which computers are applied, such as computer or electrical engineering.

The curriculum consists of three required core courses, up to 6 technical electives (depending on the capstone option chosen), and a thesis, project, or capstone course for a total of 30 semester credit hours.

Electives

Students are required to choose up to six technical electives.

Curriculum

Computing security (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CSEC-742	Computer System Security	3
CSEC-604	Cryptography and Authentication	3
	Research Electives	6
	Advanced Electives	6
Second Year		
CSEC-790	MS Thesis	6
	Advanced Electives	6
Total Semester Credit Hours		**30**

Computing security (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CSEC-742	Computer System Security	3
CSEC-604	Cryptography and Authentication	3
	Research Electives	6
	Advanced Electives	6
Second Year		
CSEC-791	MS Project	3
	Advanced Electives	9
Total Semester Credit Hours		**30**

Computing security (capstone course option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CSEC-742	Computer System Security	3
CSEC-604	Cryptography and Authentication	3
	Research Electives	6
	Advanced Electives	6
Second Year		
CSEC-793	Capstone for Computing Security	3
	Advanced Electives	9
Total Semester Credit Hours		**30**

Elective courses

COURSE	
CMPE-661	Hardware and Software Design for Cryptographic Applications
CSEC-730	Advanced Computer Forensics
CSEC-731	Web Server and Application Security Audits
CSEC-732	Mobile Device Forensics
CSEC-733	Information Security Risk Management
CSEC-741	Sensor and SCADA Security
CSEC-742	Computer System Security
CSEC-743	Computer Viruses and Malicious Software
CSEC-744	Network Security
CSEC-750	Covert Communications
CSEC-751	Information Security Policy and Law
CSCI-620	Introduction to Big Data
CSCI-622	Secure Data Management
CSCI-642	Secure Coding
CSCI-662	Foundations of Cryptography
CSCI-720	Big Data Analytics
CSCI-734	Foundations of Security Measurement and Evaluation
CSCI-735	Foundations of Intelligent Security Systems
CSCI-736	Neutral Networks and Machine Learning
CSCI-762	Advanced Cryptography
ISTE-721	Information Assurance Fundamentals

Admission requirements

To be considered for admission to the MS in computing security, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in computing security, computer science, software engineering, information technology, networking, computer engineering, electrical engineering, applied mathematics, or computer engineering technology (exceptional students from other fields may be admitted on a contingent basis).
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a minimum of two recommendations from individuals who are well-qualified to assess the applicant's potential for success.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Prerequisites

Applicants must satisfy prerequisite requirements in mathematics (integral calculus, discrete mathematics), statistics, natural sciences (physics, chemistry, etc.), and computing (programming, computer networking theory and practice, and systems administration theory and practice).

Bridge program

Students whose undergraduate preparation or employment experience does not satisfy the prerequisites required for the program may make up deficiencies through additional study. Bridge course work, designed to close gaps in a student's preparation, can be completed either before or after enrolling in the program as advised by the graduate program director. Generally, formal acceptance into the program is deferred until the applicant has made significant progress through this additional preparation.

If completed through academic study, bridge courses must be completed with a grade of B (3.0) or better. Courses with lower grades must be repeated. Bridge courses are not counted toward the 30 credit hours required for the master's degree. However, grades earned from bridge courses taken at RIT are included in a student's graduate grade point average.

A bridge program can be designed in different ways. Courses may be substituted based upon availability, and courses at other colleges may be applied. All bridge course work must be approved in advance by the graduate program director.

Additional information

Study options

The program is offered online and on campus.

Faculty

The program faculty are actively engaged in consulting and research in various areas of secure computing and information assurance, such as cryptography, databases, networking, secure software development, and critical infrastructure security. There are opportunities for students to participate in research activities towards capstone completion or as independent study work.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Cybersecurity, Adv. Cert.

csec.rit.edu/
Sumita Mishra, Graduate Program Director
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Program overview

This advanced certificate in cybersecurity provides the fundamental knowledge and expertise in network security and forensics necessary for security in networked environments. Students learn to make computers and networks resistant to attack by closing off vulnerabilities and by monitoring intrusions. The application of forensics allows successful attacks on computer systems to be detected. This involves gathering information on the nature and extent of the attack for presentation in a court of law, as well as assessing the extent of the damage to an organization. Courses taken as part of this certificate can transfer into the MS program in computing security.

Curriculum

Cybersecurity, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CSEC-744	Network Security	3
CSEC-730	Advanced Computer Forensics	3
	Electives	6
Total Semester Credit Hours		**12**

*Sample electives**

COURSE	
CSEC-603	Enterprise Security
CSEC-733	Information Security Risk Management
CSEC-742	Computer System Security
CSEC-743	Computer Viruses and Malicious Software

* Please see program chair for a complete list of current elective courses.

Admission requirements

To be considered for admission to the advanced certificate in cybersecurity, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university.
- Have knowledge of computing networking and system administration, and introductory knowledge of computing security.
- Submit transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- While GRE scores are not required for students with degrees from US universities, they are strongly recommended for applicants with an undergraduate GPA that is lower than required. Relevant employment experience can strengthen a candidate's application for admission.
- Official scores from the GRE are required for individuals with degrees from international universities.

Bridge program

Based on the evaluation of an applicant's academic and relevant experience, the graduate program director may require some applicants to complete a bridge course to fulfill any gaps in the required prerequisites needed for admission to the program. The bridge course, Introduction to Computing Security (CSEC-600), is not part of the 12 credit hours required for the advanced certificate.

Additional information

Study options

This certificate is intended for part-time study; therefore, RIT cannot issue I-20 paperwork. Courses are offered on-campus and online.

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed at www.rit.edu/emcs/financialaid/gedt/cybersecurity.html.

Data Science, MS

Michael Yacci, Program Director
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Program overview

This program is only available online.

The MS in data science has a strong career focus and aims to prepare students with the practical and theoretical skills to handle large-scale data management and analysis challenges that arise in today's data-driven organizations.

The program enables students to work with active researchers in the field of data science, analytics, and infrastructure who can provide hands-on experience with real data and real problems. The curriculum includes opportunities for students to choose elective courses to pursue a variety of career paths within the broad field of data science and its various application areas. The goal of the program is to prepare students, regardless of their scientific, engineering, or business background, to pursue a career in data science.

The program is broad-based and comprehensive, combining computing and statistics courses. Core courses include statistics, data management, analytics, and software engineering. Elective courses provide students an opportunity to explore different areas of data science while a capstone project or thesis round out the program.

Curriculum

Data science, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
DSCI-623	Introduction to Data Science: Management	3
DSCI-633	Introduction to Data Science: Analytics	3
STAT-741	Regression Analysis	3
DSCI-644	Software Engineering for Data Science	3
	Electives	6
Second Year		
DSCI-799	Data Science Capstone	3
	Electives	6
	Elective/Capstone	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS in data science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university.
- Have prior knowledge or professional experience in computer programming and statistics.
- Submit transcripts (in English) of all previously completed undergraduate and graduate course work
- Submit a minimum of two recommendations from individuals who are well-qualified to assess the applicant's potential for success.
- Submit a current resume or curriculum vitae.
- Have a minimum cumulative GPA of 3.0 (or equivalent). Applicants with a GPS below 3.0 may be considered, but are required to submit GRE scores.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Certain countries are subject to comprehensive embargoes under US Export Controls, which prohibit virtually ALL exports, imports, and other transactions without a license or other US Government authorization. Learners from Syria, Sudan, North Korea, the Crimea region of the Ukraine, Iran, and Cuba may not register for RIT online courses. Nor may individuals on the United States Treasury Department's list of Specially Designated Nationals or the United States Commerce Department's table of Deny Orders. By registering for RIT online courses, you represent and warrant that you are not located in, under the control of, or a national or resident of any such country or on any such list.

Game Design and Development, MS

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Jessica Bayliss, Graduate Program Director
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Program overview

The MS degree in game design and development explores the entertainment technology landscape, along with other related areas of software development. The program has its technical roots in the computing and information science disciplines, while simultaneously covering the breadth of the game development field through course work in topics such as computer graphics, game engines, interactive narrative, and game design. The degree is specifically for students who aspire to careers within the professional gaming industry or a related field such as simulation, edutainment, or visualization.

Plan of study

The program's curriculum consists of required courses, a choice of five advanced electives, and a capstone experience. This is a two-year, on-campus, cohort-based program in which students are admitted through a portfolio review process. During the second year, students form development teams that construct a working game engine and software title as the program capstone experience. This requirement includes both individual and group expectations. The capstone culminates in a defense before program faculty, as well as a public exhibition. Combined, these requirements provide a unique and comprehensive educational experience for individuals who aspire to a career in the game development industry.

Capstone experience

During the second year, students complete a team-based capstone experience where students present and defend their work. This presentation includes a faculty review, which constitutes the capstone defense, a public presentation, and a demonstration.

Curriculum

Game design and development, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
IGME-601	Game Development Processes	3
IGME-602	Game Design	3
IGME-603	Gameplay and Prototyping	3
IGME-695	Colloquium in Game Design and Development	1
IGME-795	Game Industry Themes and Perspectives	1
	Advanced Electives	9
Second Year		
IGME-788	Capstone Design	3
IGME-695	Colloquium in Game Design and Development	1
IGME-789	Capstone Development	3
	Advanced Electives	6
Total Semester Credit Hours		**33**

Advanced electives

COURSE	
IGME-670	Digital Audio Production
IGME-671	Interactive Game Audio
IGME-680	IGM Production Studio
IGME-681	Innovation and Invention
IGME-720	Social and Pervasive Game Design
IGME-730	Game Design and Development for Casual and Mobile Platforms
IGME-740	Game Graphics Programming
IGME-750	Game Engine Design and Development
IGME-753	Console Development
IGME-760	Artificial Intelligence for Gameplay
IGME-790	Graduate Seminar in IGM
IGME-796	Advanced Topics in Game Design*
IGME-797	Advanced Topics in Game Development*
IGME-799	Independent Study

* Advanced topics are offered in subjects as diverse as game networking and player motivation.

Admission requirements

To be considered for admission to the MS in game design and development, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in a relevant field such as information technology, computer science, software engineering, or computer graphics. Students with undergraduate degrees in related disciplines such as computer animation or human-computer interaction may be considered.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum GPA of 3.25 (or equivalent) or a first-class international degree with distinction.
- Submission of a portfolio and/or scores from the Graduate Record Exam (GRE) is required. If you choose to submit a portfolio it should include evidence of individual and group projects (clearly marked as such) relevant to the area you wish to study within the degree program.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- International applicants are required to submit scores from the GRE.
- Due to the cohort nature of the program, students are admitted for fall semester. Admission to the program is highly competitive. While GRE scores are not required for domestic applicants, students may submit scores to strengthen their application. Those applicants with a GPA below 3.25 are required to submit GRE scores.

Additional information

Prerequisites

Students are expected to have at least one year of significant programming experience in a current object-oriented language—preferably C++ or Java—and a solid working knowledge of website development and interactive multimedia concepts. If students do not have these prerequisites, additional course work may be recommended to bridge any educational gaps.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Health Informatics, MS

Qi Yu, Graduate Program Director
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Program overview

This program is only available online.

Health informatics studies the nature of medical data and the use of information technology to manage health-related information in medical practice, education, and research. With increases in the application and uses of information technology in the medical industry, there is an unprecedented need for professionals who can combine their knowledge of computing and health care to improve the safety and quality of care delivery, as well as to help control costs.

The MS degree in health informatics applies the creative power of information technology to the information and data needs of health care. This includes the acquisition, storage, and retrieval of patient data, as well as access to electronically maintained medical knowledge for use in patient care, research, and education. Professionals in the field require computing expertise; an understanding of formal medical terminology, clinical processes, and guidelines; and an understanding of how information and communication systems can be used to successfully deliver patient information in various health care settings.

The program offers two tracks: the clinician track and analyst track.

Curriculum

Health informatics, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MEDI-701	Introduction to Medical Informatics	3
MEDI-735	Clinical Information Systems	3
HCIN-610	Foundations of Human-Computer Interaction	3
MEDI-704	Practice of Health Care (summer)	3
	Track Elective	3
Second Year		
MEDI-707	Clinical Decision Support	3
MEDI-705	Medical Knowledge Structures	3
MEDI-788	Capstone in Health Informatics	3
	Track Electives	6
Total Semester Credit Hours		**30**

Tracks

Analyst track

COURSE	
ISTE-782	Visual Analytics
MEDI-730	Medical Application Integration
MEDI-766	Building the Electronic Health Record

Clinician track

COURSE	
ISTE-608	Database Design and Implementation
MEDI-610	Scripting Fundamentals
MEDI-731	System Integration Concepts

Admission requirements

To be considered for admission into the MS program in health informatics, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit two letters of recommendation from individuals who are able to assess the applicant's potential for success in the program.
- Submit a current resume or curriculum vitae.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Applicants from international universities are required to submit GRE scores.
- It is recommended that applicants have a minimum of three years of experience in a health care, health-related, or information technology organization. Applicants who do not meet this requirement may be asked to complete certain undergraduate/graduate level courses as a prerequisite.
- An interview with the program's admissions committee may also be required.

Please note: Applications should be submitted for fall admission. For priority consideration, please submit all application materials a minimum of six weeks prior to your intended start date.

Certain countries are subject to comprehensive embargoes under US Export Controls, which prohibit virtually ALL exports, imports, and other transactions without a license or other US Government authorization. Learners from Syria, Sudan, North Korea, the Crimea region of the Ukraine, Iran, and Cuba may not register for RIT online courses. Nor may individuals on the United States Treasury Department's list of Specially Designated Nationals or the United States Commerce Department's table of Deny Orders. By registering for RIT online courses, you represent and warrant that you are not located in, under the control of, or a national or resident of any such country or on any such list.

Additional information

Prerequisites

It is expected that prospective students who plan to pursue the analyst track will have a background in fundamental information technology concepts including object-oriented programming and statistics. Students without the necessary background should complete the prerequisites before applying to the program. However, bridge courses are available to satisfy the prerequisites.

Bridge program

Students whose undergraduate preparation or employment experience does not satisfy the prerequisites can make up these deficiencies by completing prerequisite bridge courses as prescribed by the graduate program director. The bridge courses are not part of the 30 semester credit hours required for the master's degree. Grades for bridge courses are not included in a student's GPA if the courses are taken before matriculation; they are included if completed after matriculation. Since bridge programs can be designed in a variety of ways, the graduate program director will assist students in planning and course selection.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Human-Computer Interaction, MS

hci.rit.edu/
Qi Yu, Graduate Program Director
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Program overview

Human-computer interaction (HCI) addresses the design, evaluation, and implementation of interactive computing and computing-based systems for the benefit of human use. HCI research is driven by technological advances and the increasing pervasiveness of computing devices in our society. With an emphasis on making computing technologies more user-friendly, HCI has emerged as a dynamic, multifaceted area of study that merges theory from science, engineering, and design—as well as concepts and methodologies from psychology, anthropology, sociology, and industrial design—with the technical concerns of computing.

The MS degree in human-computer interaction provides the knowledge and skills necessary for conceptualizing, designing, implementing, and evaluating software applications and computing technologies for the benefit of the user, whether the user is an individual, a group, an organization, or a society. Human, technological, and organizational concerns are interwoven throughout the curriculum and addressed in team- and project-based learning experiences.

Plan of study

The program is comprised of four required core courses, up to three program electives (depending upon capstone option chosen), two application domain courses, and a capstone project or thesis.

Core courses
The core courses provide knowledge and skills in the conceptual and methodological frameworks of HCI and HCI research. Emphasis is on understanding human cognition as it applies to information systems plus interaction design, interface prototyping, and usability evaluation.

Electives
Student choose up to three electives, depending on which capstone option they choose to complete.

Program electives
Students select two elective courses. In select cases, students can petition for approval to include a course complementary to the degree program as a program elective.

Application domain courses
To gain breadth in a technical area to which HCI concepts can be applied, students complete two courses in any of the application domain areas. A special topics option is also available, with faculty approval, for individuals with interest in other HCI-related areas.

Thesis/Capstone project
Students may complete a thesis or capstone project. This experience is meant to be an empirical study of a HCI problem, which can be the development of a software product through user-centered design processes. The results are either published in a peer-reviewed journal or publicly disseminated in an appropriate professional venue.

Curriculum

Human-computer interaction (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIN-600	Research Methods	3
HCIN-610	Foundations of Human-Computer Interaction	3
HCIN-620	Information and Interaction Design	3
HCIN-630	Usability Testing	3
HCIN-794	MS HCI Project Proposal	3
	Application Domain Courses	6
	Program Elective	3
Second Year		
HCIN-795	MS HCI Project	3
	Program Elective	3
Total Semester Credit Hours		**30**

Human-computer interaction (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIN-600	Research Methods	3
HCIN-610	Foundations of Human-Computer Interaction	3
HCIN-620	Information and Interaction Design	3
HCIN-630	Usability Testing	3
	Application Domain Courses	6
	Program Electives	6
Second Year		
HCIN-796	MS HCI Thesis	6
Total Semester Credit Hours		**30**

Application domain courses

eLearning technologies

COURSE	
HCIN-660	Fundamentals of Instructional Technology
HCIN-661	Interactive Courseware

Geographic information science and technology

COURSE	
ISTE-740	Geographic Information Science and Technology
ISTE-744	Thematic Cartography and Geographic Visualization

Smart device application design and development

COURSE	
HCIN-720	Prototyping Wearable and Internet of Things Devices
HCIN-722	Human Computer Interaction with Mobile, Wearable, and Ubiquitous Devices

Web development

COURSE	
ISTE-645	Foundations of Web Technologies I
ISTE-646	Foundations of Web Technologies II

Program electives

COURSE	
HCIN-660	Fundamentals of Instructional Technology
HCIN-661	Interactive Courseware
HCIN-700	Current Topics in HCI
HCIN-705	Topics in HCI for Biomedical Informatics
HCIN-715	Agent-based and Cognitive Modeling
HCIN-720	Designing User Experiences for Internet-enabled Devices
HCIN-722	Human Computer Interaction with Mobile Devices
HCIN-730	User-Centered Design Methods
HCIN-735	Collaboration, Technology, and the Human Experience
HCIN-794	MS HCI Capstone Proposal
ISTE-645	Foundations of Web Technologies I

COURSE	
ISTE-646	Foundations of Web Technologies II
ISTE-740	Geographic Information Science and Technology
ISTE-744	Thematic Cartography and Geographic Visualization
ISTE-772	Knowledge Discovery for Biomedical Informatics
PSYC-712	Graduate Cognition
PSYC-715	Graduate Perception

Admission requirements

To be considered for admission to the MS program in human-computer interaction, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Have a minimum cumulative GPA of 3.0 (or equivalent). Applicants with a GPA below 3.0 may be considered, but are required to submit standard GRE scores.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- Have prior study or professional experience in computing; however, study in other disciplines will be given consideration.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Applicants with undergraduate degrees from foreign universities are required to submit GRE scores.

Additional information

Prerequisites

The program requires strong technical and social science skills. Knowledge of quantitative statistical methodologies is important since students review research studies as well as analyze the results of their own usability evaluations. Students are also expected to have a solid background in computer programming. These competencies may be demonstrated by previous course work, technical certifications, or comparable work experience. Bridge courses are available to fulfill any gaps in an applicant's qualifications. Applicants will be made aware of any areas where additional course work may be necessary.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Online option

The program can be completed on campus or online.

Information Sciences and Technologies, MS

it.rit.edu/

Qi Yu, Graduate Program Director
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Program overview

The internet has brought a new kind of democracy where all information is created equal. No longer the sole province of experts and the traditional media, it has become grassroots, viral, and global. The sheer volume and lightning speed of information transfer has changed how the world communicates, educates, learns, and ultimately solves problems. As the web and its related technologies evolve, users need help in managing these new tools.

Graduate study in a computing discipline that only focuses on traditional computing approaches is not flexible enough to meet the needs of the real world. New hardware and software tools are continually introduced into the market. IT professionals must have a specific area of expertise, as well as adaptability, to tackle the next new thing. Or, just as often, retrofit available technologies to help users adapt to the latest trends.

The MS in information sciences and technologies provides an opportunity for in-depth study to prepare for today's high-demand computing careers. Companies are drowning in data—structured, semi-structured, and unstructured. Big data is not just high transaction volumes; it is also data in various formats, with high velocity change, and increasing complexity. Information is gleaned from unstructured sources—such as web traffic or social networks—as well as traditional ones; and information delivery must be immediate and on demand.

As the users' advocate, IT professionals also need the critical thinking skills to problem-solve in a wide variety of computing situations, combined with an understanding of the needs of their audience. Just knowing how technology works is no longer enough. Today, computing professionals need to know how to make it all work.

The information sciences and technologies program addresses the web systems and integration technologies, and the information management and database technology pillars, of the IT academic discipline, along with the additional option of discovery informatics. The program is offered on-campus and online.

Plan of study

The program can be completed on-campus or online. The on-campus program consists of 30 semester credit hours of graduate study and includes four core courses, four or five track or domain electives (depending upon capstone option chosen), and either a thesis or project. The online only option consist of 9 core courses and a capstone project.

Domain electives

Chosen only by those enrolled in the on-campus option, domain electives are available in: analytics, information management and database technology, or web systems and integration technologies. With permission of the graduate program director, students may select the special topics track to fulfill this requirement. See the graduate program director for more information.

Thesis/Capstone options

For the on-campus option of the program, students may choose a project or a thesis to build upon their domain of study. The project option is 3 credit hours and requires one additional 3 credit domain elective. The thesis option is 6 credit hours and does not require an additional elective. The online option consist of a capstone project.

Curriculum

Information sciences and technologies (thesis and project options), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-605	Scholarship in Information Sciences and Technologies	3
ISTE-610	Knowledge Representation Technologies	3
ISTE-612	Knowledge Processing Technologies	3
ISTE-600	Analytical Thinking	3
	Domain Electives	12
Second Year		
Choose one of the following:		6
ITSE-790	Thesis in Information Sciences and Technologies	
or		
ITSE-791	Project in Information Sciences and Technologies	
	Domain Elective	
Total Semester Credit Hours		**30**

Domain electives

COURSE	
Analytics	
ISTE-724	Data Warehousing
ISTE-780	Data Driven Knowledge Discovery
ISTE-782	Visual Analytics
Information management and database technology	
ISTE-721	Information Assurance Fundamentals
ISTE-722	Database Connectivity and Access
ISTE-724	Data Warehousing
ISTE-726	Database Management and Access
ISTE-728	Database Performance and Tuning
Web systems and integration technologies	
ISTE-721	Information Assurance Fundamentals
ISTE-754	Client Design and Development
ISTE-756	Server Design and Development
ISTE-759	Web Client Server Programming
Other approved electives	
ISTE-740	Geographic Information Science and Technology
ISTE-742	Introduction to Geographic Information Systems
ISTE-744	Thematic Cartography and Geographic Visualization
ISTE-774	Mobile Application Development I
ISTE-776	Mobile Application Development II

Information sciences and technologies (online option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-740	Geographic Information Science and Technology	3
ISTE-600	Analytical Thinking	3
ISTE-610	Knowledge Representation Technologies	3
ISTE-612	Knowledge Processing Technologies	3
ISTE-780	Data-driven Knowledge Discovery (summer)	3
Second Year		
ISTE-782	Visual Analytics	3
ISTE-721	Information Assurance	3
ISTE-605	Scholarship in IST	3
ISTE-724	Data Warehousing	3
ISTE-795	Capstone in IST (summer)	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in information sciences and technologies, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Applicants from foreign universities must submit GRE scores. Scores from the GRE are strongly recommended for applicants whose undergraduate grade point average is less than 3.0.

Additional information

Prerequisites

It is expected that prospective students will have a background in fundamental information technology concepts including object-oriented programming, website development, database theory and practice, and statistics. Students without the necessary background should complete the prerequisites before applying to the program. However, bridge courses are available to satisfy the prerequisites.

Bridge program

Students whose undergraduate preparation or employment experience does not satisfy the prerequisites can make up these deficiencies by completing prerequisite bridge courses as prescribed by the graduate program director. The bridge courses are not part of the 30 semester credit hours required for the master's degree. Grades for bridge courses are not included in a student's GPA if the courses are taken before matriculation; they are included if completed after matriculation. Since bridge programs can be designed in a variety of ways, the graduate program director will assist students in planning and course selection.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Networking and Systems Administration, MS

nsa.rit.edu/

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Please note: This program is no longer accepting new student applications.

Program overview

Trends in network communications—unifying wired and wireless infrastructures, Cloud computing, scalability, collaboration tools, and security—can only be coalesced into reliable communication services if there are highly educated and technically proficient networking and systems administration professionals who understand both traditional and emerging communication technologies as well as how to apply these technologies to organizational needs and opportunities.

The explosion in ubiquitous computing today means an increased need for greater efficiency and for better management oversight in the provision of IT services. Network environments are not only becoming increasingly complex, there is a greater recognition of the power of information technology to be a strategic enabler of corporate growth and adaptation.

The MS degree in networking and systems administration provides both the knowledge and the technical skills needed to successfully compete in this environment. the program is uniquely focused to address current issues in networking and systems administration through investigation of both the theoretical and the practical aspects of this continually evolving field. Course work examines the organizational and technological issues involved in enterprise scale networking, including emerging network technologies, network processing, high performance computing, network programming, and security.

The program prepares graduates to assume leadership positions in for-profit and not-for-profit organizations dealing with evolving networking solutions or to continue their education through advanced degrees. It is available for full- and part-time study both online and on-campus.

Plan of study

The program consists of five required core courses, up to four technical electives (depending upon the capstone option chosen), and a capstone thesis or project.

Curriculum

Networking and systems administration (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-605	Scholarship in Information Sciences and Technologies	3
NSSA-602	Enterprise Computing	3
NSSA-620	Emerging Computing and Network Technologies	3
NSSA-615	Advanced OOP for Networking and Systems Administration	3
	Track or Domain Electives	6
Second Year		
NSSA-714	Advanced Large Scale Computing	3
NSSA-790	MS Thesis	6
	Track or Domain Elective	3
Total Semester Credit Hours		**30**

Networking and systems administration (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-605	Scholarship in Information Sciences and Technologies	3
NSSA-602	Enterprise Computing	3
NSSA-620	Emerging Computing and Network Technologies	3
NSSA-615	Advanced OOP for Networking and Systems Administration	3
	Track or Domain Electives	6
Second Year		
NSSA-714	Advanced Large Scale Computing	3
NSSA-791	NSSA Project	3
	Track or Domain Electives	6
Total Semester Credit Hours		**30**

Electives

COURSE	
NSSA-610	Advanced Wired Networking Concepts*
NSSA-611	Advanced Topics in Wireless Networks and Technologies*
NSSA-612	Network Modeling and Analysis*
NSSA-621	Design and Deployment of Wireless Networks
NSSA-710	Network Management
NSSA-712	Advanced Storage Technologies
NSSA-713	Enterprise Service Provisioning*
NSSA-715	Network Design and Performance
NSSA-716	Enterprise Mobile Computing
ISTE-721	Information Assurance Fundamentals
ISTE-764	Project Management

* Students are required to complete at least one theoretical course. These electives fulfill this requirement.

Admission requirements

To be considered for admission to the MS program in networking and systems administration, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent). The GRE is recommended for those applicant's whose undergraduate grade point average is less than 3.0.
- Applicants from foreign universities must submit GRE scores.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Applicants with a lower TOEFL score may be admitted conditionally, but will be required to complete a prescribed program in English preparation along with a reduced program course load.

Additional information

Bridge courses

Students must have solid backgrounds in computer programming, networking and systems administration theory and practice, and statistics. Students whose undergraduate preparation does not satisfy these prerequisites can make up deficiencies through additional study. The graduate program director will make recommendations on prerequisite course

work. Formal acceptance into the program may be possible even though the applicant must complete bridge courses.

Bridge courses are not part of the required curriculum for the master's degree. Grades for these courses are only included in the student's GPA if courses are completed after matriculation. Bridge course work can be designed in a variety of ways. Other courses can be substituted, or courses at other colleges can be applied. Contact the graduate program director for more information.

Study options
This program may be completed on a full- or part-time basis, through on-campus or online learning. Full-time students may be able to complete the program in two years; part-time students may take approximately four years.

Maximum time limit
University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Networking, Planning and Design, Adv. Cert.

ist.rit.edu/
Qi Yu, Graduate Program Director
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Program overview

The advanced certificate in networking, planning and design provides the knowledge and expertise needed to seek careers that require foundation knowledge of enterprise network architectures and administration, emerging network technologies, the network design process, and project management. Students completing this certificate are able to design and implement plans for sophisticated network design projects; understand and work with emerging technologies in networking and system administration; and develop, test, and implement a network model that simulates the performance of an enterprise scale network.

Plan of study
The program consists of four courses, all of which may be later applied to the MS in networking and systems administration.

Curriculum

Networking, planning and design, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
NSSA-602	Enterprise Computing	3
DECS-744	Project Management	3
NSSA-620	Emerging Computing and Networking Technologies	3
NSSA-715	Network Design and Performance	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in networking, planning and design, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college with course work or extensive work experience in networking, systems administration, and programming in C++; experience in OS scripting (Perl preferred) is beneficial.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- While GRE scores are not required, they are strongly recommended for applicants seeking admission whose undergraduate GPA does not meet the minimum requirement. Relevant work experience can also strengthen a candidate's application for admission.

Additional information

Study options
This certificate is intended for part-time study; therefore, RIT cannot issue I-20 paperwork. International students may study part-time through online learning. Courses are available both on campus and online.

Gainful employment
Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed at www.rit.edu/emcs/financialaid/gedt/network-planning-and-design.html.

Software Engineering, MS

se.rit.edu/grad
J. Scott Hawker, Graduate Program Director
585-475-2705, hawker@se.rit.edu

Program overview

The MS in software engineering is designed to attract students with a formal undergraduate background in software engineering, computer science, or computer engineering, preferably with professional experience. The program's core content assures that graduates possess both breadth and depth of knowledge in software engineering. Special topics courses and electives provide students with the opportunity to match their graduate education with their professional goals.

Plan of study

The program comprises 36 semester credit hours, anchored by a thesis or a capstone project.

Curriculum

Software engineering (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SWEN-610	Foundations of Software Engineering	3
SWEN-745	Software Modeling	3
SWEN-640	Research Methods	3
SWEN-722	Process Engineering	3
SWEN-749	Software Evolution and Re-engineering	3
SWEN-772	Software Quality Engineering	3
Second Year		
SWEN-755	Software Architectures and Product Lines	3
SWEN-799	Independent Study	3
SWEN-790	Thesis	6
	Electives	6
Total Semester Credit Hours		**36**

Software engineering (capstone option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SWEN-610	Foundations of Software Engineering	3
SWEN-745	Software Modeling	3
SWEN-640	Research Methods	3
SWEN-722	Process Engineering	3
SWEN-749	Software Evolution and Re-engineering	3
SWEN-772	Software Quality Engineering	3
Second Year		
SWEN-755	Software Architectures and Product Lines	3
SWEN-780	Capstone Research Project	3
	Electives	9
	Elective	3
Total Semester Credit Hours		**36**

Admission requirements

To be considered for admission to the MS program in software engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree from an accredited institution,
- Have a cumulative grade point average of 3.0 or higher (Prospective students from institutions that do not use the GPA scale are expected to demonstrate an equivalent level of academic accomplishment. Formal academic background in software engineering, computer science, or computer engineering is a plus.),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a professional essay (1-4 pages) describing current job (if applicable), relevant experience, and career plans,
- Submit a current resume (including descriptions of significant software projects in which the candidate participated), and
- Submit two letters of recommendation.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 570 (paper-based) or 88 (internet-based) are required. International applicants must provide Graduate Record Exam (GRE) scores. Domestic students are encouraged to provide GRE scores.

Professional experience developing software is preferred, but candidates without a background in computing will be considered. Additional bridge course work may be required, and may extend time to graduation.

Additional information

Bridge courses

Based on the evaluation of academic and relevant experience, the graduate program director may require some applicants to successfully complete bridge courses to fill in any gaps in their background. Successful completion of bridge courses is necessary for registration in graduate-level courses.

Web Development, Adv. Cert.

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Program overview

As interactive technologies advance, the ways in which we communicate change—and the importance of enhancing the communication experience within electronic environments increases. The advanced certificate in web development provides an opportunity for students to gain firsthand knowledge and expertise in the art and science of interactive multimedia design.

Plan of study

In this certificate, students explore the theories of interactive computing, fundamentals of interactive design, web and multimedia programming, and the impact of networked technologies in web communications. Projects include the development of websites and interactive multimedia applications. Students have at their disposal a variety of computer, video, and digitizing equipment in our state-of-the-art interactive media laboratories.

Curriculum

Web development, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIN-610	Foundations of HCI	3
ISTE-645	Foundations of Web Technologies I	3
ISTE-646	Foundations of Web Technologies II	3
HCIN-636	Interactive Programming	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in web development, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.

Additional information

Prerequisites

Due to continuing advances in the technologies used for interactive multimedia, knowledge of programming is necessary in this field. Students must have object-oriented programming skills equivalent to one year of study. Bridge courses are available to complete any requirements missing from the applicant's credentials.

Study options

This certificate is intended for part-time study; therefore, RIT cannot issue I-20 paperwork. Courses are only offered on campus.

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed at www.rit.edu/emcs/financialaid/gedt/web-development.html.

Dean's Office

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Qi Yu, BE, Zhejiang University (China); MS, National University of Singapore (Singapore); Ph.D., Virginia Polytechnic Institute and State University—Associate Professor; Graduate Program Director

Interactive Games and Media

David I. Schwartz, BS, MS, Ph.D., University of Buffalo—Director; Associate Professor

Jessica Bayliss, BS, California State University at Fresno; MS, Ph.D., University of Rochester—Associate Director; Professor

John A. Biles, BA, MS, University of Kansas—Professor Emeritus

Sean Boyle, BS, MS, Rochester Institute of Technology—Senior Lecturer

Carlos Castellanos, BA, San Francisco State University; MFA, San Jose State University; Ph.D., Simon Fraser University—Assistant Professor

Chris Egert, BS, MS, Rochester Institute of Technology; Ph.D., University at Buffalo—Associate Professor

Owen Gottlieb, AB, MA, MA, Ph.D., New York University—Assistant Professor

W. Michelle Harris, BS, Carnegie Mellon University; MPS, New York University—Associate Professor

Tona Henderson, BS, Southwest Missouri State University; MS, University of Missouri—Associate Professor

Jay Alan Jackson, BS, MS, Ph.D., Florida State University—Associate Professor

Stephen Jacobs, BA, MA, New School for Social Research—Professor

Anthony Jefferson, BS, State University College at Oswego; MS, Rochester Institute of Technology—Principal Lecturer

Elizabeth Lane Lawley, AB, MLS, University of Michigan; Ph.D., University of Alabama—Professor

Jesse S. O'Brien, AAS, BS, MFA, The Academy of Art University—Senior Lecturer

Elouise Oyzon, BFA, MFA, Rochester Institute of Technology—Associate Professor

Chao Peng, B.Arch, Hebei University of Engineering (China); MFA, University of Alaska Fairbanks; MS, Ph.D., Virginia Polytechnic Institute and State University—Assistant Professor

Ian Schreiber, BS, MFA, Savannah College of Art and Design—Assistant Professor

David Simkins, BA, Earlham College; MS, Ph.D., University of Wisconsin-Madison—Associate Professor

Brian Tomaszewski, BA, University of Albany; MA, University at Buffalo; Ph.D., Pennsylvania State University—Associate Professor

Software Engineering

Naveen Sharma, MS, Indian Institutes of Sciences (India); Ph.D., Kent State University—Department Chair; Professor

Travis Desell, BS, MS, Ph.D., Rensselaer Polytechnic Institute—Associate Professor; Data Science Graduate Program Director

J. Scott Hawker, BS, MS, Texas Tech University; Ph.D., Lehigh University—Software Engineering Graduate Program Director; Associate Professor

Daniel Krutz, BS, St. John Fisher College; MS, Rochester Institute of Technology; Ph.D., Nova Southeastern University—Assistant Professor

Andrew Meneely, BA, Calvin College; Ph.D., North Carolina State University—Associate Professor

Mehdi Mirakhorli, BS, Teacher Training University (Iran); MS, National University (Iran); Ph.D., DePaul University—Assistant Professor

Mohamed Wiem Mkaouer, BS, University of Tunis (Tunisia); MS, University of Geneva (Switzerland); Ph.D., University of Michigan—Assistant Professor

Pradeep Murukannaiah, BE, University Visvesvaraya College of Engineering (India); MS, Ph.D., North Carolina State University—Assistant Professor

Christian Newman, BS, MS, Ph.D., Kent State University—Assistant Professor

James Vallino, BE, The Cooper Union; MS, University of Wisconsin; Ph.D., University of Rochester—Professor Emeritus

Computing and Information Sciences

Pengcheng Shi, BS, Shanghai Jiao Tong University (China); MS, M.Phil., Ph.D., Yale University—Doctorate Program Director; Professor; Associate Dean for Research and Scholarship

Linwei Wang, BS, Zhejiang University (China); M.Phil., Hong Kong University of Science and Technology (Hong Kong); Ph.D., Rochester Institute of Technology—Associate Professor

Kate Gleason College of Engineering

Doreen Edwards, Dean
rit.edu/engineering

Programs of Study

Doctor of Philosophy degree in:	**Page**
Engineering, Ph.D.	77
Microsystems Engineering, Ph.D.	87

Master of Science degrees in:	
Computer Engineering, MS *Research tracks available in: computer architecture; computer vision and machine intelligence, integrated circuits and systems; networks and security; and signal processing, control and embedded systems.*	73
Electrical Engineering, MS *Focus areas available in: communication, control, digital systems, electromagnetic/microwaves, integrated electronics, MEMs, robotics, and signal and image processing.*	75
Industrial and Systems Engineering, MS	79
Manufacturing Leadership, MS	81
Mechanical Engineering, MS	84
Microelectronic Engineering, MS	85
Product Development, MS	89
Sustainable Engineering, MS	92

Master of Engineering degrees in:	
Engineering Management, ME	78
Industrial and Systems Engineering, ME	79
Mechanical Engineering, ME *Focus areas available in: automotive systems, business, controls, manufacturing, mechanics-design/materials, product development, sustainability, thermo/fluids engineering, and vibrations engineering.*	82
Microelectronics Manufacturing Engineering, ME	86
Sustainable Engineering, ME	91

Advanced Certificates in:	
Lean Six Sigma, Adv. Cert.	80
Vibrations, Adv. Cert.	93

Online learning option available.

The Kate Gleason College of Engineering offers comprehensive, innovative graduate programs in a broad range of engineering disciplines. Programs include master of science degrees, master of engineering degrees, advanced certificates, and broad-based, cross-disciplinary doctoral programs in engineering and microsystems engineering. In conjunction with the College of Science, the Kate Gleason College offers an interdisciplinary MS degree in materials science and engineering.

The doctorate program in engineering prepares the next generation of engineering leaders to tackle some of the most daunting and complex problems facing our society. This program provides an original approach to engineering doctoral education, resulting in graduates who are prepared equally well for careers in industry as well as academia. The doctorate program in microsystems engineering builds on the fundamentals of traditional engineering and science combined with curriculum and research activities addressing the numerous technical challenges of micro- and nanosystems. This program provides a foundation to explore future technology through research in nano-engineering, design methods, and technologies and their integration into micro- and nano-scaled systems.

The master of science degree programs in the Kate Gleason College include extensive course work and an individual research experience to prepare graduates for employment in industry or graduate study at the doctoral level. The master of engineering degree programs are generally considered to be terminal degrees, focused on preparing graduates for technical and leadership careers in industry. A capstone experience combined with additional course work replaces the traditional thesis requirement.

Details on specific programs, including courses, research activities, thesis requirements, and assistantships, are outlined in this *Graduate Bulletin* as well as on the college and program websites.

Admission requirements

Each college makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarships

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Faculty

The college's faculty are committed to continuous learning and professional growth, and most are actively engaged in fundamental and/or applied research projects to extend the boundaries of knowledge within their discipline. A key characteristic of graduate study in the Kate Gleason College is the close working relationship between the faculty and graduate students on research, thesis, and graduate project work. Each graduate student is assigned a

faculty adviser who supervises the student's progress toward degree completion and guides the student in achieving their educational goals.

Facilities

The college provides students with access to over ninety state-of-the-art laboratories and computing facilities supporting a broad range of specializations, including machine tools and manufacturing, 3D printing, ergonomics, advanced systems integration, production systems, materials processing, biofluids, fuel cells, thermal analysis, robotics, electronics, microchip fabrication (clean room), VLSI, embedded systems, hardware design, analog devices, laser and optics, electromagnetics, computer architecture, and digital design, to name a few. Close corporate partnerships provide the college with access to current software and equipment used in industry.

Research

Engineering faculty are active in numerous research areas, which often take place across engineering disciplines and involves other RIT colleges, local health care institutions, and major industry partners.

Much of the research is inspired by the broad-based challenges within four key application domains that will have a transformational impact on our society in the coming decades: transportation, energy, communications, and health care. Graduate students and faculty members collaborate on research projects inspired by these application domains and contribute to solving daunting problems of national and global importance.

Our faculty members bring substantial expertise from a broad range of technology domains to tackle these fundamental and applied research problems. Technology strengths of faculty include nano-science and engineering; signal and image processing; high-performance and power-aware computing; access and assistive technologies; simulation, modeling and optimization; manufacturing and materials science, safety and security, heat transfer and thermo-fluids, and robotics and mechatronics.

A sampling of current research includes 3D printing and additive manufacturing, autonomous vehicles and robotics, bio-inspired computing systems, resilient and secure systems design, industry ergonomics and human performance, optics and photonics, micro-machines, water treatment and purification, signal and image processing, cardiovascular biomechanics, robotics and control, VLSI design, electron beam lithography, computer architecture, multimedia information systems, object-oriented software development, big data analytics, industrial statistics and more.

Externally sponsored projects are a vital and integral component of RIT's educational and research activities. These projects add to the body of knowledge, enhance professional development, and strengthen academic programs. Sponsored projects enhance the university's academic programs, broaden its research resources, provide opportunities for student participation in research, strengthen university-industrial partnerships, and serve the wider community. RIT's major public sponsors include the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Energy (DOE), the Department of Defense (DOD and DARPA), the Department of Education (USDE), the National Aeronautics and Science Administration (NASA), and New York State.

Study options

Students may matriculate on either a full- or part-time basis.

Full-time study: Students may matriculate on either a full- or part-time basis. A full-time student will generally take between 9 and 15 credits per semester, depending upon their research or graduate project activity, and can complete the requirements for a master's degree in one calendar year. A full-time student in a master of engineering degree program may choose to alternate academic semesters with an internship (if applicable).

Part-time study: The college encourages practicing engineers in the greater Rochester industrial community to pursue a program of study leading to the master of science or master of engineering degree while maintaining full-time employment. To facilitate this, many of the courses are scheduled in the late afternoon or early evening. Students employed full-time are limited to a maximum of two courses or 6 semester credits per semester. A student who wishes to register for more than 6 semester credits must obtain the approval of his or her adviser and the department head.

Nonmatriculated status: Individuals may take graduate courses as a nonmatriculated student if they have a bachelor's degree from an approved undergraduate school and the necessary background for the specific courses in which they wish to enroll. The courses taken for credit usually can be applied toward the master's degree when the student is formally admitted to the graduate program at a later date. However, the number of credits that will be transferred to the degree program from courses taken at RIT as a nonmatriculated student is normally limited to a maximum of 9 semester credits.

Computer Engineering, MS

www.rit.edu/study/computer-engineering-ms
Andres Kwasinski, Professor
585-475-5139, axkeec@rit.edu

Program overview

The computer engineering masters focuses on the design and development of computer and computer-integrated systems, with consideration to such engineering factors as function, performance, security, and sustainability. Computer engineers design and build these systems to meet application and system requirements with attention to the hardware-software interaction. The program emphasizes the careful adoption of design methodology and the application of sophisticated engineering tools. The intensive programming and laboratory work requirements ensure significant, high level, specialized knowledge and experience with modern facilities and state-of-the-art design tools.

The MS degree in computer engineering provides students with a high level of specialized knowledge in computer engineering, strengthening their ability to successfully formulate solutions to current technical problems, and offers a significant independent learning experience in preparation for further graduate study or for continuing professional development at the leading edge of the discipline. The program accommodates applicants with undergraduate degrees in computer engineering or related programs such as electrical engineering or computer science. (Some additional bridge courses may be required for applicants from undergraduate degrees outside of computer engineering).

Program goals and learning objectives

The MS in computer engineering prepares graduate students to:
- demonstrate independent learning, which is necessary in order to update their skills in a changing workplace and economy, and
- successfully formulate solutions to current technical problems in computer engineering or related disciplines.

The program's student learning outcomes are:
- Tools and Techniques: The ability to utilize state-of-the-art tools and techniques in the field of computer engineering.
- Depth: A depth of knowledge in a specialty area of computer engineering.
- Research: The ability to perform independent research.

Plan of study

The degree requires 30 semester credit hours and includes Analytical Topics (CMPE-610), two flexible core courses, four graduate electives, two semesters of graduate seminar, and options to conduct thesis research or a graduate project. The core courses and graduate electives provide breadth and depth of knowledge. The Computer Engineering Graduate Seminar (CMPE-795) provides students with exposure to the state-of-the-art research in computer engineering and related disciplines.

Thesis research
Thesis research is an independent investigation of a research problem that contributes to the state of the art. Students who pursue the thesis option take nine semester credit hours of thesis research to answer a fundamental science/engineering question that contributes to new knowledge in the field. Students are expected to formulate the problem under a faculty advisor's guidance and conduct extensive quantitative or qualitative analyses with sound methodology. The student's thesis committee must have at least three and no more than four faculty members, including the primary thesis advisor. Two of the committee members must be computer engineering faculty. The findings through thesis research should be repeatable and generalizable, with sufficient quality to make them publishable in technical conferences and/or journals. For detailed information on thesis research timeline and requirements, please refer to Computer Engineering Thesis Research.

Graduate project
The graduate project is a scholarly undertaking that addresses a current technical problem with tangible outcomes. Students who pursue the graduate project option take six semester credits of project focus graduate electives and three semester credits of Graduate Project, to obtain specialized education through additional courses and conduct a professionally executed project under the supervision of a faculty advisor. The project generally addresses an immediate and practical problem, a scholarly undertaking that can have tangible outcomes. Typical projects may implement, test and evaluate a software and/or hardware system, conduct a comprehensive literature review with comparative study, etc. Students are expected to give a presentation or demonstration of the final deliverables of the project. For detailed information on graduate project timeline and requirements, please refer to Computer Engineering Graduate Project.

Flexible core
One course is chosen from each of the following core clusters with faculty advisor's guidance.

Computer Architecture and Digital Design
- CMPE-630 Digital Integrated Circuit Design
- CMPE-660 Reconfigurable Computing
- CMPE-755 High Performance Architectures

Computing, Communications, and Algorithms
- CMPE-670 Data and Communication Networks
- CMPE-655 Multiple Processor Systems
- CMPE-677 Machine Intelligence

Graduate electives
Computer engineering graduate electives are 600 level and above. With advisor and department approval, students may request to take graduate courses outside of the department. The graduate electives are selected among the available research tracks. Students are encouraged to choose most of their graduate electives within a single track, by consulting with their advisor. Each student must take a minimum of two electives from the department of computer engineering. For graduate level math courses as electives, students may choose from the following:
- SEE-601 Systems Modeling and Optimization
- ISEE-701 Linear Programming
- ISEE-702 Integer and Nonlinear Programming
- MATH-603 Optimization Theory
- MATH-605 Stochastic Processes
- MATH-611 Numerical Analysis
- MATH-651 Combinatorics and Graph Theory I

Research tracks
Students are encouraged to choose most of their graduate electives within a single research track, by consulting with their advisor. Each student must take a minimum of two electives from the department of computer engineering. Students are allowed to take relevant courses from other academic programs, including electrical engineering, computer science, and software engineering, for specific research focus. The following research tracks are available:
- **Computer Architecture**–Computer architecture area deals with hardware resource management, instruction set architectures and their close connection with the underlying hardware, and the interconnection and communication of those hardware components. Some of the current computer architecture challenges that are being tackled

in the computer engineering department include energy efficient architectures, high performance architectures, graphic processing units (GPUs), reconfigurable hardware, chip multiprocessors, and Networks-on-Chips.

- **Integrated Circuits and Systems**–Modern processors demand high computational density, small form factors, and low energy dissipation with extremely high performance demands. This is enabled by the nanoscale and heterogeneous integration of transistors and other emerging devices at the massive-scale. Such nanocomputers will open unimaginable opportunities as well as challenges to computer engineers. This research focuses designing computers with emerging novel technologies in the presence of severe physical constraints; investigating dynamic reconfigurability to exploit the power of nanoscale electronics for building reliable computing systems; and studying the applicability of emerging technologies to address challenges in computing hardware of the future.
- **Networks and Security**–The prevalence of interconnected computing, sensing and actuating devices have transformed our way of life. Ubiquitous access to data using/from these devices with reliable performance as well as security assurance presents exciting challenges for engineers and scientists. Resilient to environmental uncertainty, system failures and cyber attacks requires advances in hardware, software and networking techniques. This research track focuses on intelligent wireless and sensor networks, cryptographic engineering, and predictive cyber situation awareness.
- **Computer Vision and Machine Intelligence**–Visual information is ubiquitous and ever more important for applications such as robotics, health care, human-computer interaction, biometrics, surveillance, games, entertainment, transportation and commerce. Computer vision focuses on extracting information from image and video data for modeling, interpretation, detection, tracking and recognition. Machine Intelligence methods deal with human-machine interaction, artificial intelligence, agent reasoning, and robotics. Algorithm development for these areas spans image processing, pattern recognition and machine learning, and is intimately related to system design and hardware implementations.
- **Signal Processing, Control and Embedded Systems**–This research area is concerned with algorithms and devices used at the core of system that interacts with our physical world. As such, this area considers the sensing, analysis and modeling of dynamic systems with the intent of measuring information about a system, communicating this information and processing it to adapt its behavior. Application areas are robust feedback-based control where uncertainty in the dynamics and environment must be considered during the design process and signal processing algorithms and devices for system sensing and adaptation.

Curriculum

Computer Engineering (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CMPE-610	Analytical Topics in Computer Engineering	3
CMPE-795	Graduate Seminar	0
Choose one of the following flexible core courses:		3
CMPE-630	Digital Integrated Circuit Design	
CMPE-660	Reconfigurable Computing	
CMPE-755	High Performance Architectures	
Choose one of the following flexible core courses:		3
CMPE-655	Multiple Processor Systems	
CMPE-670	Data and Communication Networks	
CMPE-677	Machine Intelligence	
	Graduate Electives*	9
Second Year		
CMPE-790	Thesis	9
	Graduate Elective	3
Total Semester Credit Hours		**30**

* At least two graduate electives must come from the computer engineering department.

Computer Engineering (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CMPE-610	Analytical Topics in Computer Engineering	3
CMPE-795	Graduate Seminar	0
Choose one of the following flexible core courses:		3
CMPE-630	Digital Integrated Circuit Design	
CMPE-660	Reconfigurable Computing	
CMPE-755	High Performance Architectures	
Choose one of the following flexible core courses:		3
CMPE-655	Multiple Processor Systems	
CMPE-670	Data and Communication Networks	
CMPE-677	Machine Intelligence	
	Graduate Electives*	9
Second Year		
CMPE-792	Graduate Project	3
	Project Focus Electives	6
	Graduate Elective	3
Total Semester Credit Hours		**30**

* At least two graduate electives must come from the computer engineering department.

Admission requirements

To be considered for admission to the MS program in computer engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in computer engineering or a related field.
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit two letters of recommendation from individuals well qualified to judge the candidate's ability for graduate study.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

Student resources

- Faculty Advisor Declaration Form
- Proposal Approval Form

Electrical Engineering, MS

www.rit.edu/study/electrical-engineering-ms
Jayanti Venkataraman, Professor
585-475-2143, jnveee@rit.edu

Program overview

In the electrical engineering masters, students can customize a specialty of their choosing while working closely with electrical engineering faculty in a contemporary, applied research area. The MS degree in electrical engineering allows students to customize their course work while working closely with electrical engineering faculty in a contemporary, applied research area. The program gives you the skills to solve business and industry challenges, and deploy high-level solutions to problems affecting the world of engineering technology today. Students may choose among the following six options: communication, control and robotics, digital systems, integrated electronics, MEMs, or signal and image processing.

The MS degree is awarded upon the successful completion of a minimum of 30 credit hours. Students have the option of completing a thesis or graduate paper. For those who choose the graduate paper, an additional course is required. Students may also choose a course-only option with a comprehensive exam (0 credits). All students are expected to attend Graduate Seminar (EEEE-795) every semester they are on campus.

Program goals and learning objectives

The MS in electrical engineering prepares graduate students to:

- Have specialized training in a concentrated field of study and develop professional attributes that include communication skills, and ethics to deal with the impact of technology in a global and societal context.
- Encourage independent thinking and creativity that prepares students to pursue doctoral degrees in electrical engineering or related disciplines.

The program's student learning outcomes are:

- Independent Thinker: Demonstrate an ability to work independently and/or in a team setting and possess the skills to continue to do so, on a global level.
- Career Focus: Demonstrate a proficiency in a concentrated course of study and research in a specialty area or subfield of electrical engineering,
- Communication: Demonstrate the ability to effectively communicate both in written and oral form.

Graduate Paper/Thesis

In order to earn the MS in electrical engineering, all students must complete a graduate paper or a graduate thesis. Of the minimum 30 credit hours needed to earn the degree, a typical student earns 24 to 27 credit hours from course work and the remaining credit hours from the graduate paper or the thesis.

Thesis and graduate paper credits do not affect GPA. A grade of 'R' is given upon registration. At completion, the advisor approves the paper with his or her signature. The graduate paper mandates a minimum of 3 credits while the thesis credit mandates a minimum of 6 credits.

Curriculum

Electrical Engineering (communications focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-602	Random Signals and Noise	3
EEEE-692	Communication Networks	3
EEEE-693	Digital Data Communication	3
EEEE-707	Engineering Analysis	3
EEEE-709	Advanced Engineering Mathematics	3
EEEE-794	Information Theory	3
EEEE-795	Graduate Seminar	0
Second Year		
EEEE-790	Thesis	6
EEEE-795	Graduate Seminar	0
EEEE-797	Wireless Communication	3
	Graduate Elective	3
Total Semester Credit Hours		**30**

Electrical Engineering (control systems focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-602	Random Signals and Noise	3
EEEE-661	Modern Control Theory	3
EEEE-669	Fuzzy Logic & Applications	3
EEEE-707	Engineering Analysis	3
EEEE-709	Advanced Engineering Mathematics	3
EEEE-765	Optimal Control	3
EEEE-766	Multivariable Modeling	3
EEEE-795	Graduate Seminar	0
Second Year		
EEEE-790	Thesis	6
EEEE-795	Graduate Seminar	0
	Elective	3
Total Semester Credit Hours		**30**

Electrical Engineering (digital systems focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-620	Design of Digital Systems	3
EEEE-621	Design of Computer Systems	3
EEEE-707	Engineering Analysis	3
EEEE-709	Advanced Engineering Mathematics	3
EEEE-720	Advanced Topics in Digital Systems Design	3
EEEE-721	Advanced Topics in Computer Systems Design	3
EEEE-795	Graduate Seminar	0
Second Year		
EEEE-790	Thesis	6
EEEE-795	Graduate Seminar	0
	Electives	6
Total Semester Credit Hours		**30**

Electrical Engineering (electromagnetic/microwaves focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-602	Random Signals and Noise	3
EEEE-617	Microwave Circuit Design	3
EEEE-629	Antenna Theory	3
EEEE-692	Communication Networks	3
EEEE-707	Engineering Analysis	3
EEEE-709	Advanced Engineering Mathematics	3
EEEE-710	Advanced Electromagnetic Theory	3
EEEE-795	Graduate Seminar	0
Second Year		
EEEE-718	Design and Characterization of Microwave Systems	3
EEEE-790	Thesis	6
EEEE-795	Graduate Seminar	0
Total Semester Credit Hours		**30**

Electrical Engineering (integrated electronics focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-610	Analog Electronics Design	3
EEEE-707	Engineering Analysis	3
EEEE-709	Advanced Engineering Mathematics	3
EEEE-711	Advanced Carrier Injection Devices	3
EEEE-712	Advanced Field Effect Devices	3
EEEE-713	Solid State Physics	3
EEEE-726	Mixed Signal IC Design	3
EEEE-795	Graduate Seminar	0
Second Year		
EEEE-790	Thesis	6
EEEE-795	Graduate Seminar	0
	Elective	3
Total Semester Credit Hours		**30**

Electrical engineering (MEMS focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-602	Random Signals and Noise	3
EEEE-661	Modern Control Theory	3
EEEE-689	Fundamentals of MEMS	3
EEEE-707	Engineering Analysis	3
EEEE-709	Advanced Engineering Mathematics	3
EEEE-787	MEMS Evaluation	3
EEEE-795	Graduate Seminar	0
MCEE-770	Microelectromechanical Systems	3
Second Year		
EEEE-790	Thesis	6
EEEE-795	Graduate Seminar	0
MCEE-601	Microelectronic Fabrication	3
Total Semester Credit Hours		**30**

Electrical Engineering (robotics focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-602	Random Signals and Noise	3
EEEE-636	Biorobotics/Cybernetics	3
EEEE-647	Artificial Intelligence Explorations	3
EEEE-661	Modern Control Theory	3
EEEE-685	Principle of Robotics	3
EEEE-707	Engineering Analysis	3
EEEE-709	Advanced Engineering Mathematics	3
EEEE-795	Graduate Seminar	0
Second Year		
EEEE-784	Advanced Robotics	3
EEEE-790	Thesis	6
EEEE-795	Graduate Seminar	0
Total Semester Credit Hours		

Electrical Engineering (signal and image processing focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-602	Random Signals and Noise	3
EEEE-678	Digital Signal Processing	3
EEEE-707	Engineering Analysis	3
EEEE-709	Advanced Engineering Mathematics	3
EEEE-768	Adaptive Signal Processing	3
EEEE-779	Digital Image Processing	3
EEEE-795	Graduate Seminar	0
Second Year		
EEEE-780	Digital Video Processing	3
EEEE-790	Thesis	6
EEEE-795	Graduate Seminar	0
	Elective	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in electrical engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering or a related field.
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit two letters of recommendation from individuals well qualified to judge the candidate's ability for graduate study, and
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Candidates with a bachelor of science degree in fields outside of electrical engineering may be considered for admission, however, they may be required to complete bridge courses to ensure they are adequately prepared for graduate studies in electrical engineering.

Additional information

Graduation requirements

Students must maintain a minimum grade-point average of 3.0 or higher. Under certain circumstances, a student chooses or may be required to complete more than the minimum number of credits.

Engineering, Ph.D.

www.rit.edu/study/engineering-phd
Edward Hensel, Professor
585-475-7684, echeme@rit.edu

Program overview

The engineering doctorate produces graduates who are subject matter experts in a knowledge domain within an engineering discipline. Instead of restricting graduates to individual engineering fields, the engineering Ph.D. provides students with the flexibility to become discipline-specific subject matter experts and engineering innovators in an open-architecture environment, fostering intellectual growth along both interdisciplinary pathways and within the bounds of conventional engineering disciplines. With this approach, the program develops world-class researchers who can capitalize on the most promising discoveries and innovations, regardless of their origin within the engineering field, to develop interdisciplinary solutions for real-world challenges.

The doctorate in engineering requires each student to address fundamental technical problems of national and global importance for the 21st century. Four key industries—health care, communications, energy, and transportation—are addressed specifically. These application domains impact every individual on the planet and are the focus areas doctoral candidates and faculty will contribute to through study and research. The college has identified several technology research strengths including: manufacturing and materials, signal and image processing, robotics and mechatronics, heat transfer and thermo-fluids, performance and power-aware computing, access and assistive technologies, simulation, modeling and optimization, safety and security, and nano-science and engineering. Students collaborate with faculty members from a variety of engineering disciplines to bring these technology strengths to bear on solving problems of global significance in the application domains.

Plan of study

The curriculum for the doctorate in engineering provides disciplinary and interdisciplinary courses, research mentorship, and engineering focus area seminars. Students are expected to have a disciplinary-rooted technical strength to conduct and complete independent, original, and novel collaborative interdisciplinary research contributing to one of the four industrial and/or societal focus areas. The program is comprised of 66 credit hours: 18 core course credits, 9 discipline foundation credits, 9 industry focus area credits, and 30 research credits

Core courses
Students complete the following core courses: Interdisciplinary Research Methods (ENGR-701), Engineering Analytics Foundation (ENGR-707), Translating Discovery into Practice (ENGR-702), an engineering analytics elective, and doctoral seminar.

Discipline foundation courses
Foundation courses build depth within a disciplinary field of engineering, such as mechanical engineering, electrical and microelectronics engineering, computer engineering, industrial and systems engineering, chemical engineering, or biomedical engineering.

Application domain courses
This rigorous set of engineering courses provides students with comprehensive coverage of engineering challenges and solution approaches in one of the four key industry areas associated with the program: health care, energy, communications, and transportation. Students choose a focus area and work with the program director to identify a set of focus area courses appropriate to their research and professional interests. Students can also take additional courses from their selected industry as electives.

Qualifying exam
Students complete a qualifying exam at the end of their first year of study. The exam evaluates the student's aptitude, potential, and competency in conducting Ph.D. level research.

Dissertation proposal and candidacy exam
Students must present a dissertation proposal to their dissertation committee no sooner than six months after the qualifying exam and at least twelve months prior to the dissertation defense exam. The proposal provides the opportunity for the student to elaborate on their research plans and to obtain feedback on the direction and approach to their research from his/her dissertation committee.

Research review meetings
Research review meetings provide comprehensive feedback to the student regarding their dissertation research progress and expected outcomes prior to defense of their full dissertation. Research review meetings must be held at least every six months following the conclusion of the dissertation proposal and candidacy exam until the dissertation defense.

Dissertation presentation and defense
Each doctoral candidate prepares an original, technically sound, and well-written dissertation. They present and defend their dissertation and its accompanying research to their dissertation committee.

Curriculum

Engineering, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ENGR-701	Interdisciplinary Research Methods	3
ENGR-702	Translating Discovery into Practice	3
ENGR-795	Doctoral Seminar	2
	Discipline Concentration Courses	6
	Engineering Foundation Courses	6
Second Year		
ENGR-795	Doctoral Seminar	2
ENGR-892	Graduate Research	6
	Discipline Concentration Courses	3
	Engineering Focus Area Electives	9
Third Year		
ENGR-795	Doctoral Seminar	2
ENGR-890	Dissertation and Research	24
Total Semester Credit Hours		**66**

Admission requirements

To be considered for admission to the Ph.D. program in engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in an engineering discipline.
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a Statement of Purpose for Research describing the applicant's (a) interest in one of the four application domains of transportation, energy, communications or health care; (b) areas of technology strength aligned with the college's faculty; and (c) disciplinary foundation.

- Submit a current resume or curriculum vitae highlighting educational background and experiences.
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral candidates must be confidential and must be submitted directly from the referee to RIT.
- Participate in an on-campus or teleconference interview (when applicable).
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 94 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

Residency

All students in the program must spend at least three years in residence before completing the degree.

Engineering Management, ME

www.rit.edu/study/engineering-management-me
Michael Kuhl, Professor
585-475-2134, mekeie@rit.edu

Program overview

The engineering management masters combines technical expertise with managerial skills to focus on the management of engineering and technological enterprises. Students learn the technology involved in engineering projects and the business processes through which technology is applied. The objective is to provide a solid foundation in the areas commonly needed by managers who oversee engineers and engineering projects: organizational behavior, finance, and accounting.

Plan of study

The master of engineering in engineering management is a blend of courses from the department of industrial and systems engineering in RIT's Kate Gleason College of Engineering and RIT's Saunders College of Business. This creates a focused curriculum on the management of the engineering and technological enterprise. It combines technological expertise with managerial skills.

Engineering management is concerned with understanding the technology involved in an engineering project and the management process through which the technology is applied. This combination deals with the dual role of the engineering manager, both as a technologist and a manager. The objective is to provide a background in areas commonly needed in this role, such as organizational behavior, finance, and accounting, in addition to industrial engineering expertise. Students develop a program of study in conjunction with their advisor, which contains courses from Saunders College of Business to complement engineering course work.

Curriculum

Engineering Management, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-794	Cost Management in Technical Organizations	3
ISEE-750	Systems and Project Management	3
ISEE-760	Design of Experiments	3
ISEE-771	Engineering of Systems I	3
	Engineering Management Elective	3
	Elective	3
Second Year		
ISEE-792	Engineering Capstone	3
	Engineering Management Electives	6
	Elective	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the ME program in engineering management, candidates must fulfill the following requirements:

- Complete a graduate application,
- Hold a baccalaureate degree in engineering, mathematics, or science, from an accredited institution,
- Have a minimum cumulative undergraduate GPA of 3.00,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Record Exam (GRE) (recommended if candidate's degree is from an ABET accredited institution, otherwise required)

- Submit letters of recommendation, and
- Submit a one-page statement of purpose.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 580 (paper-based) or 90 (internet-based) are required.

Industrial and Systems Engineering, ME

www.rit.edu/study/industrial-and-systems-engineering-me
Michael Kuhl, Professor
585-475-2134, mekeie@rit.edu

Program overview

The master of engineering in industrial and systems engineering focuses on the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy. The program emphasizes specialized knowledge and skills in the mathematical, physical, computer, and social sciences together with the principles and methods of engineering analysis and design. The overarching goal of industrial and systems engineering is the optimization of the system, regardless of whether the activity engaged in is a manufacturing, distribution, or a service-related capacity. Students graduate with a variety of skills in the areas of applied statistics/quality, ergonomics/human factors, operations research/simulation, manufacturing, and systems engineering.

Curriculum

Industrial and Systems Engineering, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-601	Systems Modeling and Optimization	3
ISEE-760	Design of Experiments	3
ISEE-771	Engineering of Systems I	3
	Electives	9
Second Year		
ISEE-792	Engineering Capstone	3
	Electives	9
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the ME program in industrial and systems engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering, mathematics, or science.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a one page statement of purpose.
- Submit at least two letters of recommendation from academic or sources (three are recommended).
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 90 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Industrial and Systems Engineering, MS

www.rit.edu/study/industrial-and-systems-engineering-ms
Michael Kuhl, Professor
585-475-2134, mekeie@rit.edu

Program overview

Focused on the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy, this master of science in industrial and systems engineering allows you to customize your course work while working closely with industrial and systems engineering faculty in a contemporary, applied research area. You will graduate with a variety of skills in the areas of contemporary manufacturing processes, product development, ergonomic analysis, logistics and supply chain management, and sustainable design and development.

The MS degree in industrial and systems engineering allows students to customize their course work while working closely with industrial and systems engineering faculty in a contemporary, applied research area. Faculty members are currently conducting applied project and research work in the areas of contemporary manufacturing processes/systems, ergonomic/biomedical analysis, logistics and supply chain management, sustainable design and development, systems engineering/product development, and systems simulation.

Curriculum

Industrial and Systems Engineering, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-601	Systems Modeling and Optimization	3
ISEE-760	Design of Experiments	3
ISEE-771	Engineering of Systems I	3
ISEE-795	Graduate Seminar I	0
ISEE-796	Graduate Seminar II	0
	Electives	9
Second Year		
ISEE-790	Thesis	6
	Electives	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in industrial and systems engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering, mathematics, or science.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a one page statement of purpose.
- Submit at least two letters of recommendation from academic or sources (three are recommended).
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 90 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Lean Six Sigma, Adv. Cert.

www.rit.edu/study/lean-six-sigma-adv-cert
Rebecca Ziebarth,
585-475-2033, razeqa@rit.edu

Program overview

Lean Six Sigma is a methodology for increasing organizational productivity and efficiency through a structured problem solving process called DMAIC (define, measure, analyze, improve, and control). The focus is on improving organizational systems and work processes.

The advanced certificate in Lean Six Sigma is for engineers, process-improvement facilitators, and other practitioners looking to increase their effectiveness or enhance their qualifications to broaden their careers. Industry certifications such as lean six sigma green belt and black belt are not the focus of this academic program, but students interested in obtaining these credentials are well prepared to do so after the deep topical coverage offered in this advanced certificate program. See Lean Six Sigma for Students or contact the program office for details.

Curriculum

Lean Six Sigma, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ISEE-682	Lean Six Sigma Fundamentals	3
Choose one of the following:		3
ISEE-660	Applied Statistical Quality Control	
STAT-621	Statistical Quality Control	
Choose one of the following:		3
ISEE-760	Design of Experiments	
STAT-670	Design of Experiments	
Elective		**3**
Total Semester Credit Hours		**12**

Electives

COURSE	
BUSI-710	Project Management
BUSI-711	Advanced Project Management
BUSI-712	International Project Management
DECS-743	Operations and Supply Chain Management
DECS-744	Project Management
DECS-745	Quality Control and Improvement
ISEE-626	Contemporary Production Systems
ISEE-703	Supply Chain Management
ISEE-704	Logistics Management
ISEE-720	Production Control
ISEE-723	Global Facilities Planning
ISEE-728	Production Systems Management
ISEE-745	Manufacturing Systems
ISEE-750	Systems and Project Management
ISEE-751	Decision and Risk Benefit Analysis
ISEE-771	Engineering of Systems I
ISEE-786	Lifecycle Assessment

Admission requirements

To be considered for admission to the advanced certificate in Lean Six Sigma, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Have a satisfactory background in statistics (at least one course in probability and statistics).
- Submit a current resume or curriculum vitae.
- Submit one letter of recommendation.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Graduate entrance exams are not required. However, students are welcome to submit scores from the GMAT or the GRE to support their application for admission.

Students currently enrolled in master's degree programs at RIT may add the advanced certificate in Lean Six Sigma as part of their current program of study in consultation with their academic advisor. Students must have a satisfactory background in statistics (at least one course in probability and statistics) to be eligible. Students should use the following form to add the certificate program. The form should be submitted to cqas@rit.edu.

Additional information

Prerequisites

Students should have a basic familiarity with MINITAB statistical software. This may be obtained by self-study or through a short course.

Grades

Students must maintain an overall program GPA of 3.0 (B) to qualify for graduation.

Format

Classes are available online and on campus.

Manufacturing Leadership, MS

www.rit.edu/study/manufacturing-leadership-ms
Christine Fisher,
585-475-7971, Christine.Fisher@rit.edu

Program overview

The master of science in manufacturing leadership is for experienced engineers, business, and technical professionals who aspire to high-level positions in operations, supply chain management, and process improvement. The program integrates business and engineering management courses, delivering them online or on-campus where students continue to work while taking classes.

Manufacturing leadership is a focused program developed jointly by the Kate Gleason College of Engineering and Saunders College of Business. Particular emphasis is placed on supply chain management, global manufacturing and operations, lean systems thinking, leadership, and decision making. A capstone project, oriented to the solution of a manufacturing or service management problem or process improvement initiative, enables students to apply new skills and capabilities to the solution of a pressing real-world problem, with significant financial benefit to sponsors. The program can also be taken on a full-time basis, with several courses available on campus. Students may start any term (fall, spring, summer) and complete courses at their own pace.

Sponsorship

Most students are sponsored by an employer, who is committed to improving leadership capabilities in operational excellence. Sponsorship includes financial support and a commitment to work with the student to provide clear expectations and a well-articulated career development plan that builds upon the program. Candidates are welcome to sponsor themselves. Students should contact Financial Aid and Scholarship for more information.

Curriculum

Educational objective

To prepare graduates to lead teams and organizations within a manufacturing or service enterprise for successful competition in a complex global economy, through the integration of business and technical skills.

Key capabilities of graduates

- Ability to make sound business decisions in a complex global economy: business planning with full understanding of outsourcing and offshoring; financial management and total/life-cycle cost; agile decision-making.
- Ability to manage the global supply chain: supply chain strategy development and execution; logistics management (quality and delivery assurance); systems needs for supply chain management; and supply chain optimization.
- Ability to manage global, multi-site production and operations: managing distributed teams; process technology transfer to domestic and international locations; service operations; enterprise and manufacturing strategies; lean operations; location strategy and facility design; state-of-the-art tools; regulatory issues and established norms.
- Comprehensive understanding of quality and continuous improvement principles, with application to the manufacturing and operations management.
- Strong leadership and management skills applied to global high technology manufacturing: systems thinking, planning, and management; applications ("hands-on") orientation; project management expertise (planning, relationship management, control, risk management and decision-making); creative leadership to drive innovative solutions; enhanced ability to recognize barriers to success early, when corrective actions are least costly.

The 30 semester-credit program consists of 9 business and engineering courses, including one elective, plus a Capstone project (3 credits).

Manufacturing Leadership, MS degree

COURSE		SEMESTER CREDIT HOURS
ISEE-682	Lean Six Sigma Fundamentals	3
ISEE-703	Supply Chain Management	3
ISEE-723	Global Facilities Planning	3
ISEE-745	Manufacturing Systems	3
ISEE-771	Engineering of Systems I	3
MGMT-740	Organizational Behavior and Leadership	3
Choose one of the following:		3
BUSI-710	Project Management	
ISEE-750	Systems and Project Management	
Choose one of the following:		3
ACCT-603	Accounting for Decision Makers	
ACCT-794	Cost Management in Technical Organizations	
Choose one of the following:		3
ISEE-792	Engineering Capstone	
ISEE-793	Manufacturing Leadership Capstone	
	Engineering Elective	3
Total Semester Credit Hours		**30**

Elective courses

An elective course offers students the opportunity to better meet personal and organizational needs. Students may select from a long list of courses. Recommended electives include such offerings as Decision and Risk Benefit Analysis, Advanced or International Project Management, Breakthrough Thinking and Creativity, Customer Centricity, and others.

Capstone project

Students complete a project during the final academic year of the program, based on a real problem often identified in the companies where they work. The corporate-oriented capstone project is directed at the solution of a manufacturing or services management problem or process improvement initiative. It enables students to broaden the educational experience and demonstrate the knowledge and skills essential to business leadership. The project provides immediate benefits to sponsoring organizations and is an excellent opportunity for students to gain visibility and recognition. Projects often result in substantial cost savings or improved efficiencies. View our list of capstone projects for examples of projects past students have completed as part of the program.

Admission requirements

To be considered for admission to the MS program in manufacturing leadership, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Have at least two years of experience in a manufacturing-related organization or business environment.
- Submit a current resume or curriculum vitae.
- Submit one letter of recommendation.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of

6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Exceptions to admission requirements may be considered on a case-by-case basis. No graduate entrance exam is required, although candidates are welcome to support their application with results from the GMAT or GRE.

Applications are accepted on a rolling basis and students may begin the program in any semester.

Prerequisite knowledge

Admitted students must possess knowledge and skills at the introductory course level in probability and statistics, engineering economy, or basic accounting. Areas that need strengthening may be addressed by guided reading, independent study, or formal course work.

Format

Students may start the program during any semester and complete the course work at their own pace. Classes are available online but several courses may be taken on campus for local or full-time students. Students may take up to three courses on a nonmatriculated basis. Credits earned while enrolled as a nonmatriculated student may be applied to the degree program following formal admission.

Tuition

The program's tuition is calculated using the part-time graduate tuition rate (12 credits or less). For information on tuition, scholarships, and financial aid, please visit Financial Aid and Scholarships. Discounts are available for groups.

Additional information

Related programs

Visit the Engineering Leadership department for information on related offerings, including the master of science in product development, graduate certificate programs, and non-credit workshops and training programs.

Programs are available online, on-campus, or onsite at your location. Contact us for information about partnerships and customized programs for your organization.

Mechanical Engineering, ME

www.rit.edu/study/mechanical-engineering-me
Risa Robinson, Professor
585-475-6445, rjreme@rit.edu

Program overview

The mechanical engineering masters prepares graduates to support the design of engineered systems through the application of the fundamental knowledge, skills, and tools of mechanical engineering. Students will work independently as well as collaboratively with leaders in industry, while demonstrating the professional and ethical responsibilities of the engineering profession. Ultimately, graduates will enhance their skills through formal education and training, independent inquiry, and professional development.

The ME in mechanical engineering is intended to be a terminal degree program designed for those who do not expect to pursue a doctoral degree, but who wish to become a leader within the mechanical engineering field. This program is particularly well-suited for students who wish to study part time, for those interested in updating their technical skills, or for those who are not focused on a research-oriented master of science degree, which requires a thesis. A conventional thesis is not required for the program. In its place, students complete a capstone experience, which may be a design project leadership course or a well-organized and carefully chosen industrial internship. A research methods course may also fulfill the capstone experience; however, this option is primarily intended for students who are considering transitioning to the MS program in mechanical engineering. (Courses taken within the ME program are transferrable to the MS program.)

Educational objectives

The ME in mechanical engineering program has outlined the following educational objectives to prepare graduates to:
- practice mechanical engineering in support of the design of engineered systems through the application of the fundamental knowledge, skills, and tools of mechanical engineering.
- enhance their skills through formal education and training, independent inquiry, and professional development.
- work independently as well as collaboratively with others, while demonstrating the professional and ethical responsibilities of the engineering profession.

Plan of study

The program requires 30 credit hours. In addition to the two required courses, students choose three courses from nine different focus areas and four elective courses. All full-time equivalent students are required to attend graduate seminar weekly for each semester they are on campus. Up to three courses may be taken outside the mechanical engineering department. Students may complete the program's requirements within one calendar year with summer study. Students may also augment their education through cooperative education employment opportunities. Although co-op is not a requirement of the program, it provides students an opportunity to gain valuable employment experience within the field.

Curriculum

Mechanical Engineering, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MECE-707	Engineering Analysis	3
MECE-709	Advanced Engineering Mathematics	3
MECE-795	Graduate Seminar	0
	Graduate Focus Courses	6
	Graduate Electives	6
Second Year		
Choose one of the following:		3
MECE-730	Design Project Leadership*	
MECE-777	Graduate Internship†	
MECE-792	Project with Paper‡	
MECE-795	Graduate Seminar	0
	Graduate Focus Course	3
	Graduate Electives	6
Total Semester Credit Hours		**30**

Graduate Seminar (MECE-795) is a 0 credit course required for all full-time and full-time equivalent students.

* Design Project Leadership (MECE-730) is reserved only for students enrolled in the accelerated BS/M. Eng. program.

† Graduate Internship (MECE-777) is an option for all ME students and student enrolled in the accelerated BS/M.Eng. program.

‡ Project with Paper (MECE-792) is an option for all ME students and students enrolled in the accelerated BS/M.Eng program.

Focus areas

COURSE		SEMESTER CREDIT HOURS
Automotive systems		
Choose three of the following:		
ISEE-740	Design for Manufacture and Assembly	3
MECE-623	Powertrain Systems and Design	3
MECE-624	Vehicle Dynamics	3
MECE-643	Classical Controls	3
MECE-658	Introduction to Engineering Vibrations	3
MECE-739	Alternative Fuels and Energy Efficiency	3
MECE-752	Tribology Fundamentals	3
Business		
ACCT-603	Accounting for Decision Makers	3
MGMT-740	Organizational Behavior and Leadership	3
Choose one of the following:		
ACCT-706	Cost Management	3
INTB-730	Cross-Cultural Management	3
MGMT-735	Management of Innovation in Products and Services	3
Controls		
MECE-643	Classical Controls	3
Choose two of the following:		
EEEE-661	Modern Control Theory	3
EEEE-733	Robust Control	3
EEEE-765	Optimal Control	3
MECE-606	Systems Modeling	3
MECE-743	Digital Controls	3
MECE-744	Nonlinear Controls	3
Manufacturing		
Choose three of the following		
ISEE-626	Contemporary Production Systems	3
ISEE-720	Production Control	3
ISEE-740	Design for Manufacture and Assembly	3
ISEE-741	3D Printing	3
ISEE-745	Manufacturing Systems	3
MECE-643	Classical Controls	3
Mechanics-Design/Materials		
Choose three of the following:		
MECE-605	Finite Elements	3
MECE-620	Introduction to Optimal Design	3
MECE-623	Powertrain Systems and Design	3
MECE-644	Introduction to Composite Materials	3
MECE-657	Applied Biomaterials	3
MECE-752	Tribology Fundamentals	3
MECE-785	Advanced Mechanics of Solids	3

COURSE		SEMESTER CREDIT HOURS
Product development		
Choose three of the following:		
DECS-744	Project Management*	3
ISEE-741	3D Printing	3
ISEE-750	Systems and Project Management*	3
ISEE-751	Decision and Risk Benefit Analysis	3
ISEE-771	Engineering of Systems I	3
ISEE-772	Engineering of Systems II	3
Sustainability		
Choose three of the following:		
ISEE-785	Fundamentals of Sustainable Engineering	3
ISEE-786	Lifecycle Assessment	3
ISEE-787	Design for the Environment	3
MECE-629	Renewable Energy Systems	3
MECE-733	Sustainable Energy Management	3
MECE-739	Alternative Fuels and Energy Efficiency	3
Thermo/Fluids Engineering		
Choose three of the following:		
MCSE-610	Applied Biofluid Mechanics and Microcirculation	3
MECE-725	Fundamentals of Computational Fluid Dynamics	3
MECE-731	Computational Fluid Dynamics	3
MECE-738	Ideal Flows	3
MECE-751	Convective Phenomena	3
Vibrations engineering		
MECE-658	Introduction to Engineering Vibrations	3
MECE-758	Intermediate Engineering Vibrations	3
Choose one of the following:		
EEEE-602	Random Signals and Noise	3
EEEE-678	Digital Signal Processing	3
MECE-606	System Modeling	3

Admission requirements

To be considered for admission to the ME program in mechanical engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in mechanical engineering, physics, or a related field.
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- International students are required to submit scores from the GRE. Minimum scores of 302 (V&Q) and 3.0 (writing) and required.

Mechanical Engineering, MS

www.rit.edu/study/mechanical-engineering-ms
Risa Robinson, Professor
585-475-6445, rjreme@rit.edu

Program overview

The mechanical engineering masters produces graduates who are leaders in their respective fields who are ready to tackle high-level problems as practicing professionals. Designed for students who desire advanced training in specific areas of mechanical engineering, the master of science acts as a prelude to a career in either research or industry. Students can choose to focus on a variety of disciplines including dynamics, robotics, nanotechnology, biomechanics, energy systems, or more.

The MS degree in mechanical engineering consists of a minimum of 30 credit hours (24 credit hours of course work and 6 credit hours of thesis). A limited number of credit hours may be transferred from graduate courses taken outside the university, provided such courses complement a student's proposed graduate program in the mechanical engineering department. An adviser will review course work for possible transfer credit. Upon matriculation into the MS program, the student should formulate a plan of study in consultation with an advisor.

Educational objectives

The MS in mechanical engineering program has set the following educational objectives to prepare graduates to:

- practice mechanical engineering in support of the design of engineered systems through the application of the fundamental knowledge, skills, and tools of mechanical engineering.
- enhance their skills through formal education and training, independent inquiry, and professional development.
- work independently as well as collaboratively with others, while demonstrating the professional and ethical responsibilities of the engineering profession.
- successfully pursue graduate degrees at the doctoral levels, should they choose.

Plan of study

The program includes core courses, focus area courses, elective courses, and a thesis. All full-time and full-time equivalent students are required to attend the weekly graduate seminar each semester they are on campus.

Focus area courses

All students must develop a focus area of study, with prior approval from their advisor and the department head. The focus area should consist of at least 9 semester credit hours of graduate study in mechanical engineering and be related to the student's technical and professional development interests. Examples of focus areas include controls, materials science, thermo/fluids, and mechanics/design.

Independent study

Students may earn a limited number of credits by doing an independent study with guidance from a member of the graduate faculty. Areas for independent study include selected topics in applied mathematics, analytical mechanics, nonlinear mechanics, fracture mechanics, heat transfer, fluid mechanics, thermodynamics, control systems, optimal control, thermal stresses, composite materials, and biomechanics.

Thesis

Prior to completing 24 semester credit hours of graduate work, students should prepare and present a formal thesis proposal to their faculty advisor. An acceptable proposal (including a statement of work, extensive literature search, and proposed timeline), signed by the student and approved by their faculty advisor and department head, is required prior to registering for thesis credits. Students must form a graduate thesis committee in coordination with their advisor and present their proposal to their committee for review and approval during the first semester in which they have registered for thesis credit. Students are required to deliver a successful written and oral presentation of their thesis.

Curriculum

Mechanical Engineering, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
MECE-707	Engineering Analysis	3
MECE-709	Advanced Engineering Mathematics	3
MECE-790	Thesis	6
MECE-795	Graduate Seminar	0
	Graduate Focus Courses	9
	Electives	9
Total Semester Credit Hours		**30**

* Graduate Seminar (MECE-795) is required for all full-time and full-time equivalent students.

Admission requirements

To be considered for admission to the MS program in mechanical engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in mechanical engineering or a related field.
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE. Minimum scores of 302 (V&Q) and 3.0 (writing) and required.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Microelectronic Engineering, MS

www.rit.edu/study/microelectronic-engineering-ms
Sean Rommel, Professor
585-475-4723, slremc@rit.edu

Program overview

Integrated microelectronic or nanoelectronic circuits and sensors drive our global economy, increase our productivity, and help improve our quality of life. Semiconductor and photonic devices impact virtually every aspect of human life, from communication, entertainment, and transportation to health, solid state lighting, and solar cells. RIT's microelectronic engineering program is considered a world leader in the education of semiconductor process engineers.

The microelectronic engineering masters provides a unique combination of physics, chemistry, and engineering in a state-of-the-art facility to prepare graduates for the real world. With internationally renowned professors with years of experience, courses are grounded in reality – practical skill and advanced theory, combine for comprehensive learning. Put your knowledge to work with a microelectronic engineering masters from RIT.

The objective of the MS degree in microelectronic engineering is to provide an opportunity for students to perform graduate-level research as they prepare for entry into either the semiconductor industry or a doctoral program. The degree requires strong preparation in the area of microelectronics and requires a thesis.

Program outcomes

- Understand the fundamental scientific principles governing solid-state devices and their incorporation into modern integrated circuits.
- Understand the relevance of a process or device, either proposed or existing, to current manufacturing practices.
- Develop in-depth knowledge in existing or emerging areas of the field of microelectronics such as device engineering, circuit design, lithography, materials and processes, yield, and manufacturing.
- Apply microelectronic processing techniques to the creation/investigation of new process/device structures.
- Communicate technical material effectively through oral presentations, written reports, and publications.

Plan of study

The MS degree is awarded upon the successful completion of a minimum of 32 semester credit hours, including a 6 credit hour thesis.

The program consists of six core courses, two graduate electives, 2 credits of graduate seminar, and a six credit thesis. The curriculum is designed for students who do not have an undergraduate degree in microelectronic engineering. Students who have an undergraduate degree in microelectronic engineering develop a custom course of study with their graduate adviser.

Thesis

A thesis is undertaken once the student has completed approximately 20 semester credit hours of study. Planning for the thesis, however, should begin as early as possible. Generally, full-time students should complete their degree requirements, including thesis defense, within two years (four academic semesters and one summer term).

Curriculum

Microelectronic Engineering, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MCEE-601	Microelectronic Fabrication	3
MCEE-602	Semiconductor Process Integration	3
MCEE-603	Thin Films	3
MCEE-605	Lithography Materials and Processes	3
MCEE-732	Microelectronics Manufacturing	3
MCEE-795	Microelectronics Research Methods	2
	Graduate Elective	3
Second Year		
MCEE-704	Physical Modeling of Semiconductor Devices	3
MCEE-790	MS Thesis	6
	Graduate Elective	3
Total Semester Credit Hours		**32**

Admission requirements

To be considered for admission to the MS program in microelectronic engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering or a related field.
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE. (RIT graduates exempt.)
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Candidates applying with a bachelor's degree in fields outside of electrical and microelectronic engineering may be considered for admission; however, bridge courses may be required to ensure the student is adequately prepared for graduate study.

Additional information

Assistantships and fellowships

A limited number of assistantships and fellowships may be available for full-time students. Appointment as a teaching assistant carries a 12-hour-per-week commitment to a teaching function and permits a student to take graduate work at the rate of 9 credits per semester. Appointment as a research assistant also permits taking up to 9 credits per semester while the remaining time is devoted to the research effort, which often serves as a thesis subject. Students in the MS program are eligible for research fellowships. Appointments provide full or partial tuition and stipend. Applicants for financial aid should contact to the program director for details.

Microelectronics Manufacturing Engineering, ME

www.rit.edu/study/microelectronics-manufacturing-engineering-me
Sean Rommel, Professor
585-475-4723, slremc@rit.edu

Program overview

The microelectronics manufacturing engineering masters covers the intensive aspects of integrated circuit technology, modeling and simulation techniques, and hands-on laboratory verification of these processes. In the laboratory, students from various engineering and science backgrounds design and fabricate semiconductor circuits, learn how to utilize imaging equipment, develop and create systems, and manufacture and test their own integrated circuits in our cleanroom. Microelectronics manufacturing at RIT utilizes many different disciplines such as chemistry, physics, and engineering to provide a degree that makes our students very sought after in the job market.

The ME in microelectronics manufacturing engineering provides a broad-based education for students who are interested in a career in the semiconductor industry and hold a bachelor's degree in traditional engineering or other science disciplines.

Program outcomes

After completing the program, students will be able to:

- Design and understand a sequence of processing steps to fabricate a solid state device to meet a set of geometric, electrical, and/or processing parameters.
- Analyze experimental electrical data from a solid state device to extract performance parameters for comparison to modeling parameters used in the device design.
- Understand current lithographic materials, processes, and systems to meet imaging and/or device patterning requirements.
- Understand the relevance of a process or device, either proposed or existing, to current manufacturing practices.
- Perform in a microelectronic engineering environment, as evidenced by an internship.
- Appreciate the areas of specialty in the field of microelectronics, such as device engineering, circuit design, lithography, materials and processes, and yield and manufacturing.

Plan of study

Students are awarded the ME degree after the successful completion of 30 credit hours, which are comprised of core courses, elective courses, research seminars, and an internship. Under certain circumstances, a student may be required to complete bridge courses totaling more than the minimum number of credits. Students complete courses in microelectronics, microlithography, and manufacturing.

Microelectronics
Microelectronics courses cover major aspects of integrated circuit manufacturing technology such as oxidation, diffusion, ion implantation, chemical vapor deposition, metallization, plasma etching, etc. These courses emphasize modeling and simulation techniques as well as hands-on laboratory verification of these processes. Students use special software tools for these processes. In the laboratory students design and fabricate silicon MOS integrated circuits. They learn how to utilize most of the semiconductor processing equipment and how to develop and create a process, manufacture and test their own integrated circuits.

Microlithography
The microlithography courses are advanced courses in the chemistry, physics and processing involved in microlithography. Optical lithography will be studied through diffraction, Fourier and image assessment techniques. Scalar diffraction models will be utilized to simulate aerial image formation and influences of imaging parameters. Positive and negative resist systems, as well as processes for IC application, will be studied. Advanced topics will include chemically amplified resists; multiple layer resist systems; phase shift masks, and electron beam, x-ray and deep UV lithography. Laboratory exercises include projection system design, resist materials characterization, process optimization, electron beam lithography and excimer laser lithography.

Manufacturing
The manufacturing course include topics such as scheduling, work-in-progress tracking, costing, inventory control, capital budgeting, productivity measures and personnel management. Concepts of quality and statistical process control are introduced to the students. The laboratory for this course is the student-run factory functioning in the department. Important issues that include measurement of yield, defect density, wafer mapping, control charts and other manufacturing measurement tools are introduced to the students in the lecture and laboratory. Computer integrated manufacturing is also studied in detail. Process modeling, simulation, direct control, computer networking, database systems, linking application programs, facility monitoring, expert systems applications for diagnosis and training and robotics are all introduced and supported by laboratory experiences in the integrated circuit factory at RIT. An online version of the ME in microelectronic manufacturing engineering is available for engineers employed in the semiconductor industry.

Internship

The program requires students to complete an internship. This requirement provides a structured and supervised work experience that enables students to gain job-related skills that assist them in achieving their desired career goals.

Students with prior engineering-related job experience may submit a request for credit by experience with the department head. Supported by a letter from the appropriate authority substantiating the student's job responsibility, duration, and performance quality, a student may be able to waive the internship if a previous work experience fulfills this requirement.

For students who are not working in the semiconductor industry while enrolled in this program, the internship can be completed at RIT. It involves an investigation or study of a subject or process directly related to microelectronic engineering under the supervision of a faculty advisor. An internship may be taken any time after the completion of the first semester, and may be designed in a number of ways. At the conclusion of the internship, submission of a final internship report to the faculty advisor and program director is required.

Curriculum

Microelectronic Manufacturing Engineering, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MCEE-601	Microelectronic Fabrication	3
MCEE-605	Lithography Materials and Processes	3
MCEE-603	Thin Films	3
MCEE-732	Microelectronics Manufacturing	3
MCEE-602	Semiconductor Process Integration	3
MCEE-615	Nanolithography Systems	3
MCEE-795	Microelectronics Research Methods	2
MCEE-777	Master of Engineering Internship or Graduate Elective	3

COURSE		SEMESTER CREDIT HOURS
Second Year		
Choose one of the following:		1
MCEE-795	Microelectronics Research Methods	
	1 credit of Independent Study	
	Graduate Electives	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the ME program in microelectronic manufacturing engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering or a related field.
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Candidates applying with a bachelor's degree in non-electrical or non-microelectronic engineering fields may be considered for admission, however they may be required to complete additional bridge courses to ensure they are adequately prepared for graduate study.

Microsystems Engineering, Ph.D.

www.rit.edu/study/microsystems-engineering-phd
Bruce Smith, Professor
585-475-2058, bwsemc@rit.edu

Program overview

The multidisciplinary doctorate degree in microsystems engineering builds on the fundamentals of traditional engineering and science combined with curriculum and research activities addressing the numerous technical challenges of micro- and nano-systems. These include the manipulation of electrical, photonic, optical, mechanical, chemical, and biological functionality to process, sense, and interface with the world at a nanometer scale. This nanotechnology Ph.D. program provides a foundation to explore future technology through research in nano-engineering, design methods, and technologies and their integration into micro- and nano-scaled systems.

The microsystems engineering doctorate includes the following areas of exploration:

- Next-generation nanoelectronics including: development of new techniques, processes and architectures for nanoelectronic and nano-optoelectronic devicesexploration into new materials research including germanium, III-V materials, carbon annotubes, and spintronics
- Photovoltaic research in silicon, compound semiconductor, and organic solar cells
- Photonics and nanophotonics imaging, communications, and sensing research including couplers, micro-lasers, microdetectors, integrated silicon waveguides, silicon spectrometers, and biosensors
- MEMS (micro-electro-mechanical systems), MEOMS (micro-electro-optical-mechanical systems), and NEMS (nano-electro-mechanical systems) device, processing, and materials research for smart sensors, actuators, biochips, and micro-implantable appliances
- Scaled micro- and nano- electronics for integration into biomedical systems
- New and improved technologies in organic electronic components and devices
- Nanomaterials research including carbon nanotubes, nanoparticles, quantum dots, self-assembly materials and their applications in electronics, optics, and materials science
- Microfluidics research on the behavior, control, and manipulation of fluids at the micro-scale

Mission

The program fulfills a critical need for an expanded knowledge base and expertise in the innovation, design, fabrication, and application of micro- and nano-scale materials, process, devices, components, and systems. RIT is an internationally recognized leader in education and research in the fields of microsystems and nanoscale engineering.

The curriculum is structured to provide a sound background and a thorough foundation in engineering and science through world-class education in the innovative application of educational technologies and research experiences.

Program highlights

The program is designed for students with a strong background in engineering and the physical sciences, and with an interest in hands on exploration into new fields of micro- and nano-systems.

- The program has a renowned, multidisciplinary faculty that shares resources and expertise over a wide variety of micro- and nao-scale tehcnologies. The program is administered by core faculty from RIT's colleges of engineering and science.

- Unique state-of-the art research laboratories have been developed to provide a focus for microsystems and nanoscale engineering research across traditional disciplinary boundaries. A semiconductor and microsystems fabrication clean-room constitute part of the research facilities, providing students access to the most advanced micro- and nano-electronic processing capabilities.
- Students explore applications of microsystems and nanotechnology through close collaboration with industry and government laboratories.
- Graduates have discovered exciting opportunities in new technology frontiers.

Plan of study

A total of 66 credit hours of combined graduate course work and research are required for completion of the program. The course work requires a combination of foundation courses, major and minor technical area courses, and electives. The student must pass the qualifying exam, the candidacy exam and the dissertation defense exam to complete the degree requirements.

Phase 1–Qualifying: The first phase prepares students with the foundation in science and engineering required for the program as well as to determine the student's ability to do independent research. This includes the foundation and specialization courses taken during the first year together with the successful completion of the qualifying exam. The qualifying exam tests the student's ability to think and learn independently, to critically evaluate current research work in microsystems engineering, and to use good judgment and creativity to determine appropriate directions for future research work.

Phase 2–Candidacy: The second phase continues students course work and preliminary dissertation research. Much of this course work supports the dissertation research to be conducted in the third phase. This phase is completed when the student has finished most of the formal course work as prescribed in the program of study, has prepared the dissertation proposal, and has passed the candidacy examination.

Phase 3–Defense: The third phase includes the completion of the experimental and/or theoretical work needed to complete the student's dissertation along with the required publication of results. The research review milestone is held as a meeting during this phase, as is the defense of the dissertation, which consists of a public oral presentation and examination.

The course work requirements are divided into four parts to ensure that students complete a well-rounded program of study with the necessary concentration in their specialized field.

Foundation courses

Four foundation courses and the Microsystems Ph.D. Seminar (MCSE-795) are mandatory for all students. Foundation courses consist of Microelectronics Fabrication (MCEE-601), Introduction to Nanotechnology and Microsystems (MCSE-702), Material Science for Microsystems Engineering (MCSE-703), and Theoretical Methods in Materials Science and Engineering (MTSE-704).

Major technical interest area

Students complete a sequence of three courses in the major technical research area and a sequence of two courses in a support area.

Minor technical interest areas

Students complete a two-course sequence in a minor technical area which should be outside of the student's undergraduate degree major.

Elective courses

Students complete at least two elective courses, in addition to the foundation and technical interest courses.

General course requirements

The total number of credit hours required for the degree depends upon the highest degree level completed by the student before entering the program. Students entering without prior graduate work must complete a minimum of 39 credit hours of course work as outlined above. A minimum of 18 research credits and a total of 66 total credits are required. Credits beyond the minimum of 39 course and 18 research requirements can be taken from either category to reach the 66 credit total.

Students entering the program with a master's degree may be permitted up to 24 course credit hours toward those required for the degree, based on the approval of the program director.

All students are required to maintain a cumulative grade-point average of 3.0 (on a 4.0 scale) to remain in good standing in the program.

Preparing a program of study

Students should prepare a program of study after passing the qualifying exam and no later than the spring semester of the second year. The program of study should be reviewed periodically by the student and the advisor, and modifications should be made as necessary. Leading up to or upon completion of the candidacy exam, the student's advisor and advisory committee may add additional course work requirements to ensure the student is sufficiently prepared to carry out and complete their dissertation research.

Qualifying examination

Every student must take the qualifying examination, which tests student's ability to think and learn independently, to critically evaluate current research work in the field of microsystems engineering, and to use good judgment and creativity to determine appropriate directions for future research work. The exam must be completed successfully before a student can submit a thesis proposal and attempt the candidacy examination.

Research proposal

A research topic chosen by the student and their research advisor becomes the basis for the dissertation. The research proposal sets forth both the exact nature of the matter to be investigated and a detailed account of the methods to be employed. In addition, the proposal usually contains material supporting the importance of the topic selected and the appropriateness of the research methods to be employed.

Candidacy examination

The candidacy examination is an oral examination based on the dissertation research proposal and allows the advising committee to judge the student's ability to execute a research task and to communicate the results. The exam also serves to evaluate the proposed topic to ensure that if completed as posed it constitutes an original contribution to knowledge.

Research review milestone

The research review milestone is administered by the student's advisor and the advisory committee between the time the student passes the candidacy exam and registers for the dissertation defense. This normally occurs approximately six months prior to the Dissertation Defense.

Dissertation defense and examination

The culmination of a student's work toward the doctorate degree is the publication of their research. In addition to developing experimental and technical skills during the creation of research, a student needs to acquire the necessary literary skills to communicate results to others. The preparation of the proposal and the dissertation manuscripts will demonstrate these skills. It is also expected that these skills are developed through the publication of technical papers and communications. The dissertation

defense and examination is scheduled after all course requirements for the degree have been successfully completed.

Additional details regarding program requirements can be found in the Microsystems Engineering Ph.D. Graduate Student Manual.

Curriculum

Microsystems Engineering, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MCEE-601	Microelectronic Fabrication	3
MCSE-702	Introduction to Nanotechnology and Microsystems	3
MCSE-703	Material Science for Microsystems Engineering	3
MCSE-795	Microsystems Ph.D. Seminar	2
MTSE-704	Theoretical Methods in Materials Science and Engineering	3
	Major Technical Area Electives	6
Second Year		
MCSE-795	Microsystems Ph.D. Seminar	2
MCSE-890	MCSE-Dissertation	2
	Major Technical Area Elective	3
	Minor Technical Area Electives	6
	Technical Elective	3
Third Year		
MCSE-795	Microsystems Ph.D. Seminar	2
MCSE-890	MCSE-Dissertation	9
	Technical Elective	3
Fourth Year		
MCSE-890	MCSE-Dissertation	16
Total Semester Credit Hours		**66**

Admission requirements

To be considered for admission to the doctorate program in microsystems engineering, candidates must complete a graduate application and fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in the physical sciences or engineering.
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE with minimum requirements of 156 (verbal), 156 (quantitative), and 3.5 writing.
- Submit a current resume or curriculum vitae.
- Submit a personal statement of educational objectives which specifically addresses research interests.
- Submit at least two letters of academic and/or professional recommendation.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

Advising

Doctoral students' work is overseen by an advisor, the advisory committee, and the program's director.

Product Development, MS

www.rit.edu/study/product-development-ms
Christine Fisher, Graduate Program Director
585-475-7971, Christine.Fisher@rit.edu

Program overview

The master of science in product development is a leadership program for experienced engineers and technical specialists who aspire to high-level positions associated with product innovation. The program integrates business and engineering management courses, delivering them in online or on-campus where students continue to work while taking classes.

New products and services are the lifeblood of today's high technology firms, and companies need more technically grounded leaders to drive the engine for business growth. The MS in product development integrates business and engineering courses consistent with cross-functional, end-to-end product development and the systems perspective critical to conceive, create, launch, and support today's complex product portfolios. Participants acquire the foundation skills and strategic perspective necessary to become future leaders and senior managers responsible for driving business growth through new products and services. In short, the product development program prepares today's technical experts for successful careers as project leaders and technically grounded senior managers of their enterprises.

To stay on the cutting edge, the program was designed by academic and industry leaders to integrate formal education with state-of-the-art research and best practices from industry. It includes a year-long capstone project that generates significant return-on-investment to sponsoring organizations. Electives and the capstone project provide flexibility to tailor the program's content to specific learning objectives of students and sponsoring organizations. The program is offered fully online or as a blend of online and on-campus courses. Students may start any term (fall, spring, summer) and complete courses at their own pace.

Sponsorship

Most students are sponsored by an employer who is committed to improving leadership capabilities in product development. Sponsorship includes financial support and a commitment to work with the student to provide clear expectations and a well-articulated career development plan that builds upon the program. Candidates are welcome to sponsor themselves. Students should contact Financial Aid and Scholarship for more information

Curriculum

Educational objective

To develop a leadership perspective and knowledge base of the total life cycle product development system, integrating management and (systems) engineering elements. To establish the foundation for the systems approach needed to conceive, create, launch, and support products and platforms. The program considers new product development in a larger framework: how a company's business strategy, vision, and core capabilities coupled with the voice of the customer combine to determine product strategy and create best-in-class product portfolios.

Key capabilities of graduates

- Leadership expertise of the product development process and of high-performing product development teams and organizations.
- Improved leadership through structured systems thinking, design, and management.

- A strategic, enterprise-wide and global perspective.
- An innovative mindset receptive to changing markets, new technologies, and new opportunities.
- Decision making in uncertain and fast-paced environments.
- A market-oriented product development focus – i.e. the ability to transform customer problems, needs, and market opportunities into successful product portfolios.
- Economic analysis and the application of sound business principles to effective management in the product development domain.
- Project management: business and technical planning, relationship management and outsourcing, program control, structured decision making and risk management.
- Enhanced ability to recognize barriers to success early, when corrective actions are less costly.
- In-depth understanding and application of state-of-the-art tools for design, analysis, and management in the product development domain.

Embedded engineering competencies

The product development leader must apply engineering competencies to the development of strategic product architectures that relate to the business value chain of the corporation, to the integration of enabling technologies, and to the creation of realizable design concepts. These capabilities are supported by:

- The ability to assess the merits and risks associated with emerging technologies.
- The ability to create products with acceptable product liability, life cycle cost, and environmental impact.
- The ability to create products consistent with manufacturing and supply chain capabilities.
- The ability to coordinate the product architecture with organizational structure.
- The ability to select which competencies are core to the business and which can be outsourced.
- The ability to create and implement an organization's decision processes.
- The ability to identify and implement enabling technologies and tools.

The 30 semester-credit program consists of 9 business and engineering courses, including one elective, plus a capstone project (3 credits).

Product Development, MS degree

COURSE		SEMESTER CREDIT HOURS
ACCT-603	Accounting for Decision Makers	3
DECS-743	Operations and Supply Chain Management	3
ISEE-751	Decision and Risk Benefit Analysis	3
ISEE-771	Engineering of Systems I	3
ISEE-772	Engineering of Systems II	3
ISEE-781	Excellence in New Product Development	3
ISEE-798	Product Development Capstone II	3
MKTG-761	Marketing Concepts and Commercialization	3
Choose one of the following:		3
BUSI-710	Project Management	
ISEE-750	Systems and Project Management	
	Engineering or Business Elective	3
Total Semester Credit Hours		**30**

Elective courses

An elective course offers students the opportunity to better meet personal and organizational needs. Students may select from a long list of courses. Recommended electives include such offerings as Managing Research and Innovation, Lean Six Sigma Fundamentals, Advanced or International Project Management, Breakthrough Thinking and Creativity, Customer Centricity, and others.

Capstone project

Students complete a project during the final academic year of the program, based on a real problem often identified in the companies where they work. The corporate-oriented capstone project encompasses the broad integrative aspects of new product development – it synthesizes, increases, and demonstrates the student's understanding of previous program material and underscores the behaviors essential to product development leadership. The capstone project generates immediate benefits to sponsoring organizations. View our list of capstone projects for examples of projects past students have completed as part of the program.

Admission requirements

To be considered for admission to the MS program in product development, candidates must fulfill the following requirements:

- Complete a graduate application,
- Hold a baccalaureate degree (or equivalent) in engineering (or a related scientific or technical field),
- Have a minimum cumulative grade point average of 3.0,
- Have at least two years of experience in product development or a related business environment,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit one professional recommendation, and
- Submit a current resume.

Exceptions may be considered on a case-by-case basis. No graduate entrance exam is required, although candidates are welcome to support their application with results from the Graduate Management Admission Test (GMAT) or the Graduate Record Exam (GRE).

Applications are accepted on a rolling basis and students may begin the program in any semester.

Format

Students may start the program during any semester and complete the course work at their own pace. Classes are available online but several courses may be taken on campus for local or full-time students. Students may take up to three courses on a nonmatriculated basis. Credits earned while enrolled as a nonmatriculated student may be applied to the degree program following formal admission.

Tuition

The program's tuition is calculated using the part-time graduate tuition rate (12 credits or less). For information on tuition, scholarships, and financial aid, please visit Financial Aid and Scholarships. Discounts are available for groups.

Additional information

Related programs

Visit the Engineering Leadership department for information on related offerings, including the master of science in manufacturing leadership, graduate certificate programs, and non-credit workshops and training programs.

Programs are available online, on-campus, or onsite at your location. Contact us for information about partnerships and customized programs for your organization.

Sustainable Engineering, ME

www.rit.edu/study/sustainable-engineering-me

Brian Thorn, Professor
585-475-6166, bkteie@rit.edu

Program overview

Sustainable engineering refers to the integration of social, environmental, and economic considerations into product, process, and energy system design methods. Additionally, sustainable engineering encourages the consideration of the complete product and process lifecycle during the design effort. The intent is to minimize environmental impacts across the entire lifecycle while simultaneously maximizing the benefits to social and economic stakeholders.

The master of engineering in sustainable engineering is multidisciplinary and managed by the industrial and systems engineering department. The program builds on RIT's work in sustainability research and education and offers students the flexibility to develop tracks in areas such as renewable energy systems, systems modeling and analysis, product design, and engineering policy and management. The degree program is offered on campus and may be completed on a full- or part-time basis.

Educational objectives

The program is designed to accomplish the following educational objectives:

- Heightened awareness of issues in areas of sustainability (e.g., global warming, ozone layer depletion, deforestation, pollution, ethical issues, fair trade, gender equity, etc.).
- Clear understanding of the role and impacts of various aspects of engineering (design, technology, etc.) and engineering decisions on environmental, societal, and economic problems. Particular emphasis is placed on the potential trade-offs between environmental, social, and economic objectives.
- Strong ability to apply engineering and decision-making tools and methodologies to sustainability-related problems.
- Demonstrated capacity to distinguish professional and ethical responsibilities associated with the practice of engineering.

Plan of study

Technical in nature, the program equips engineers with the tools they need to meet the challenges associated with delivering goods, energy, and services through sustainable means. In addition to basic course work in engineering and classes in public policy and environmental management, students are required to complete a capstone project directly related to sustainable design challenges impacting society. Many of these projects can be incorporated into sustainability themed research by RIT faculty in the areas of fuel-cell development, life-cycle engineering, and sustainable process implementation.

Students must successfully complete a total of 30 credit hours through course work and a capstone project. This program is designed to be completed in three semesters.

Curriculum

Sustainable Engineering, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-785	Fundamentals of Sustainable Engineering	3
ISEE-771	Engineering of Systems I	3
MECE-629	Renewable Energy Systems	3
ISEE-786	Lifecycle Assessment	3
	Engineering Electives	6
Second Year		
ISEE-792	Engineering Capstone	3
	Engineering Elective	3
	Social Context Elective	3
	Technology Elective	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the ME program in sustainable engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering, mathematics, or science.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a statement of purpose.
- Submit three letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Sustainable Engineering, MS

www.rit.edu/study/sustainable-engineering-ms

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Program overview

Sustainable engineering refers to the integration of social, environmental, and economic considerations into the design of product, process, and energy systems. Additionally, sustainable engineering encourages the consideration of the complete product and process lifecycle during the design effort. The intent is to minimize environmental impacts across the entire lifecycle of a product or process while simultaneously maximizing the benefits to social and economic stakeholders. This environmental engineering degree builds on RIT's work in sustainability research and education, and offers students the flexibility to develop tracks in areas such as renewable energy systems, systems modeling and analysis, product design, and engineering policy and management.

Educational objectives

The program is designed to accomplish the following educational objectives:

- Heighten awareness of issues in areas of sustainability (e.g., global warming, ozone layer depletion, deforestation, pollution, ethical issues, fair trade, gender equity, etc.).
- Establish a clear understanding of the role and impact of various aspects of engineering (design, technology, etc.) and engineering decisions on environmental, societal, and economic problems. Particular emphasis is placed on the potential trade-offs between environmental, social, and economic objectives.
- Strong ability to apply engineering and decision-making tools and methodologies to sustainability-related problems.
- Demonstrate a capacity to distinguish professional and ethical responsibilities associated with the practice of engineering.

Plan of study

The MS in sustainable engineering builds on RIT's work in sustainability research and education and offers students the flexibility to develop tracks in areas such as renewable energy systems, systems modeling and analysis, product design, and engineering policy and management. Course work is offered on campus and available on a full- or part-time basis. Technical in nature, the program equips engineers with the tools they need to meet the challenges associated with delivering goods, energy, and services through sustainable means. In addition to basic course work in engineering and classes in public policy and environmental management, students are required to complete a research thesis directly related to sustainable design challenges impacting society. Many of these thesis projects support the sustainability-themed research being conducted by RIT faculty in the areas of fuel-cell development, life-cycle engineering, and sustainable process implementation.

Students must successfully complete a total of 30 credit hours of course work comprised of four required core courses; two graduate engineering electives in an area of interest such as energy, modeling, manufacturing and materials, transportation and logistics, or product design and development; one social context elective; one environmental technology elective; two semesters of Graduate Seminar I, II (ISEE-795, 796); and a thesis. This research-oriented program is designed to be completed in two years.

Curriculum

Sustainable Engineering, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-771	Engineering of Systems I	3
ISEE-785	Fundamentals of Sustainable Engineering	3
ISEE-786	Lifecycle Assessment	3
ISEE-795	Graduate Seminar I	0
ISEE-796	Graduate Seminar II	0
MECE-629	Renewable Energy Systems	3
	Engineering Electives	6
Second Year		
ISEE-790	Thesis	6
	Technology Elective	3
	Social Context Elective	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in sustainable engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering, mathematics, or science.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a statement of purpose.
- Submit three letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Vibrations, Adv. Cert.

www.rit.edu/study/vibrations-adv-cert
Risa Robinson, Professor
585-475-6445, rjreme@rit.edu

Program overview

Engineers with skills in vibration engineering contribute to creating manufacturing production systems, aerospace systems, automotive engineering, medical product development, consumer product development, and a host of industrial equipment and process systems in which vibration must be minimized or controlled. Students utilize sophisticated software tools, analytical techniques, and experimental methods to design, develop, and implement solutions for vibration control and minimization in engineering systems.

The advanced certificate in vibrations takes students beyond the preparation in vibration engineering that students typically complete during their undergraduate program of study. Students learn to use sophisticated software tools, analytical techniques and experimental methods to design, develop, and implement solutions for problems of vibration control and minimization in engineering systems. Students are exposed to modern technologies used in industry to ensure that they are prepared for their specialized job market. The curriculum answers a need for graduate level instruction for practicing engineers in a field of importance for the 21st century.

Plan of study

The advanced certificate requires students to successfully complete four required courses and one elective course. Students may apply the courses toward a master's degree at a later date.

Curriculum

Vibrations, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MECE-658	Introduction to Engineering Vibrations	3
MECE-707	Engineering Analysis	3
MECE-709	Advanced Engineering Mathematics	3
MECE-758	Intermediate Engineering Vibrations	3
Choose one of the following:		
EEEE-602	Random Signals and Noise	3
EEEE-678	Digital Signal Processing	3
MECE-606	Systems Modeling	3
Total Semester Credit Hours		**15**

Admission requirements

For information regarding the admission requirements for the advanced certificate in vibrations, contact the department head or the Office of Graduate Enrollment.

Dean's Office

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Jennifer Bailey, BS, Ph.D., Purdue University—Lecturer

Thomas Gaborski, BS, Cornell University; MS, Ph.D., University of Rochester—Assistant Professor, Nanomaterials, Separations, Cellular Mechanics

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Chemical Engineering

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Industrial and Systems Engineering

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College of Engineering Technology

S. Manian Ramkumar, Interim Dean
rit.edu/engineeringtechnology

Programs of Study

Online learning option available.

The diverse, graduate-level programs offered by the College of Applied Science and Technology represent RIT's commitment to curricular innovation, program flexibility, and academic rigor. The college is committed to advancing the state of the education we provide through research, the latest uses of technology, and current management theories and educational philosophies.

Admission requirements

Each college makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarship

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Faculty

The college's faculty bring a unique blend of academic credentials, scholarship, and significant industrial experience into the classroom. Ongoing participation as professional consultants and researchers allows them to integrate the latest innovations, theories, and content into their classes. This blend creates a learning environment where both theoretical knowledge and application are important.

Facilities

The college's facilities include state-of-the-art laboratories in support of courses that address current and future applications in the areas of electrical, computer, and telecommunications engineering technology; manufacturing and mechanical engineering technology; and packaging science. In addition to laboratories in computer networking and telecommunications, the college also offers a circuits studio, and mechanics and materials labs.

The Center for Integrated Manufacturing Studies gives graduate students the opportunity to test new technologies for actual companies seeking solutions to real problems. Continual upgrades to our computer laboratories mean we have technology that is considered the industry standard.

Most importantly, the academic leadership of our programs is world-renowned. In addition, our close ties to business and industry mean our course content is relevant and practical for tomorrow's managers, whether they oversee computer-integrated manufacturing or a resort hotel. Graduates are eagerly sought out by employers. We have a high placement rate that assures graduates can pick the best positions for their personal and professional development.

Study options

Most graduate programs offer a variety of study options, including full-time, part-time, and online study. Please refer to each individual program for specific information regarding these options.

School of Engineering Technology

Construction Management, MS

www.rit.edu/study/construction-management-ms
Maureen Valentine, Professor
585-475-7398, msvite@rit.edu

Program overview

The master of science degree in construction management is specifically designed for experienced construction management professionals interested in advancing into leadership positions within the field. The program may also accommodate recent graduates of undergraduate programs in construction management or related disciplines.

The goals of the program are to provide graduates with the requisite strategic skills to lead and advance the construction industry. Graduates will develop competencies in leadership, construction cost analysis and control, construction operations management and productivity, construction business development, sustainable design and construction, and construction client relationship building. As part of the multidisciplinary nature of the program, a wide range of electives from different disciplines provides graduates with flexibility to take relevant courses across RIT. Core construction management courses in the program are taught by faculty with both field and research experience in the discipline.

Plan of study

The program is hosted completely online and designed with the working professional in mind. You will have the convenience and flexibility to plan your course work around your work or personal commitments. The program consists of 30 credit hours and can be completed in as little as one and a half years of full-time study, or approximately 2 to 3 years of part-time study. The curriculum consists of core courses, professional electives, and a choice of a graduate thesis, project, or a comprehensive exam.

Curriculum

Construction Management, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CONM-650	Principles of Construction Leadership and Management	3
CONM-690	Sustainable Building Construction and Design	3
CONM-718	Construction Operations and Productivity	3
CONM-720	Construction Cost Analysis and Management	3
GRCS-701	Research Methods	3
	Professional Electives	6
Second Year		
CONM-760	Construction Client Development	3
Choose one of the following:		6
CONM-790	Thesis, plus GRCS-702 Principles of Research Communications	
CONM-795	Comprehensive Exam, plus two Professional Electives	
CONM-797	Graduate Project, plus one Professional Elective	
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS in construction management, candidates must fulfill the following requirements:

- Hold a bachelor's degree with a minimum undergraduate GPA of 3.0 in construction management, civil engineering, civil engineering technology or related program that includes at least 15 semester hours of college level math and science. Applicants holding other bachelor degrees with appropriate, related work experience will be considered for admission on an individual basis,
- Have coursework or equivalent documented professional experience in cost estimating, planning & scheduling and project management.
- Business/management courses and a statistics course are strongly recommended.
- Have at least one-year relevant construction management experience. Those who lack appropriate work experience may be required to complete one or more semesters of related graduate co-operative work experience;
- If academic and/or work preparation is needed before being admitted and beginning graduate studies, applicants are encouraged to develop a plan with the program chair. Preparatory course(s) may be completed at RIT or with pre-approval may be completed at other universities. Each course must be completed with a grade of B or higher.
- Submit a completed, official graduate application, accompanied by official transcripts (in English) of all previously completed undergraduate and graduate course work;
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 570 on the written exam, 230 on the electronic version of the exam, or 88 on the internet version of the exam is required.

Environmental, Health and Safety Management, MS

www.rit.edu/study/environmental-health-and-safety-management-ms
Joseph Rosenbeck, Professor
5854756469, jmrcem@rit.edu

Program overview

Management of environmental, health and safety issues has changed significantly in recent years. The emergence of voluntary standards and codes of conduct, including international standards, coupled with the need to manage costs and limited resources, has resulted in a trend to move beyond regulatory compliance. Now, companies work toward sustainability through the use of integrated environmental and management systems, which are woven into key business processes. The environmental management masters provides students with a solid foundation in the managerial aspects of developing and implementing environmental, health and safety management systems that can move organizations toward a more sustainable and socially responsible future.

Although they are distinct disciplines, environmental management, occupational health, and workplace safety share many technical, regulatory, and organizational characteristics. Today's professionals need to be educated in all three areas. Graduates are employed by Fortune 100 companies, environmental, health and safety consultancies, universities, and government agencies such as the EPA, OSHA, and NYSDEC.

The MS degree in environmental, health and safety management provides students with a solid foundation in the managerial aspects of developing and implementing environmental, health and safety management systems that can move organizations toward a more sustainable and socially responsible future. In addition, students gain a solid technical foundation in air emissions, wastewater, solid and hazardous waste, occupational safety and occupational health (industrial hygiene). Elements of sustainability are integrated into most core courses and some electives.

The program consists of 30 credit hours and may be completed entirely through online learning, or via a combination of online and traditional on-campus courses. The curriculum includes core courses, professional electives, and a choice of a thesis, capstone project, or comprehensive exam.

Cooperative education

Full-time students are eligible to participate in RIT's cooperative education program. After completing two semesters (a minimum of 18 credit hours), students may request approval to complete up to one year of cooperative education employment related to their field of study.

Professional electives

Professional electives are subject to availability and include Fire Protection, Occupational Health, Solid and Hazardous Waste Management, Industrial Wastewater Management, Air Emissions Management, Occupational Safety, Mechanical and Electrical Controls and Standards, EHS Law, EHS Accounting and Finance, EHS Project Management, and Organizational Behavior and Leadership. Additional professional electives are available in topics such as business management, quality, sustainability, and other areas.

Curriculum

Environmental, Health and Safety Management (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ESHS-720	Environmental, Health and Safety Management	3
ESHS-740	EHS Management System Design	3
ESHS-755	Corporate Social Responsibility	3
ESHS-760	Integrating EHS Management	3
ESHS-780	EHS Internal Auditing	3
ESHS-790	Thesis	3
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communications	3
	Professional Electives	6
Total Semester Credit Hours		**30**

Environmental, Health and Safety Management (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ESHS-720	Environmental, Health Safety Management	3
ESHS-740	EHS Management System Design	3
ESHS-755	Corporate Social Responsibility	3
ESHS-760	Integrating EHS Management	3
ESHS-780	EHS Internal Auditing	3
ESHS-797	Graduate Project	3
GRCS-701	Research Methods	3
	Professional Electives	9
Total Semester Credit Hours		**30**

Environmental, Health and Safety Management (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ESHS-720	Environmental, Health and Safety Management	3
ESHS-740	EHS Management System Design	3
ESHS-755	Corporate Social Responsibility	3
ESHS-760	Integrating EHS Management	3
ESHS-780	EHS Internal Auditing	3
ESHS-795	Comprehensive Exam	0
GRCS-701	Research Methods	3
	Professional Electives	12
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in environmental, health and safety management, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum grade point average of 3.0 (or equivalent) over the junior- and senior-level years.
- Have completed at least 9 semester hours of college-level course work in the sciences, with at least 3 semester credit hours in each of the following categories: chemistry, biology, and physics.
- Submit a one-page personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two professional letters of recommendations.
- Submit two writing samples to demonstrate written communication skills.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement of waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

- Applicants with acceptable professional certification(s) and/or work experience may have prerequisite science course work waived.
- Applicants without formal academic training or documented experience in air emissions, waste water, solid and hazardous waste, occupational health, or occupational safety may be required to take professional electives in these areas. Students may complete a graduate cooperative education placement during their program of study.
- Graduate Record Examination (GRE) scores are not required; however, applicants may submit test scores to support their candidacy.

Additional information

Transfer credit

With the permission of the department, relevant graduate course work may be transferred into the program, per the maximum number of credit hours allowed.

International students

International students enrolled in courses at the RIT campus are required to take at least two traditional classroom courses and one or two online courses per semester. In addition, international students are solely responsible for meeting the requirements of their government and other sponsors, as applicable.

Manufacturing and Mechanical Systems Integration, MS

www.rit.edu/study/manufacturing-and-mechanical-systems-integration-ms
Betsy Dell, Professor
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Program overview

The MS in manufacturing and mechanical systems integration is designed for individuals who wish to achieve competence in mechanical or manufacturing engineering. The program combines engineering, business, and management functions to effectively guide and lead in a range of manufacturing enterprises.

The program is offered by the department of manufacturing and mechanical engineering technology in collaboration with Saunders College of Business and the Kate Gleason College of Engineering.

Plan of study

The program consists of 36 semester credit hours and is comprised of core courses, a three-course concentration, electives, and a capstone project, thesis, or comprehensive exam. Concentrations are available in product design, automation, quality, or electronics manufacturing. Students may be required to take additional prerequisite courses depending on their background and the concentration they select. The graduate director may approve the waiver of courses in the prerequisite group from graduation requirements, depending on a student's academic and employment background.

Cooperative education

Full-time students are eligible to participate in RIT's cooperative education program. After completing two semesters (a minimum of 18 credit hours), students may request approval to complete up to one year of cooperative education employment related to their field of study.

Electives

The number of electives is based on whether the student chooses to complete a thesis, capstone project, or comprehensive exam. The thesis option requires one elective; the capstone project requires two electives, and the comprehensive exam option requires three electives. Elective courses can be any course from a different concentration from the one chosen, a graduate-level course from another program (if approved by the graduate director and faculty member teaching the course), or an independent study course (if approved by the student's graduate program director).

Curriculum

Manufacturing and Mechanical Systems Integration (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-706	Cost Management	3
GRCS-701	Research Methods	3
MFET-600	MMSI Graduate Seminar	0
MFET-650	Manufacturing and Mechanical Systems Fundamentals	3
MFET-730	Six Sigma for Design and Manufacturing	3
MFET-788	MMSI Thesis Planning	3
STAT-670	Design of Experiments	3
	MMSI Concentration Courses	6
Second Year		
DECS-744	Project Management	3
MFET-790	MMSI Thesis	3
	Elective*	3
	MMSI Concentration Course	3
Total Semester Credit Hours		**36**

Manufacturing and Mechanical Systems Integration (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-706	Cost Management	3
GRCS-701	Research Methods	3
MFET-600	MMSI Graduate Seminar	0
MFET-650	Manufacturing and Mechanical Systems Fundamentals	3
MFET-730	Six Sigma for Design and Manufacturing	3
STAT-670	Design of Experiments	3
	MMSI Concentration Courses	6
	Elective*	3
Second Year		
DECS-744	Project Management	3
MFET-797	MMSI Capstone Project	3
	MMSI Concentration Course	3
	Elective*	3
Total Semester Credit Hours		**36**

Manufacturing and Mechanical Systems Integration (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-706	Cost Management	3
GRCS-701	Research Methods	3
MFET-600	MMSI Graduate Seminar	0
MFET-650	Manufacturing and Mechanical Systems Fundamentals	3
MFET-730	Six Sigma for Design and Manufacturing	3
STAT-670	Design of Experiments	3
	MMSI Concentration Courses	6
	Elective*	3
Second Year		
MFET-795	MMSI Comprehensive Exam	0
DECS-744	Project Management	3
	MMSI Concentration Course	3
	Electives*	6
Total Semester Credit Hours		**36**

* Elective courses must be chosen from the list of concentration courses, but must be outside of the concentration the student has chosen as part of their program of study.

Concentrations

COURSE		SEMESTER CREDIT HOURS
Automated Manufacturing		
ISEE-610	Systems Simulation	3
MFET-670	Manufacturing Automation Control	3
MFET-685	Robots & CNC in Integrated Manufacturing	3
Electronics Packaging		
MFET-655	Surface Mount Electronics Manufacturing	3
MFET-656	Advanced Concepts in Semiconductor Packaging	3
TCET-740	Fiber Optic Telecommunications Technology	2
TCET-741	Fiber Optic Telecommunications Technology Lab	1
Management Systems		
DECS-743	Operations and Supply Chain Management	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-742	Technology Management	3
Product Development		
MCET-620	Robust Design & Production Systems	3
MCET-670	Concept Design & Critical Parameter Management	3
MCET-720	Product & Production System Development & Integration	3
Quality Management		
MCET-620	Robust Design & Production Systems	3
STAT-621	Statistical Quality Control	3
STAT-641	Applied Linear Models - Regression	3

Admission requirements

To be considered for admission to the MS program in manufacturing and mechanical systems integration, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in the field of engineering, engineering technology, or computing. Students with degrees in other disciplines will be considered on an individual basis.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have completed college level course work in computer programming and probability and statistics.
- Have a minimum cumulative GPA of 3.0 (or equivalent). Applicants with a lower GPA will be evaluated on a case-by-case basis and may be admitted on a probationary basis. These students will have to secure a B or better average in the first three graduate courses to be considered for full admission.
- Submit a one-page personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Packaging Science, MS

www.rit.edu/study/packaging-science-ms

Erin Aaron, Senior Staff Assistant
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Program overview

Designed to educate packaging professionals to become experts in the packaging development process, the MS degree in packaging science focuses on how to select raw materials, design, and create functional packaging that withstands environmental, chemical, and physical hazards during distribution and transportation, and to create aesthetically pleasing packages to pique consumer interest. Through a combination of theoretical and application-focused learning experiences, students gain comprehensive knowledge related to packaging design, package testing, product marketing, project management, and quality control.

The packaging science program consists of 36 credit hours comprised of six required core courses, elective courses, and either a comprehensive exam, a capstone project, or a thesis. The total number of elective courses depends on the student's choice of the exam, project, or thesis option. Faculty advisors assist in selecting an option that best meets a student's career aspirations.

Elective courses

All elective courses are approved by the student's advisor and must meet degree requirements. In certain circumstances, with pre-approval by the graduate advisor and where individual need indicates appropriateness, a limited number of upper-level undergraduate courses may be used to fulfill elective credit. Students, with advisor permission, may include independent study as part of their elective credits. However, independent study may not be used toward the required packaging core course work. Courses selected for elective credit may be combined to create special areas of focus with program chair approval.

Cooperative education

Full-time students may choose to complete cooperative education. After completing two semesters of study (a minimum of 18 credit hours), students may request approval to complete up to one year of cooperative education employment related to their field of study.

Green Belt – Lean Six Sigma

Students may elect to pursue Green Belt certificate in Lean Six Sigma with the completion of the thesis or capstone project. Certification requires students to complete the Lean Six Sigma Yellow Belt Certification training program as one of their electives. Upon completion, student must implement the fundamentals of Lean Six Sigma within their thesis or capstone project.

Curriculum

Packaging Science (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communications	3
PACK-730	Packaging and the Environment	3
PACK-742	Distribution Systems	3
PACK-763	Packaging for End Use	3
	Packaging Electives	9
Second Year		
PACK-783	Advanced Packaging Dynamics	3
PACK-790	Research Thesis	6
	Packaging Elective	3
Total Semester Credit Hours		**36**

Packaging Science (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
PACK-742	Distribution Systems	3
PACK-730	Packaging and the Environment	3
PACK-763	Packaging for End Use	3
	Packaging Electives	12
Second Year		
PACK-783	Advanced Packaging Dynamics	3
PACK-797	Graduate Project	3
	Packaging Electives	6
Total Semester Credit Hours		**36**

Packaging Science (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
PACK-742	Distribution Systems	3
PACK-730	Packaging and the Environment	3
PACK-763	Packaging for End Use	3
	Packaging Electives	12
Second Year		
PACK-783	Advanced Packaging Dynamics	3
PACK-795	Comprehensive Examination	0
	Packaging Electives	9
Total Semester Credit Hours		**36**

Admission requirements

To be considered for admission to the MS program in packaging science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Have a minimum cumulative GPA of 3.0 (or equivalent) in the final two years of undergraduate course work.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Graduate Record Exam (GRE) scores are not required. However, in cases where there may be some question of the capability of an applicant to complete the program, applicants may wish to submit scores to strengthen their application.
- Students who do not have an equivalent bachelor's degree in packaging science will be evaluated and the appropriate undergraduate bridge courses will be prescribed. These courses may not be used for credit toward the MS degree.
- Applicants are required to have one semester of physics (mechanics focus), one semester of calculus, one year of chemistry (including organic chemistry), statistics, and basic computer literacy.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Students who do not have an equivalent bachelor's degree in packaging science will be evaluated and the appropriate undergraduate bridge courses will be prescribed. These courses may not be used for credit toward the MS degree.
- Applicants are required to have one semester of physics (mechanics focus), one semester of calculus, one year of chemistry (including organic chemistry), statistics, and basic computer literacy.

Additional information

Advising

Students are appointed an academic advisor who works with the program coordinator to develop a program of study. Students follow their program of study to complete their degree requirements and, with advisor approval, choose packaging electives that enhance their career objectives. Students choose a faculty advisor with approval from their program coordinator for their thesis or project. The faculty advisor guides the student on topic choice and works with the program coordinator for approval and timely completion of the thesis or project.

Telecommunications Engineering Technology, MS

www.rit.edu/study/telecommunications-engineering-technology-ms
William Johnson, Professor
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Program overview

The telecommunications industry has driven technological innovation and provided outstanding career opportunities for people with the right technical and leadership skills. New services offered through the internet, mobility via wireless technology, and extreme capacity created by fiber optics, as well as the evolution of policy and regulation, are shaping the telecommunication network of the future. The MS in telecommunications engineering technology focuses on developing an advanced level of skill and knowledge needed by future leaders in the industry. This program is designed for individuals who seek advancement into managerial roles in the dynamic telecommunications environment.

The telecommunications engineering technology program requires 33 credit hours of study and includes eight core courses that introduce essential fundamental concepts and skills. Students are required to complete a comprehensive exam, a capstone project, or a thesis. The remaining credits consist of technical electives or other approved graduate courses.

Electives

Students may take three credit hours of elective course work from other graduate programs subject to the approval of the graduate program director. Students often choose courses from Saunders College of Business, Golisano College of Computing and Information Sciences, or Kate Gleason College of Engineering. The number of elective credits depends upon the student's choice of a thesis, project, or comprehensive exam.

Research and cooperative education

Students have the opportunity to apply for research projects or participate in a cooperative education experience. While not a requirement, these opportunities increase the value of the program and the marketability of its graduates. Full-time students may choose to complete cooperative education after completing two semesters (a minimum of 18 credit hours of study), students may request approval to complete up to one year of cooperative education employment related to their field of study.

Comprehensive Exam/Project/Thesis options

All students are required to complete a comprehensive exam at the conclusion of their course work. The comprehensive exam focuses on knowledge of the core competencies, theory and foundation principles, and application of this knowledge to a variety of scenarios. Students who wish to complete a graduate project or a thesis in place of the comprehensive exam must have the approval of the faculty and the graduate program director.

Curriculum

Telecommunications Engineering Technology (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
TCET-710	Principles of Telecommunications Networks	3
TCET-720	Telecommunications Concepts	3
TCET-740	Fiber Optic Telecommunications Technology	2
TCET-741	Fiber Optic Telecommunications Technology Lab	1
TCET-750	Wireless Infrastructure & Policy	3
TCET-760	Network Planning & Design	3
GRCS-701	Research Methods	3
	Elective	3
Second Year		
TCET-747	Next Generation Networks	3
TCET-790	Graduate Thesis	6
	Elective	3
Total Semester Credit Hours		**33**

Telecommunications Engineering Technology (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
TCET-710	Principles of Telecommunications Networks	3
TCET-750	Wireless Infrastructure & Policy	3
GRCS-701	Research Methods	3
TCET-740	Fiber Optic Telecommunications Technology	2
TCET-741	Fiber Optic Telecommunications Technology Lab	1
TCET-720	Telecommunications Concepts	3
TCET-760	Network Planning & Design	3
	Elective	3
Second Year		
TCET-747	Next Generation Networks	3
TCET-797	Graduate Project	3
	Electives	6
Total Semester Credit Hours		**33**

Telecommunications Engineering Technology (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
TCET-710	Principles of Telecommunications Networks	3
TCET-750	Wireless Infrastructure & Policy	3
GRCS-701	Research Methods	3
TCET-740	Fiber Optic Telecommunications Technology	2
TCET-741	Fiber Optic Telecommunications Technology Lab	1
TCET-720	Telecommunications Concepts	3
TCET-760	Network Planning & Design	3
	Elective	3
Second Year		
TCET-747	Next Generation Networks	3
TCET-795	TCET Comprehensive Exam	0
	Electives	9
Total Semester Credit Hours		**33**

Admission requirements

To be considered for admission to the MS program in telecommunications engineering technology, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering technology, engineering, or a related area.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two professional letters of recommendation.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Applicants with a lower TOEFL score may be admitted conditionally and may be required to take a prescribed program in English and a reduced program course load.
- International applicants from universities outside the United States must submit scores from the Graduate Record Examination (GRE).
- While GRE scores are not required for applicants submitting transcripts from American universities, they are recommended for those whose undergraduate grade point average is below 3.0.

Additional information

Transfer credit

A limited number of credit hours may be transferred from an accredited institution. Please consult the department chair for more information.

Prerequisite courses

Students may be required to take additional prerequisite courses depending on their background and the concentration they select. The graduate director may approve the waiver of courses in the prerequisite group from graduation requirements, depending on a student's academic and employment background.

Programming skills requirement

Students are required to have sufficient programing knowledge and skills to assure successful completion of course work. During orientation students will complete a programming qualification assessment. Students who do not take the exam or who do not earn a satisfactory grade will be required to take (TCET-601) as a bridge course to make up any deficiencies in their knowledge of programming. This bridge course does not count towards degree completion.

Workplace Learning and Instruction, Adv. Cert.

www.rit.edu/study/workplace-learning-and-instruction-adv-cert
Linda Tolan, Professor
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Program overview

Senior leaders in the most successful businesses agree that leveraging the human capital of an organization is vital to survival in today's competitive business climate. This requires businesses to align employee development plans with strategy and provide targeted learning experiences to ensure they equip their workforce to perform at the peak of their capability, attract the best candidates, and retain the most qualified employees.

The advanced certificate in workplace learning and instruction provides professionals with the competencies required to develop highly effective learning materials that drive strategic employee development, boost performance, and manage the employee development efforts of an organization.

Curriculum

Workplace Learning and Instruction, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EDLI-730	Theories of Learning	3
EDLI-733	Instructional Design	3
EDLI-755	Learning Assessment and Evaluation	3
EDLI-756	Learning Design and Technology	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in workplace learning and instruction, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Print Media, MS

www.rit.edu/study/print-media-ms
Bruce Myers, Associate Professor
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Program overview

The MS program in print media offers students an opportunity to explore new areas of research in the graphic communications field. The program's faculty and curriculum focus on establishing quality and efficiencies pertaining to business, technology, and processes in graphic communications. Recent student research includes 3D printing quality analysis, consumer preferences for printed textiles, user experience in digital publishing, and implementation of lean techniques in printing. Our faculty are experts in many different areas, including print, business, color management, web and IT, digital publishing, imaging, and typography. Students have the opportunity to get hands-on experience by working with faculty as graduate assistants either in the classroom or assisting with faculty research. Graduates are employed as industry leaders in advertising, publishing, business operations, communication processes, and product developments.

Plan of study

The program requires 36 credit hours of study and includes seven core courses, three electives, and a thesis. The thesis provides an opportunity for students to explore in-depth research and present their findings.

Electives

The program encourages cross-disciplinary and interdepartmental collaboration. Students may choose elective courses from a variety of courses offered in the School of Media Sciences or with other graduate departments and programs at RIT with approval of the graduate director.

Thesis

All students are required to complete a research thesis that demonstrates original thinking and creativity in the search for new knowledge in the graphic communication industry. Students work with expert faculty and focus on a particular topic of thesis research in areas including content management, publishing workflows, typography and layout, business trends, color management, media processes, materials, and applications of printing.

Curriculum

Print Media, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
DECS-782	Statistical Analysis for Decision Making	3
PPRT-601	Materials and Processes in Printing	3
PPRT-602	Tone and Color Analysis	3
PPRT-603	Operations Management in the Graphic Arts	3
PPRT-703	Cross Media Workflow	3
PPRT-704	Research Methods and Trends in Graphic Media	3
PPRT-780	Thesis Seminar	3
	Free Elective	3
Second Year		
PPRT-790	Thesis	6
PPRT-892	Continuation of Thesis Print Media	0
	Free Electives	6
Total Semester Credit Hours		**36**

Admission requirements

To be considered for admission to the MFA program in print media, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent). Applicants with a GPA below 3.0 may be considered, but are required to submit standard GRE scores.
- Submit scores from the GRE.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Faculty

S. Manian Ramkumar, BE, PSG, College of Technology-Bharathiar (India); ME, Rochester Institute of Technology; Ph.D., State University of New York at Binghamton—Dean

Linda A. Tolan, BS, State University College at Geneseo; MS, Rochester Institute of Technology; Ph.D., Andrews University; NCC—Senior Associate Dean for Curriculum Innovation, Human Resources and Engagement; Professor

Michael Eastman, BS, MS, Rochester Institute of Technology, Ph.D., University at Buffalo—Associate Dean for Academic Programs and Continuous Improvement; Professor

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Rebecca L. Sumner, AB, Franklin and Marshall College; MA, Ph.D., University of Rochester—Assistant Dean for Research Development

School of Engineering Technology

Civil Engineering Technology

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Mark Piterman, MCE, Odessa Marine Engineers Institute (Ukraine)—Professor Emeritus

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Environmental, Healthy and Safety Management

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Manufacturing and Mechanical Engineering Technology/Packaging Science

Ronald F. Amberger, PE, BME, Rensselaer Polytechnic Institute; ME, Pennsylvania State University—Professor Emeritus

Beth A. Carle, BSE, University of Pittsburgh; MS, Ph.D., University of Illinois; EIT Professional Certification—Professor

Elizabeth M. Dell, BSME, General Motors Institute; MS, University of Michigan—Paul A. Miller Professorship; Professor

Robert D. Garrick, BSEE, GMI Engineering and Management Institute; MBA, Rochester Institute of Technology; MS, University of Rochester; Ph.D., University of South Carolina—Acting Department Chair, Professor

Martin Gordon, PE, BSME, MSME, MBA, State University of New York at Buffalo—Program Director for Undergraduate Studies, Professor

Seung H. Kim, BS, Hanyang University (South Korea); MS, Ph.D., University of Illinois—Associate Professor

William Leonard, AAS, State University College at Canton; BS, MS, Rochester Institute of Technology—Mechanical Engineering Technology Program Chair; Associate Professor

Ti-Lin Liu, MS, Tsinghua University (China)—Associate Professor

Carl A. Lundgren, BS, Rensselaer Polytechnic Institute; MBA, University of Rochester— Professor Emeritus

Jennifer A. O'Neil, BS, Rochester Institute of Technology; Ph.D., Purdue University—Assistant Professor

Michael J. Parthum Sr., BS, MS, Rochester Institute of Technology—Associate Professor

Michael J. Slifka, BS, MS, Rochester Institute of Technology—Senior Lecturer

John A. Stratton, PE, BS, Rochester Institute of Technology; MS, Rensselaer Polytechnic Institute—Professor Emeritus

Larry A. Villasmil, BSME, Universidad del Tachira (Venezuela); MSME, Ph.D., Texas A&M University—Associate Professor

Packaging Science

Carlos Diaz-Acosta, BS, MS, Universidad de los Andes (Colombia), Ph.D., Michigan State University—Associate Professor

Changfeng Ge, BSME, MSME, Tongji University (China); Ph.D., University of Dortmund (Germany)—Graduate Program Director: Professor

Daniel L. Goodwin, BS, MS, Ph.D., Michigan State University—Professor Emeritus

Deanna M. Jacobs, BS, State University College at Plattsburgh; MA, State University College at Geneseo; MS, Rochester Institute of Technology—Professor Emeritus

Daniel P. Johnson, BS, MS, Rochester Institute of Technology—Department Chair; Professor

Georgios Koutsimanis, BS, MS, Aristotle University of Thessaloniki (Greece)—Lecturer

Karen L. Proctor, BS, Michigan State University; MBA, Rochester Institute of Technology—Professor

Patricia Poteat, BA, University of Rochester; MS, Rochester Institute of Technology; Ph.D., University of Rochester—Senior Lecturer

College of Health Sciences and Technology

Daniel Ornt, Dean
rit.edu/healthsciences

Programs of Study

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Advanced Certificate in:	
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Online learning option available.

The United States faces a looming shortage of many types of health care professionals, including nurses, physicians, dentists, pharmacists, and allied health workers. The college, housed in the Institute of Health Sciences and Technology, serves as an independent academic and research entity designed to provide a focused, interdisciplinary, and systems approach to innovative health care education, applied/translational research, and community outreach. The institute incorporates three major thrusts: the College of Health Sciences and Technology, a Health Science Research Center, and a Health Science Community Collaboration and Outreach Center.

The college offers clinically related and biomedical research-based programs to meet both the present and future needs of the health care system. The college's faculty and staff are committed to delivering high quality educational programs. Building on a foundation of liberal arts and basic sciences, students will gain advanced knowledge in theoretical science and practical applications in experiential learning environments. These experiences prepare students to serve as practitioners, scientists, and leaders through their contribution to, and the provision of, high-quality patient care, health care service, and/or applied, translational biomedical research.

Admission requirements

Each college makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarships

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Faculty

Faculty members in the college have considerable experience in their respective fields of discipline. Basic science and clinical faculty work side-by-side to provide students with a comprehensive learning experience to prepare them for their chosen health care related career.

Facilities and resources

In addition to facilities shared with the College of Science and the College of Imaging Arts and Sciences, the Center for Bioscience Education and Technology (CBET) provides a comprehensive environment to support academic, community, and career-training programs in the emerging life and medical sciences. The facility consists of multi-purpose, high-tech laboratories and classrooms for work-force development, academic programs, continuing education programs, research, K-12 student workshops, and secondary school training programs.

Health Care Finance, Adv. Cert.

www.rit.edu/study/health-care-finance-adv-cert
Carla Stebbins, Senior Lecturer
585-475-4761, casihst@rit.edu

Program overview

The advanced certificate in health care finance is an ideal way for health care professionals to deepen their understanding of health care financial management. The four-course, 12 credit hour curriculum supports student understanding how the US health care system is financed, the impact of efforts to reform the system, as well as the development of financial management skills within for-profit and not-for-profit health care organizations. To meet the needs of working professionals, courses in this advanced certificate are available online.

The advanced certificate may serve as a stand-alone credential, or, at a later date be applied to the MS program in health systems management.

Curriculum

Health Care Finance, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
HLTH-730	Health Care Financial Management I: Principles & Practice	3
HLTH-731	Health Care Financial Management II: Concepts/ Applications	3
HLTH-735	Management of Risk in Health Care	3
HLTH-737	Lean Sigma in Health Care	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in health care finance, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit two letters of recommendation from individuals who have the opportunity to observe the applicant's work output.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Please note: Certain countries are subject to comprehensive embargoes under US Export Controls, which prohibit virtually ALL exports, imports, and other transactions without a license or other US Government authorization. Learners from Syria, Sudan, North Korea, the Crimea region of the Ukraine, Iran, and Cuba may not register for RIT online courses. Nor may individuals on the United States Treasury Department's list of Specially Designated Nationals or the United States Commerce Department's table of Deny Orders. By registering for RIT online courses, you represent and warrant that you are not located in, under the control of, or a national or resident of any such country or on any such list.

Health Systems Management, MS

www.rit.edu/study/health-systems-management-ms
Carla Stebbins, Senior Lecturer
585-475-4761, casihst@rit.edu

Program overview

A health administration degree driven by today's health care imperatives

Critical success factors driving health care systems today are often referred to as the Quadruple Aim:

1. Improve the health of populations
2. Enhance the quality of care for individuals
3. Reduce the per capita cost of health care
4. Improve the work life of care providers

Successfully managing strategy, finance, patient experience, and operations in the highly regulated and unique health care sector requires specialized competencies and expertise beyond a traditional MBA. The master of science in health systems management is the currency needed to advance and perform in health care systems today.

Plan of study

This health administration master's degree is a 39-credit applied, competency-based, and industry-focused online degree. Unique to this degree, you will have the opportunity to attend two on-campus leadership immersions, blending the flexibility of online learning with the value of face-to-face networking and interaction. You will take case-based, dynamic, and interactive courses focused on key health care topics including economics and policy, health IT and decision support, ethics, systems quality, and organizational learning.

Business and leadership courses prepare you to tackle issues involving financial management, quality improvement, operations, and strategy formulation—all within the context of real-world health care trends and challenges. You'll be well prepared to develop, direct, and implement strategy and tactics that will shape the health care organizations of the future.

On-campus leadership immersion

To best profer highly developed leadership skills, you will have the valuable opportunity to attend two on-campus, hands-on, application-based learning and networking experiences. You will work closely with your classmates and faculty on case analysis, problem-solving, critical thinking, teamwork, and leadership skills during these four-day sessions. This face-to-face training delivers skills and competencies which will continue to be developed in a virtual environment within the online courses to maximize your return on investment in skill development and practice.

Travel course

One of the most distinguishing and attractive benefits of this health administration degree is the culminating travel course. During the final summer term, you will have the opportunity for a faculty-led travel experience in which you will conduct an intensive study of the locale's health system in comparison to your native system. As your final project, you will use that experience to innovate a product or service. For those unable to travel, an alternative study option will be provided.

Competencies

Upon completing the MS in health systems management, you'll be proficient in:

- Knowledge of health care systems in the U.S.
- Communications and interpersonal effectiveness
- Critical thinking, analysis, and problem-solving skills

- Management and leadership skills
- Professionalism and ethics theory and practice

Faculty

The program is led by a team of faculty who are practice-based scholars with extensive experience in the field. Faculty members are accessible, offer constructive feedback on course projects and assignments, and are at the forefront of providing an educational experience in which students can learn and directly apply classroom theories and concepts to the real-world practice of health care management.

An advisory board of health administrators from around the country guides the development of the degree program to ensure the curriculum addresses today's most pressing challenges for health care leaders.

Industry outlook

Health care is the largest industry in the U.S. and the second largest employer, representing 20 percent of the Gross National Product, and employing more than 11 million people. Employment opportunities for health systems managers and administrators will increase by 20 percent over the next 10 years, according to the Bureau of Labor Statistics.

Flexible degree built around your schedule

This online degree offers five start dates per year and an accelerated course format which will allow you to complete your degree in half the time of a traditional, semester-based program. A full-time student can complete this degree in one year; a part-time student can complete the degree in 24 months.

Stackable credentials

You may earn a graduate-level credential and advance your career while you work toward your MS. The advanced certificate in health care finance stands alone, and may also be applied to your MS degree.

Curriculum

Health Systems Management, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
HLTH-608	Integrated Health Systems & Population Health	3
HLTH-706	Leading Health Systems I	3
HLTH-710	Health Care Economics and Policy	3
HLTH-718	Evidence-Based Management in Health Care	3
HLTH-725	Healthcare Strategic Marketing & Communications	3
HLTH-730	Health Care Financial Management I: Principles & Practice	3
HLTH-731	Health Care Financial Management II: Concepts/ Applications	3
HLTH-733	Organizational Quality and Systems Learning	3
HLTH-736	Health Care Operations: Building High Reliability Systems	3
HLTH-746	Leading Health Systems II	3
HLTH-760	Health IT and Decision Support	3
HLTH-796	Healthcare Strategy: Analysis & Formulation	3
HLTH-798	Health Systems Analysis & Innovation	3
Total Semester Credit Hours		**39**

Admission requirements

To be considered for admission to the MS program in health systems management, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a cumulative GPA of 3.0 (or equivalent). Applicants with GPAs below a 3.0 are encouraged to apply.
- Submit two letters of recommendation from individuals who have the opportunity to observe the applicant's work.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Certain countries are subject to comprehensive embargoes under US Export Controls, which prohibit virtually ALL exports, imports, and other transactions without a license or other US Government authorization. Learners from Syria, Sudan, North Korea, the Crimea region of the Ukraine, Iran, and Cuba may not register for RIT online courses. Nor may individuals on the United States Treasury Department's list of Specially Designated Nationals or the United States Commerce Department's table of Deny Orders. By registering for RIT online courses, you represent and warrant that you are not located in, under the control of, or a national or resident of any such country or on any such list.

Additional information

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program.

Medical Illustration, MFA

www.rit.edu/study/medical-illustration-mfa
James Perkins, Professor
585-475-2443, japfaa@rit.edu

Program overview

A medical illustrator is a professional artist with advanced education in the biomedical sciences, cutting edge digital media, and the principles of visual communication. RIT's MFA in medical illustration is one of only five such programs in North America and the only program in the northeast. It combines training in human anatomy (with complete cadaver dissection), immunology, histology (the cellular structure of organs), and pathophysiology (the study of disease) with extensive training in 2D and 3D digital graphics, interactive media, and animation.

Collaborating with scientists, physicians, and other health care professionals, medical illustrators translate complex scientific information into visual images that support medical education, science research, patient care, advertising, and litigation. Illustration projects are designed for use in print, projection, broadcast media, and distribution via the web and mobile devices.

The two-year program emphasizes visual problem solving, determining the best approach to communicate a difficult concept. Students also gain real world experience by collaborating with medical researchers and observing live surgery in an operating room. The program culminates with the production of a thesis project, which requires extensive background research and an original body of artwork on a complex medical topic.

Program goals and learning outcomes

The MFA in medical illustration has established the following program goals and student learning outcomes:

Demonstrate an advanced level of knowledge in the biomedical sciences
- Demonstrate advanced knowledge of human anatomy, molecular biology, physiology, and related biomedical sciences

Visualize scientific structures, processes, and concepts
- Visualize and accurately render anatomic, tissue, cellular, and molecular structures
- Illustrate physiological processes and abstract scientific concepts through visual storytelling

List instructional objectives to communicate biomedical content to a variety of target learners
- Identify the target learners (audience) for each set of instructional illustrations
- Describe the level of scientific literacy of each group of target learners
- Create a set of instructional objectives for each instructional illustration

Solve complex communication problems with appropriate application of verbal and visual content, realism, symbolism, graphic conventions, and motion or interactive media.
- Select the most appropriate medium for delivery of content to target learners
- Select appropriate level of realism, symbolism, and graphic conventions for optimal delivery of instructional objectives to target learners

Utilize a variety of media and production techniques in appropriate applications and understand production processes sufficiently to communicate with pre-press companies, art directors, etc.
- Create artwork in a variety of media
- Select the appropriate dimensions, color space, resolution, file format, and other criteria for delivery to client
- Use industry standard terminology when discussing production and output processes

Communicate effectively with clients, subject matter experts, co-workers, supervisors, and vendors in oral and written form
- Use correct anatomic and medical terminology when discussing scientific content

Demonstrate knowledge of professional and ethical conduct
- Describe HIPAA regulations regarding the use of patient information
- Follow operating room protocols at affiliated hospitals
- Describe US and international copyright laws and how they apply to the use of reference materials
- Describe copyright infringement and the criteria for determining Fair Use

Demonstrate awareness of established business and management practices
- Describe standard employment practices in the profession
- Describe business models and taxation of independent illustrator
- Describe pricing strategies and calculate prices for illustration projects
- Create a personal identity package and marketing materials
- Generate sample contracts, licensing agreements, and invoices

Demonstrate competency in the academic research process through a graduate research project or thesis
- Conduct background research on a proposed biomedical topic
- Develop a set of instructional objectives to deliver the topic to a specific group of target learners
- Create a body of artwork to meet the instructional objectives
- Exhibit the body of work during one of the thesis shows or at a screening of digital media productions
- Complete a written thesis paper summarizing the project

Graduates

Graduate students in medical illustration come from a variety of backgrounds including biology, chemistry, anthropology, fine arts, illustration, photography, and graphic design. Students who have no prior experience in illustration, fine art, drawing, or medical illustration must demonstrate outstanding drawing skills and a strong aptitude for the life sciences.

Careers and employment

Graduates of the MFA in medical illustration find work with hospitals, medical schools, research centers, museums, medical publishers, advertising agencies, web design firms, animation studios, law firms, and a variety of other creative agencies. Since the MFA is considered the terminal degree in the arts, graduates may also find employment in academia, teaching in a wide range of computer graphics, scientific illustration, and art programs. Organizations that employ our include:
- *Science* magazine (American Association for the Advancement of Science)
- Department of Neurobiology and Anatomy, University of Rochester Medical Center
- *New England Journal of Medicine*
- Roswell Park Cancer Center, Buffalo, NY
- MIT Center for Biomedical Innovation

- Cell Press (publishers of *Cell* and other scientific journals)
- Nucleus Global (medical communications)
- Custom Learning Designs (pharmaceutical advertising)
- The Presentation Group (courtroom graphics)
- Bryan Christie Design (pharmaceutical advertising)
- Emmi Solutions (web and interactive media)
- Cleveland Institute of Art (scientific illustration program)
- Illustrated Verdict (courtroom graphics)
- National Capital Area Medical Simulation Lab, Uniformed Services University of the Health Sciences (developing virtual surgical simulators)
- Visible Body/Argosy Medical Publishing (medical publishing and interactive media)
- Department of Imaging Sciences, University of Rochester Medical Center
- Smithsonian National Museum of Natural History
- Springer Healthcare Communications (medical publishing)
- Legal Art Works (courtroom graphics)

Curriculum

Medical Illustration, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ILLM-601	Human Gross Anatomy	6
ILLM-602	Anatomic Studies	3
ILLM-603	3D Modeling of Biomedical Forms	3
ILLM-606	3D Animation of Biomedical Forms	3
ILLM-607	Computer Applications in Medical Illustration	3
ILLM-608	Scientific Visualization	3
ILLM-890	Thesis	1
MEDS-615	Medical Pathophysiology	3
MEDS-630	Human Immunology	3
	Studio Elective	3
Second Year		
ILLM-612	Surgical Illustration	3
ILLM-615	Interactive Media I	3
ILLM-616	Interactive Media II	3
ILLM-617	Portfolio and Business Practices	3
ILLM-890	Thesis	9
MEDS-620	Histology and Histopathology	4
	Studio Elective	3
Total Semester Credit Hours		**59**

Studio electives

COURSE	
HCIN-610	Foundations of Human-Computer Interaction
HCIN-620	Information and Interaction Design
HCIN-660	Fundamentals of Instructional Technology
ILLM-618	Eye Ear Nose Prosthetics
ILLM-689	Special Topics
ILLM-799	Independent Study
	Any graduate studio course offered in the College of Art and Design

Admission requirements

To be considered for admission to the MFA in medical illustration, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in a field of the arts, sciences, or education. The undergraduate degree should include studio art courses, one year of general or introductory biology (for biology majors), and a minimum of three advanced biology courses, such as vertebrate anatomy, physiology, neurobiology, cell biology, molecular biology, immunology, microbiology, genetics, developmental biology, or pathology.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Demonstrate, through the quality of the undergraduate record and creative production, a genuine, professional potential.
- Demonstrate, through the submission of a portfolio, outstanding drawing skills, particularly the ability to draw subjects from direct observation. (Refer to Graduate Portfolio Requirements for more information.)
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Those applicants coming from countries where the baccalaureate degree is not awarded for programs in the practice of art may be admitted to graduate study if the diploma or certificate received approximates the standards of the BFA, BA, or BS degrees, and if their academic records and portfolios indicate an ability to meet graduate standards.

Faculty

Dean's Office

Daniel Ornt, BA, Colgate University; MD, University of Rochester—Dean

Health Systems Administration

Carla Stebbins, BA, University of Northern Iowa; MHA, Des Moines University; Ph.D., Iowa State University—Program Director; Senior Lecturer

Medical Illustration

James Perkins, BA, Cornell University; MFA, Rochester Institute of Technology; ABD, University of Rochester—Graduate Program Director; Professor

Craig Foster, BFA, University of Michigan; MS, Medical College of Georgia—Visiting Assistant Professor

Glen Hintz, BA, Lafayette College; MS, The Medical College of Georgia—Associate Professor

School of Individualized Study

James C. Hall, Executive Director
rit.edu/sois

Programs of Study

Online learning option available.

The School of Individualized Study is about the individual students' ideas, interests and goals. Through the school, students can combine multiple disciplines to create a singular master's degree program, the MS in professional studies. The school also offers an advanced certificate in project management.

Admission requirements

Each college or degree-granting entity makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarship

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Faculty

The school's faculty is comprised of faculty members from a wide range of disciplines. A core faculty oversees the school and guides students in creating a personalized degree program.

Study options

Most graduate programs offer a variety of study options, including full-time, part-time, and online study. Please refer to each individual program for specific information regarding these options.

Professional Studies, MS

www.rit.edu/study/professional-studies-ms

Peter Boyd, Lecturer
585-475-6320, plbcms@rit.edu

Program overview

The professional studies masters program enables students to create an individualized plan of study tailored to their personal and professional goals. The degree offers students the opportunity to draw on more than 50 of RIT's graduate programs to gain the advanced knowledge and skills necessary to respond successfully to new and emerging career opportunities.

For example, students interested in integrating sustainability into their career as a facilities manager might combine courses from the sustainability and facility management programs. Educators may be interested in combining courses from the school psychology and secondary education of students who are deaf or hard of hearing programs to improve their knowledge of special learning populations and the social issues students face in today's educational environments. There are a wide range of concentrations that can be created based on each student's professional career aspirations.

The degree also includes a capstone project. This applied, hands-on project is directly related to the student's individualized plan of study.

The professional studies degree can be completed on campus or online.

Concentration areas

Students create two or three concentrations with courses selected from a wide range of graduate programs at RIT. Some common concentration areas include:

- Applied and Computational Mathematics
- Applied Statistics/Quality
- Bioinformatics
- Business (Marketing, Management, etc.)
- Chemistry
- Color Science
- Communication and Media Technology
- Computer Engineering
- Computer Science
- Criminal Justice
- Electrical Engineering
- Environmental, Health and Safety Management
- Facilities Management
- Health Systems Administration
- Human Resource Development
- Imaging Science
- Industrial and Systems Engineering
- Industrial Design
- Information Sciences and Technologies
- Microelectronics Manufacturing Engineering
- Packaging Science
- Product Development and Design
- Project Management
- Public Policy
- School Psychology
- Secondary Education of Students Who Are Deaf or Hard of Hearing
- Service Management
- Software Development
- Software Engineering
- Sustainability
- Workplace Learning and Instruction
- Visual Communication Design

Plan of study

The program requires the completion of 33 credit hours and can be completed through full- or part-time study. Students begin their studies with Contexts and Trends (PROF-705), the program's foundation course. Throughout this course students explore their personal career objectives and research RIT's portfolio of graduate programs to identify courses that best match their professional and personal goals.

Students create two or three concentrations that make up their required course work for the degree program. Each concentration is a selection of courses drawn from existing RIT graduate programs and can range from 9 to 15 credit hours. Graduate credits earned in other programs may be used in completing a concentration, upon approval.

Credit hours not required to fulfill a concentration area may be used as electives. All elective and transferred graduate courses need to be integrated into the proposed plan of study. With certain concentrations, the degree may be completed entirely through online learning.

Curriculum

Professional Studies, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PROF-705	Context and Trends	3
	Concentration A courses	9
	Concentration B courses	6
Second Year		
PROF-770	Capstone Proposal Seminar	0
PROF-775	Capstone Project	3
	Concentration A or elective course	6
	Concentration B course	3
	Concentration B or elective course	3
Total Semester Credit Hours		**33**

Admission requirements

To be considered for the MS program in professional studies, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent), or superior endorsements.
- Submit a personal statement of educational objectives and career objectives.
- Submit a current resume or curriculum vitae.
- Submit letters of recommendation from two recent instructors or supervisors.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- All applicants are urged to discuss their course ideas with a professional studies graduate adviser before submitting a formal application.

Project Management, Adv. Cert.

www.rit.edu/study/project-management-adv-cert
School of Individualized Study
585-475-2234, sois@rit.edu

Program overview

In today's business-oriented society, project-based organizations and project management have become much more than just a way of conducting business. New growth within these organizations has changed the shape of project management to reveal what is becoming an exciting new career path for many individuals. The goal of a project manager is to successfully plan, organize, and accomplish a specific project or one-time effort. Project managers have quickly become a necessary asset for many businesses.

Encountering the challenges of cultural and social differences, along with an assortment of industrial focuses, the project manager must be aware of a project's goals on a daily and, sometimes, hourly basis. The advanced certificate in project management teaches students how to plan, develop, and implement successful business projects from initiation to completion. The program consists of three core courses and one elective. The certificate can be completed entirely online, on campus, or through a combination of both options.

RIT's School of Individualized Study is a Project Management Institute (PMI) Registered Education Provider.

Curriculum

Project Management, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
BUSI-710	Project Management	3
BUSI-711	Advanced Project Management	3
BUSI-712	International Project Management	3
	Graduate Elective	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in project management, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Faculty

James Hall, BA, Wilfrid Laurier University; MA, Ph.D., University of Iowa—Dean, University Studies Division; Executive Director, School of Individualized Study

Peter Boyd, BA, Nazareth College; MA, Columbia University—Graduate Coordinator

Leonie Fernandes, BS, University of Michigan; MS, Rochester Institute of Technology; PMI—Project Management Coordinator

College of Liberal Arts

James J. Winebrake, Dean
rit.edu/liberalarts

Programs of Study

Online learning option available.

The College of Liberal Arts offers master of science degrees in the following areas: communication and media technologies; criminal justice; experimental psychology; science, technology, and public policy; and school psychology. The college also offers three advanced certificates in communication and digital media, engineering psychology, and school psychology.

Elective graduate courses complement the professional emphasis of our degree programs by exploring the broader knowledge and social implications embodied in these areas of study. By providing this humanistic perspective, these courses play an integral role in professional education, making a direct and distinct contribution to the student's preparation for a specialized career.

The college also provides a number of graduate courses that serve as electives for graduate degree programs offered by other RIT colleges.

Admission requirements

Each college makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarships

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Faculty

Members of the faculty serve as students' advisers as well as their professors. Their backgrounds in their fields, in the classroom, and in their research are the basis for academic standards and expertise that anticipate graduates' career requirements.

Study options

Most graduate programs offer a variety of study options, including full-time and part-time study, as well as portions of programs that may be available to complete online. Please refer to each individual program for specific information regarding these options.

Communication and Media Technologies, MS

www.rit.edu/study/communication-and-media-technologies-ms
Ammina Kothari, Associate Professor
585-475-7397, abkgpt@rit.edu

Program overview

Communication and the technologies for message creation and dissemination are at the center of dramatic economic, social, and cultural changes occurring as a result of technological development and global connectedness. The master of science degree in communication and media technologies is an advanced interdisciplinary program combining liberal arts courses in communication with course work in an applied or professional program. Students will become adept at the analysis of communication problems, the development of solutions, and the creation of messages as a result of their combined training in the social sciences, humanities, and applied technologies.

Communication courses rooted in the humanities and social sciences provide students with the opportunity to gain a broad, historical understanding of issues in communication, including the ethical, legal, and social dimensions. Additional courses give students advanced guidance in the creation of written and visual message content. Courses in applied technologies or professional programs provide opportunities for implementation and application. The required thesis combines knowledge, practice, original research, and application under the guidance of a graduate advisement committee.

Students are prepared to pursue careers as communication experts in commerce, industry, education, entertainment, and government, as well as for graduate work toward a doctoral degree.

Plan of study

The degree requires the completion of 36 credit hours of graduate course work. The program consists of five required courses, three communication electives, three applied professional or technical courses, and either a thesis, project, or a comprehensive exam.

Graduate committee

Full-time students create a graduate advisement committee by the end of their first semester of study. The committee is comprised of at least one faculty member from the department of communication and one faculty member from outside the department. The outside member should have a terminal degree. The committee advises and guides the student's elective course selection and course sequencing. With the guidance and approval of the graduate advising committee, students design and conduct a thesis or project appropriate to their course of study and their career goals.

Thesis/Project

A thesis or project is an option for all students in the program. The topic should complement the student's academic graduate interests and scholarly training. Topic selection and methods for implementing the thesis/project occur in consultation with the student's graduate advisement committee.

Comprehensive examinations

Comprehensive examinations may be taken in lieu of a thesis or project. Students are eligible to take these examinations after all course work has been completed. The graduate committee chooses the exam committee members from two areas: theory and methods. The student selects a specialty area within the communication elective courses with the consent of the faculty member who taught the course, and that faculty member will administer and grade the exam question(s). Specialization areas include the following: electronic, visual, international, strategic, and education. Exams take place at two times: intersession and in June. If students fail any portion of the exam, they receive one opportunity for a rewrite.

Curriculum

Communication and Media Technologies, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
COMM-700	Survey of Media Technologies	3
COMM-702	Communication Theories	3
COMM-703	Research Methods in Communication	3
COMM-704	Media Law and Ethics	3
COMM-720	Thesis Preparation Seminar	0
	Communication Electives	9
	Professional Core	9
Choose one of the following:		6
COMM-800	Communication Thesis/Project	
COMM-801	Comprehensive Exam, plus two additional courses*	
Total Semester Credit Hours		**36**

* Courses may be professional core courses, communication electives, or a combination of both.

Admission requirements

To be considered for admission to the MS program in communication and media technologies, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited college or university.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative undergraduate GPA of 3.0.
- Submit a personal statement describing the applicant's goals for the program, focusing on their professional interests.
- Submit at least two letters of reference from academic advisers, major professors, and/or supervisors or managers.
- Submit a writing portfolio consisting of at least three writing samples, such as academic papers written for class, work-related brochures and pamphlets, or newspaper or magazine articles.
- International applicants whose native language is not English must submit scores from either the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). Minimum scores of 570 (paper-based) or 88-89 (Internet-based) are required on the TOEFL. A minimum score of 6.5 is required on the IELTS. This requirement may be waived for students who submit undergraduate transcripts from American colleges and universities.
- Students are encouraged to submit scores from the GRE.

Communication and Digital Media, Adv. Cert.

www.rit.edu/study/communication-and-digital-media-adv-cert
Ammina Kothari, Associate Professor
585-475-7397, abkgpt@rit.edu

Program overview

The advanced certificate in communication and digital media assists students and professional practitioners in better understanding the research and theory of digital media in message creation and in the analysis of dynamic new media channels. Collectively, the certificate focuses on critical thinking, global interconnectedness, ethical reasoning, integrative literacies (digital, technical, communication, and aesthetic), and creative and innovative thinking.

The advanced certificate in communication and digital media is comprised of courses focusing on digital media that have both career and scholarly applications. The certificate combines both academic and pragmatic perspectives and assists students and practitioners in better understanding the research and theory of digital media, in message creation, and in the analysis of these dynamic new channels. Collectively, courses also enhance critical thinking, global interconnectedness, ethical reasoning, integrative literacies (digital, technical, communication, and aesthetic), and creative and innovative thinking.

The curriculum is designed for those who need to update or upgrade their skills, certify their competence, add to their credentials, or improve their understanding of media. The courses are taught online in eight-week sessions, (two per semester) to accommodate students who would like to complete the four-course certificate in one academic year (or two semesters).

Curriculum

Communication and Digital Media, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
COMM-705	Technology-Mediated Communication	3
COMM-706	Crafting the Message	3
COMM-710	Visual Communication	3
	Elective	3
Total Semester Credit Hours		**12**

Electives

COURSE	
Choose one of the following:	
COMM-707	International Media
COMM-711	Persuasion in a Digital Age
UXDE-711	User Interface Design
UXDE-721	User Experience Design
UXDE-722	Interaction Design and Development

Admission requirements

To be considered for admission to the advanced certificate in communication and digital media, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0.
- Submit a personal statement describing the applicant's goals for the program, focusing on their professional interests.
- Submit scores from the GRE.
- Submit a personal statement describing the applicant's goals for the program, focusing on their research interests and possible thesis research (including possible thesis mentors).
- Submit at least two letters of reference from academic advisors, major professors, and/or supervisors or managers.
- International applicants whose native language is not English must submit scores from either the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). Minimum scores of 570 (paper-based) or 88-89 (internet-based) are required on the TOEFL. A minimum score of 6.5 is required on the IELTS. This requirement may be waived for students who submit undergraduate transcripts from American colleges and universities.

Please note: Certain countries are subject to comprehensive embargoes under US Export Controls, which prohibit virtually ALL exports, imports, and other transactions without a license or other US Government authorization. Learners from Syria, Sudan, North Korea, the Crimea region of the Ukraine, Iran, and Cuba may not register for RIT online courses. Nor may individuals on the United States Treasury Department's list of Specially Designated Nationals or the United States Commerce Department's table of Deny Orders. By registering for RIT online courses, you represent and warrant that you are not located in, under the control of, or a national or resident of any such country or on any such list.

Criminal Justice, MS

www.rit.edu/study/criminal-justice-ms
Jason Scott, Associate Professor
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Program overview

RIT's criminal justice master's degree fosters the creation of new knowledge through active research in agencies and the community. Students learn and apply problem-solving skills rooted in areas of individual interest with an emphasis on applied research. The degree enables graduates to enter successful careers in criminal justice agencies, policy analysis, or pursue further education in a criminal justice doctoral program.

The MS degree in criminal justice emphasizes a multidisciplinary approach to urban studies with a focus on public safety. The program stresses training in policy analysis and practice, particularly as it is relevant to community and urban issues.

The program builds on a foundation of locally relevant policy research by providing students with the critical skills to carry out such work and the experience to assure success in employment or in pursuit of further graduate studies. The program provides students with a strong foundation in criminological, criminal justice theory, and social scientific research skills, thus enabling graduates to have successful careers in the policy analysis arena or to be prepared to pursue advanced study beyond the master's degree.

Recent graduates have entered careers in prosecutorial investigation, criminal justice program evaluation, and crime analysis. Many have also pursued doctoral degrees.

Plan of study

A minimum of 30 semester credit hours is required for completion of the MS in criminal justice.

Students applying to the program should have a strong undergraduate foundation in criminology and research methods. Students that do not possess these skills may be required to complete additional undergraduate course work (e.g., Criminology, Theories of Crime, and Research Methods) or demonstrate that they have equivalent skills for completion of the degree.

Curriculum

Criminal Justice (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
CRIM-700	Pro-Seminar In Criminal Justice Theory	3
CRIM-701	Statistics	3
CRIM-702	Pro-Seminar in Research Methods	3
CRIM-703	Advanced Criminology	3
CRIM-704	Crime, Justice, and Community	3
CRIM-705	Interventions and Change in Criminal Justice	3
CRIM-800	Thesis in Criminal Justice	6
	Electives	6
Total Semester Credit Hours		**30**

Criminal Justice (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
CRIM-700	Pro-Seminar In Criminal Justice Theory	3
CRIM-701	Statistics	3
CRIM-702	Pro-Seminar in Research Methods	3
CRIM-703	Advanced Criminology	3
CRIM-704	Crime, Justice, and Community	3
CRIM-705	Interventions and Change in Criminal Justice	3
CRIM-775	Criminal Justice Capstone	3
	Electives	9
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in criminal justice, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit two writing samples, one of which is a personal statement.
- Have completed a statistics course (students may be required to take a data analysis or a statistics course if not taken previously).
- Submit two letters of recommendation. Letters should be from faculty members familiar with the applicant's academic work.
- Complete a personal interview.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Engineering Psychology, Adv. Cert.

www.rit.edu/study/engineering-psychology-adv-cert
Esa Rantanen, Associate Professor
585-475-4412, emrgsh@rit.edu

Program overview

The advanced certificate in engineering psychology focuses on exploring and understanding the relationship between humans and machines. It's the science of human behavior and our interactions with the technologies that go into the design and operation of machines, equipment, and more. Students expand their knowledge of engineering psychology by exploring course work in cognition, perception, ergonomics, industrial design, and more.

The advanced certificate in engineering psychology provides students with core knowledge in the key areas of engineering psychology, as well as an opportunity to study particular topics in greater depth through electives. The advanced certificate provides students with formal recognition of their knowledge in engineering psychology and establishes a credential for seeking a career in the human factors/ergonomics field.

Plan of study

The certificate consists of five courses. Students must earn at least a B in each course. Students enrolled in the MS degree in experimental psychology can be awarded the advanced certificate by taking the required courses as part of their master's program.

Curriculum

Engineering Psychology, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
PSYC-712	Graduate Cognition	3
PSYC-714	Graduate Engineering Psychology	3
PSYC-715	Graduate Perception	3
	PSYC Elective or Institute Elective*	6
Total Semester Credit Hours		**15**

* Any graduate level course except PSYC-640, PSYC-642.

Admission requirements

To be considered for admission to the advanced certificate in engineering psychology, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Have a minimum of 15 semester hours of course work in undergraduate psychology or a related field (e.g., engineering, computer science, information technology), including one course in experimental psychology and one course in statistics.
- Submit a personal statement describing the applicant's experience and goals regarding the certificate.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Scores from the GRE are not required. However, they may be beneficial for some students.

Prerequisite courses

Students may meet the prerequisite requirements by taking the designated prerequisite courses at RIT, having sufficient background from their undergraduate education, or if prerequisite requirements are explicitly waived by the course instructor.

Experimental Psychology, MS

www.rit.edu/study/experimental-psychology-ms

Tina Sutton, Assistant Professor
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Program overview

In the experimental psychology masters degree, students are trained to apply scientific methods to basic psychological processes in perception, brain and behavior relationships, thinking, memory, learning, social interactions, human development and related areas. It is a broad and flexible program that provides a solid stepping-stone into careers or further study in psychology. A choice of tracks – in experimental psychology or engineering psychology – allows students to specialize their degree toward their career goals and aspirations.

The MS program in experimental psychology builds on the strengths of faculty research and student interests in experimental psychology broadly defined. The program as a whole provides a foundation for further advanced academic study in human factors and/or experimental psychology.

Plan of study

The program includes 30 credit hours of core courses, elective courses, and a thesis. It also offers students two tracks to choose from: experimental psychology and engineering psychology.

The **experimental psychology** track embraces the application of the scientific method to the study of behavior. Faculty are experts in a variety of fields including addiction, attention, cognition, development, evolutionary psychology, forensic psychology, perception, psychopathology, and social psychology, among others.

The **engineering psychology** track examines human capabilities to sense, perceive, store, and process information and how these human factors impact interactions with technology. This knowledge is applied to the design, use, and maintenance of human-machine systems. Courses emphasize the role of human behavior and performance in both simple and complex human-machine systems. Students are trained in both research methods of experimental psychology and application of the results to contemporary problems in industry. This track prepares students to function as effective engineering psychologists in industrial, governmental, or consulting organizations.

Electives

Students in the engineering psychology track must select two electives (students should check for course prerequisites or if permission of the instructor is required). Any graduate course at RIT can be taken as an elective, assuming prerequisites are met.

Cooperative education

The program includes an optional cooperative education component. Co-op is generally completed in the summer after the first year of the program. The co-op experience provides experiential learning that integrates with classroom education and allows students to apply psychological principles to problems in a variety of work environments. Co-op may be completed in any business or industrial setting.

Thesis

Students select a thesis adviser during the first year. Selection of an advisor, thesis topic, and research proposal must be completed in the second semester of the first year of the program. Ongoing research activity is expected through the summer term of the program. At the completion of the thesis, students will publicly present their findings and defend their research before a thesis committee.

Curriculum

Experimental Psychology, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PSYC-640	Graduate Statistics	3
PSYC-642	Graduate Research Methods	3
PSYC-751	Graduate Research Seminar	0
PSYC-752	Thesis Proposal	3
Choose one of the following:		3
PSYC-714	Graduate Engineering Psychology (Engineering Psychology track)	
	PSYC Elective (Experimental track)	
	PSYC Elective	3
	Institute Electives	6
Second Year		
PSYC-753	Thesis	3
	PSYC Elective	3
Choose one of the following:		3
	PSYC Elective	
	Institute Elective	
Total Semester Credit Hours		**30**

Electives

COURSE	
BIOL-673	Marine Biology
BIOL-675	Advanced Conservation Biology
HCIN-600	Research Methods
HCIN-610	Foundations of Human-Computer Interaction
HCIN-620	Information and Interaction Design
HCIN-630	Usability Testing
HCIN-661	Interactive Courseware
HCIN-700	Current Topics in HCI
HCIN-705	Topics in HCI for Biomedical Informatics
HCIN-715	Agent-Based and Cognitive Modeling
HCIN-720	Prototyping Wearable and Internet of Things Devices
HCIN-722	Human-Computer Interaction with Mobile, Wearable, and Ubiquitous Devices
HCIN-730	User-Centered Design Methods
HCIN-735	Collaboration, Technology, and the Human Experience
HRDE-711	Program Evaluation and Design
ISEE-730	Biomechanics of Human Movement
ISEE-731	Advanced Topics in Human Factors and Ergonomics
ISEE-732	Systems Safety Engineering
MATH-655	Biostatistics
MKTG-761	Marketing Concepts and Commercialization
MSSE-704	Teaching Deaf and Hard of Hearing Learners with Special Educational Needs
PSYC-631	Cognitive Assessment
PSYC-632	Social-Emotional Assessment
PSYC-641	Applied Psychology Methods
PSYC-650	Applied Behavior Analysis
PSYC-711	Graduate Biopsychology
PSYC-712	Graduate Cognition
PSYC-713	Graduate Development Psychology
PSYC-715	Graduate Perception
PSYC-716	Graduate Social Psychology
PSYC-717	Advanced Graduate Statistics
PSYC-720	Advanced Consultation
PSYC-721	Academic Intervention
PSYC-723	Systems and Organizational Interventions
STAT-611	Statistical Software
STAT-641	Applied Linear Models - Regression
STAT-701	Foundations of Experimental Design
STAT-756	Multivariate Analysis
STAT-775	Design and Analysis of Clinical Trials
STSO-621	Graduate Biodiversity and Society

Admission requirements

To be considered for admission to the MS in experimental psychology, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.

- Have a minimum cumulative GPA of 3.0 (or equivalent)
- Have a minimum of 15 semester hours of course work in undergraduate psychology or a related field (e.g., engineering, computer science, information technology), including one course in experimental psychology and one course in statistics.
- Submit scores from the GRE.
- Submit a personal statement describing the applicant's goals for the program, focusing on their research interests and possible thesis research (including possible thesis mentors).
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

School Psychology, MS

www.rit.edu/study/school-psychology-ms
Suzanne Bamonto, Associate Professor
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Program overview

A school psychologist works with young children; elementary, junior high, and high school students; teachers and administrators; parents; and various educational professionals to offer services to prevent or improve existing student difficulties and enhance the educational success of all children. Through diagnostic testing, counseling, consultation, and intervention, school psychologist programs help students deal with learning and behavioral difficulties and help improve students' adjustment to school and their community. The school psychology masters prepares students for provisional New York state certification as school psychologists. Designed to provide students with a strong background in psychological foundations, the program develops professional skills and competencies in assessment, counseling, consultation, and program evaluation.

Designed to provide students with a strong background in psychological foundations, the MS degree in school psychology develops professional skills and competencies in assessment, counseling, consultation, and program evaluation. The program prepares students for provisional New York state certification as school psychologists. The MS degree in school psychology is approved by the National Association of School Psychologists, and is awarded after students have completed all course work, an internship, and have passed a portfolio review.

Plan of study

A minimum of 66 semester credit hours are required for completion of the program. Before registering for the internship, students must pass a portfolio review. A cumulative GPA of 3.0 or above is required.

Curriculum

School Psychology, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PSYC-600	Field Experience I: Professional School Psychology Foundations	3
PSYC-601	Field Experience II: Professional School Psychology Foundations	3
PSYC-620	Interpersonal Intervention Skills	3
PSYC-630	Academic Assessment	3
PSYC-631	Cognitive Assessment	3
PSYC-632	Social-Emotional Assessment	3
PSYC-640	Graduate Statistics	3
PSYC-650	Applied Behavior Analysis	3
PSYC-713	Graduate Developmental Psychology	3
PSYC-721	Academic Intervention	3
Second Year		
PSYC-603	Ethical and Legal Issues	3
PSYC-641	Applied Psychology Methods	3
PSYC-701	Advanced Practicum I: Issues in Diversity	3
PSYC-702	Advanced Practicum II: Issues in Diversity	3
PSYC-710	Developmental Psychopathology	3
PSYC-711	Graduate Biopsychology	3
PSYC-720	Advanced Consultation	3
PSYC-722	Advanced Counseling	3
PSYC-723	Systems and Organizational Interventions	3
PSYC-730	Comprehensive Assessment Integration	3
Third Year		
PSYC-750	Internship	6
Total Semester Credit Hours		**66**

Admission requirements

To be considered for admission to the MS program in school psychology, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Have a minimum of 18 semester hours of course work in behavioral sciences with a grade of B (3.0) or better.
- Have completed prerequisite undergraduate courses in general psychology, elementary statistics, child or developmental psychology, and abnormal psychology.
- Submit scores from the GRE.
- Submit a personal statement outlining the candidate's goals and related experience that shows evidence of a professional commitment and the potential for developing effective relationships with children, youth, and adults.
- Complete a personal interview.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- All credentials must be submitted and reviewed before the student completes 9 semester credit hours of graduate work in the program. Applications are due by February 1. Later applications are reviewed on a space-available basis.

School Psychology, Adv. Cert.

www.rit.edu/study/school-psychology-adv-cert
Suzanne Bamonto, Associate Professor
585-475-2765, sbggsp@rit.edu

Program overview

The advanced certificate in school psychology is designed for students who are interested in learning aspects of school psychology, but may not want to pursue an advanced degree. The certificate may be completed as a stand-alone program, or courses may be applied later for students who wish to complete RIT's MS degree in school psychology. Students who complete the MS program in school psychology automatically earn this certificate.

Curriculum

School Psychology, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PSYC-620	Interpersonal Intervention Skills	3
PSYC-630	Academic Assessment	3
PSYC-641	Applied Psychology Methods	3
PSYC-650	Applied Behavior Analysis	3
Second Year		
PSYC-640	Statistics	3
PSYC-720	Advanced Consultation	3
PSYC-723	Systems and Organizational Interventions	3
Total Semester Credit Hours		**21**

Admission requirements

To be considered for admission to the advanced certificate in school psychology, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Have a minimum of 18 semester hours of course work in behavioral sciences with a grade of B (3.0) or better.
- Have completed prerequisite undergraduate courses in general psychology, elementary statistics, child or developmental psychology, and abnormal psychology.
- Submit a personal statement outlining the candidate's goals and related experience that shows evidence of a professional commitment and the potential for developing effective relationships with children, youth, and adults.
- Complete a personal interview.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- All credentials must be submitted and reviewed before the student completes 9 semester credit hours of graduate work in the program. Applications are due by February 1. Later applications are reviewed on a space-available basis.

Science, Technology and Public Policy, MS

www.rit.edu/study/science-technology-and-public-policy-ms
Eric Hittinger, Associate Professor
eshgpt@rit.edu

Program overview

The MS degree in science, technology, and public policy enables students to work at the intersection of engineering, science, technology, and public policy. The program builds on RIT's strengths as a technological university, enabling students to interact with faculty and researchers who are working on scientific developments and technological innovations that drive new public policy considerations. The public policy masters is interdisciplinary and draws significantly from disciplines and courses throughout RIT. It is geared toward producing graduates who will make significant contributions in the private, public, and not-for-profit sectors.

All students in the MS degree in science, technology, and public policy take a set of policy core courses that emphasize analysis, problem solving, and interdisciplinary approaches. Students work with an advisor to choose electives that focus their policy studies in a particular area, such as environmental policy, climate change policy, health care policy, STEM education policy, telecommunications policy, or energy policy. Typical students include those with science or engineering backgrounds seeking to broaden their career opportunities in government or business settings, as well as those with undergraduate degrees in the liberal arts (e.g., economics) who are interested in science, technology, and policy issues. Full-time students can typically finish the program in one to two years. The program prides itself on working one-on-one with students to ensure that their educational needs and academic goals are attained.

Plan of study

The program requires a minimum of 30 credit hours and consists of five required core courses, three elective courses, and the completion of a thesis or comprehensive exam. The thesis option allows students to work with a faculty advisor on an independent research project in their area of interest.

Electives

Students choose three elective courses based on their interests and career goals. Courses may be offered in various colleges throughout the university, including the colleges of Business, Engineering, Engineering Technology, and Science. Course selection is completed jointly with a faculty advisor and typically aims to develop a specialized area of interest for the student (e.g., biotechnology policy, environmental policy, energy policy, communications policy, etc.).

Curriculum

Science, Technology and Public Policy, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PUBL-700	Readings in Public Policy	3
PUBL-701	Graduate Policy Analysis	3
STSO-710	Graduate Science and Technology Policy Seminar	3
PUBL-702	Graduate Decision Analysis	3
PUBL-703	Evaluation and Research Design	3
	Graduate Electives	9
Choose one of the following:		6
PUBL-790	Public Policy Thesis	
PUBL-798	Comprehensive Exam plus 2 Graduate Electives	
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in science, technology and public policy, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Have completed course work in calculus and statistics. Students may be required to take a course in data analysis or statistics course and an introductory calculus course, if not taken previously.
- Submit scores from the GRE.
- Submit two writing samples, one of which should be a statement of interest.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Faculty

Dean's Office

James J. Winebrake, BS, Lafayette College; MS, Massachusetts Institute of Technology; Ph.D., University of Pennsylvania—Dean; Professor

Laverne McQuiller Williams, BS, Rochester Institute of Technology; JD, Albany Law School of Union University; MA, Buffalo State College; Ph.D., University at Buffalo—Senior Associate Dean; Professor

Michael Laver, BA, Purdue University; MA, Ph.D., University of Pennsylvania—Associate Dean; Professor

School of Communication

Kelly Norris Martin, BA, John Carroll University; MS, Ph.D., North Carolina State University—Director; Associate Professor

Bruce A. Austin, BA, Rider College; MS, Illinois State University; Ph.D., Temple University—Professor

Grant C. Cos, BA, University of Massachusetts at Amherst; MA, Emerson College; Ph.D., Kent State University—Professor

Keith B. Jenkins, BA, University of Arkansas; MA, Ph.D., Florida State University—Vice President and Associate Provost for Diversity and Inclusion; Professor

Ammina Kothari, BA, North Central College; MA, University of Oregon; Ph.D., Indiana University—Director of Graduate Program, Associate Professor

Hinda Mandell, BA, Brandeis University; MA, Harvard University; Ph.D., Syracuse University—Associate Professor

David R. Neumann, BA, Ithaca College; MA, Ph.D., Bowling Green State University—Professor

Rudy Pugliese, BA, State University College at Oneonta; MA, State University College at Brockport; Ph.D., Temple University—Professor

Patrick M. Scanlon, BA, State University of New York at Albany; MA, Ph.D., University of Rochester—Professor

Jonathan E. Schroeder, BA, University of Michigan; MA, Ph.D., University of California at Berkeley—William A. Kern Professor in Communications

Wang, Xiao, BA, Beijing University of Aeronautics and Astronautics (China); MA, Marquette University; Ph.D., Florida State University—Associate Professor

Tracy R. Worrell, BA, Otterbein College; MA, University of Cincinnati; Ph.D., Michigan State University—Professor

Criminal Justice

Christopher Schreck, BA, University of Florida; MA, University of Arizona; Ph.D., Pennsylvania State University—Department Chair; Professor

Irshad Altheimer, BA, Alabama State University; MA, Ph.D., Washington State University—Associate Professor

John Klofas, BA, College of the Holy Cross; MA, Ph.D., State University of New York at Albany—Distinguished Professor

John McCluskey, BA, MA, Ph.D., State University of New York at Albany—Department Chair; Professor

LaVerne McQuiller Williams, BS, Rochester Institute of Technology; MS, State University of New York College at Buffalo; JD, Albany Law School; Ph.D., University at Buffalo—Senior Associate Dean; Professor

Judy Porter, BA, University of Northern Colorado; MA, New Mexico State University; Ph.D., University of Nebraska at Omaha—Undergraduate Director; Associate Professor

O. Nicholas Robertson, BA, State University College at Geneseo; MA, State University College at Brockport; Ph.D., State University of New York at Buffalo— Assistant Professor

Jason Scott, BS, Roberts Wesleyan College; MA, Ph.D., State University of New York at Albany—Graduate Director; Associate Professor

Tony Smith, BA, MA, Ph.D., State University of New York at Albany—Associate Professor

Joe Williams, BS, Rochester Institute of Technology; MA, State University College at Brockport—Lecturer; Field Experience Coordinator

Humanities

Timothy H. Engström, BA, MA, Ph.D., University of Edinburgh (United Kingdom)—Professor, Philosophy

Jessica Lieberman, BA, University of Pennsylvania; Ph.D., University of Michigan—Associate Professor, Visual Culture

Cecillia Ovesdotter Alm, BA, Universitat Wien (Austria); MA, Ph.D., University of Illinois—Associate Professor, English

Katie Terezakis, BA, Central Connecticut State University; MA, Ph.D., New School for Social Research—Professor

Psychology

Joseph Baschnagel, BA, MA, Ph.D., State University of New York at Buffalo—Department Chair; Associate Professor

Suzanne Bamonto, AA, Finger Lakes Community College; BA, State University College at Geneseo; Ph.D., University of Oregon—Graduate Program Director: School Psychology; Associate Professor

Kirsten Condry, BA, Swarthmore College; Ph.D., University of Minnesota—Associate Professor

Caroline DeLong, BA, New College of Florida; MA, Ph.D., University of Hawaii—Undergraduate Program Director; Professor

Nicholas DiFonzo, AB, Lafayette College; MA, Rider College; MA, Ph.D., Temple University—Professor

John E. Edlund, BS, MA, Ph.D., Northern Illinois University—Associate Professor

Stephanie A. Godleski, BA, Hamilton College; MS, Ph.D., University of Buffalo—Assistant Professor

Andrew M. Herbert, B.Sc., McGill University (Canada); MA, Ph.D., University of Western Ontario (Canada)—Professor

Rebecca Houston, BS, University of Arkansas at Little Rock; MA, Ph.D., University of New Orleans, Louisiana—Assistant Professor

Jennifer Lukomski, BA, Williams College; MA, Gallaudet University; Ph.D., University of Arizona—Professor

Scott P. Merydith, BA, M.Ed., Ph.D., Kent State University—Professor

Vincent Pandolfi, BA, Lafayette College; MA, Ph.D., Hofstra University—Associate Professor

Esa Rantenen, BS, MS, Embry-Riddle Aeronautical University; MS, Ph.D., Pennsylvania State University—Associate Professor

Lindsay Schenkel, BA, St. John Fisher College; MA, Ph.D., University of Nebraska at Lincoln—Associate Professor

Alan Smerbek, BA, University of Rochester; Ph.D., State University of New York at Buffalo—Associate Professor

Tina Sutton, BS, Union College; MA; Ph.D., State University of New York at Albany—Graduate Director: Experimental Psychology; Associate Professor

Public Policy

Sandra Rothenberg, BS, Syracuse University; MS, Ph.D., Massachusetts Institute of Technology—Department Chair, Professor

Eric Hittinger, BS, MS, Case Western Reserve University; Ph.D., Carnegie Mellon University—Associate Professor

Avi Mersky, BS, Lafayette College; MS, Ph.D., Carnegie Mellon University—Visiting Assistant Professor

James J. Winebrake, BS, Lafayette College; MS, Massachusetts Institute of Technology; Ph.D., University of Pennsylvania—Dean; Professor

Science, Technology and Society

Christine Keiner, BA, Western Maryland College; Ph.D., Johns Hopkins University—Department Chair; Professor

Deborah Blizzard, BA, Smith College; MS, Ph.D., Rensselaer Polytechnic Institute—Department Chair; Professor

Thomas Cornell, BA, Rhodes College; MS, Georgia Institute of Technology; Ph.D., Johns Hopkins University—Professor

Franz A. Foltz, BS, MS, Pennsylvania State University; Ph.D., Rensselaer Polytechnic Institute—Public Policy Graduate Program Director; Associate Professor

M. Ann Howard, BS, Cornell University; JD, Rutgers University—Professor

Qing Miao, BA, Nanjing University (China); MS, University of Michigan; Ph.D., Syracuse University—Assistant Professor

Kristoffer J. Whitney, BS, Rochester Institute of Technology; Ph.D., University of Pennsylvania—Assistant Professor

National Technical Institute for the Deaf

Gerard Buckley, President, NTID; Vice President and Dean, RIT
rit.edu/ntid

Programs of Study

Online learning option available.

The National Technical Institute for the Deaf (NTID) is the world's largest technological college for deaf and hard-of-hearing students. Among RIT's more than 19,000 full- and part-time students are more than 1,200 undergraduate and graduate deaf and hard-of-hearing students from across the United States and 26 foreign countries.

NTID offers a master of science degree in secondary education of students who are deaf or hard of hearing. All full-time students in the MS program are eligible for graduate assistantships. NTID offers a master of science degree in health care interpretation as well. Students also can pursue master's degrees through RIT's other ten mainstream colleges.

Admission requirements

Each college makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Health Care Interpretation, MS

www.rit.edu/study/health-care-interpretation-ms
Kathleen Miraglia, Program Director
585-672-6084 (VP), kamnss@rit.edu

Program overview

The master of science degree program in health care interpretation is designed to meet the demands of nationally certified sign language interpreters desiring a master's degree specific to working in health care environments. The National Technical Institute for the Deaf'sDepartment of American Sign Language and Interpreting Education administers the program with some course work contributed by RIT's College of Health Sciences and Technology. This unique program:

- Meets the growing demand for specialized sign language health care interpreters as more deaf and hard-of-hearing professionals enter medical/health care fields.
- Increases the number of specialized sign language interpreters working in patient health care settings.
- Prepares interpreters to work in leadership roles in the health care interpreting field.

The program begins with a one-week on-campus Professional Seminar held during the first week of June each year. This course consists of pre-readings, 40 hours of classroom instruction, and assignments to be completed after the on-campus sessions. The course is designed to deliver crucial introductory content and create connections that build trust and rapport among classmates. This initial connection promotes student engagement in the reflection-based components of the program. The Professional Seminar course establishes the theoretical parameters that you are expected to follow in case analysis and establishes a framework for conducting online discussions in safe and confidential ways.

The remaining course work is taken online. It is estimated that each course will require 9-12 hours per week for class assignments. Course materials will be delivered via both synchronous and asynchronous methods. In your final semester, you will complete a capstone project consisting of either a research paper or project.

The program may be completed on a full- or part-time basis: one academic year (with two summers) for full-time students or two academic years (with two summers) for part-time students.

Curriculum

Health Care Interpretation (full-time), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIA-610	Interpreting Research Settings (summer)	3
HCIA-705	Professional Seminar (summer)	3
HCIA-719	Theories of Translation and Interpretation (summer)	3
HCIA-715	Human Body Systems/Diseases I*	3
HCIA-720	Health Care Practical Interpreting I*	3
HCIA-730	Human Body Systems/Diseases II**	3
HCIA-740	Health Care Practical Interpreting II**	3
HCIA-760	Research Methods in Interpreting	3
	HLTH Elective	3

COURSE		SEMESTER CREDIT HOURS
Second Year		
HCIA-750	Health Care Interpreting Within a Diverse Deaf Community (summer)	3
HCIA-770	Capstone Prof Proj/Rsrch Paper (summer)	3
Total Semester Credit Hours		**33**

*HCIA-715 and HCIA-720 are taken in session 1 (first 7 weeks) of the semester.
**HCIA-730 and HCIA-740 are taken in session 2 (last 7 weeks) of the semester.

Health Care Interpretation (part-time), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIA-705	Professional Seminar (summer)	3
HCIA-719	Theories of Translation and Interpretation (summer)	3
HCIA-715	Human Body Systems/Diseases I*	3
HCIA-720	Health Care Practical Interpreting I*	3
HCIA-730	Human Body Systems/Diseases II**	3
HCIA-740	Health Care Practical Interpreting II**	3
Second Year		
HCIA-610	Interpreting Research Settings (summer)	3
HCIA-750	Health Care Interpreting Within a Diverse Deaf Community (summer)	3
HCIA-760	Research Methods in Interpreting	3
HCIA-770	Capstone Prof Proj/Rsrch Paper	3
	HLTH Elective	3
Total Semester Credit Hours		**33**

*HCIA-715 and HCIA-720 are taken in session 1 (first 7 weeks) of the semester.
**HCIA-730 and HCIA-740 are taken in session 2 (last 7 weeks) of the semester.

Admission requirements

To be considered for admission to the MS program in health care interpretation, candidates must fulfill the following requirements:

- Complete a graduate application,
- Submit a current resume or curriculum vitae,
- Hold current national ASL/English certification or state licensure. Applicants must email a copy of their credentials to ntidadmissions@rit.edu.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a cumulative GPA of 3.0 or above (or superior endorsement) from an accredited college or university.
- Submit two letters of reference from individuals who are qualified to observe your interpreting work.
- Submit a personal statement describing your educational objectives. (This may include reasons for applying to the program, how the program will relate to long-range career objectives, any personal or non-academic qualities that contribute to the program, any prior experience, or why you want to attend RIT.)
- Submit an ASL interpretation sample.
- Deaf and hard-of-hearing applicants must submit an audiogram.

Applicants accepted into the program are required to complete a self-paced online course in medical terminology called Language of Medicine prior to the beginning of the summer term, which starts each June.

Additional information

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program.

Secondary Education of Students Who Are Deaf or Hard of Hearing, MS

www.rit.edu/study/secondary-education-students-who-are-deaf-or-hard-hearing-ms

Gerald C. Bateman, Director
585-475-6776 (voice), 585-286-4282 (VP), gcbnmp@rit.edu

Program overview

The master of science (MS) degree in secondary education of students who are deaf or hard of hearing is designed for deaf, hard-of-hearing, and hearing students with a passion for teaching. As an teacher-candidate in the program, you'll earn dual certification to teach a secondary school content area for students who are hearing or deaf as well as in deaf education for grades K-12. The curriculum is taught by renowned faculty at RIT, one of the most innovative campuses in the world. The program prepares teachers to be effective and ethical practitioners and also to be scholars and leaders in the profession.

As a graduate student in the program you will enjoy small class sizes, one-to-one discussions, and advisement with world renowned faculty in small classes that allow you to build your strengths and develop your skills.

RIT and the National Technical Institute for the Deaf (NTID) have created a unique educational community with a diverse communication environment. All community members share responsibility for effective communication and are expected to respect the language preferences of students, faculty, and staff. The rich inclusive communication environment at RIT/NTID prepares you for the broad array of communication styles you will encounter in the classroom as a teacher of the deaf.

Faculty members are international leaders in research and are highly skilled in the education of deaf people. A carefully designed system of faculty advisement is a prominent feature of the program. On-campus facilities, state-of-the-art technology, and a well-established system of educational access services combine to make this a vital program for both deaf and hearing students who desire careers as professional educators of deaf students.

Plan of study

Course work requires a minimum of four semesters. A cumulative grade point average of at least 3.0 must be maintained. Before graduation, students are expected to have at least intermediate-level signing skills as determined by a Sign Language Proficiency Interview.

Degree and certification

When you successfully complete the program, you will have earned:

- A master of science degree
- Initial Certification from New York State to teach in an academic subject area at the secondary school level (grades 7-12). Subject areas include biology, chemistry, earth science, English, math, physics, social studies, or American Sign Language
- Initial certification from New York State in education of students who are deaf or hard of hearing, grades K-12
- Initial certification from Council on Education of the Deaf Note: To be eligible for initial certification, you are required to take and pass the New York State Teacher Certification Examinations (NYSTCE). There are four tests: Educating All Students (EAS)Content Specialty Test (CST), Deaf and Hard of HearingContent Specialty Test (CST), in the academic subject area for which you wish to become certified to teach. edTPA (Teacher Performance Assessment)

Is the RIT/NTID's MS in secondary education right for you?
How do you know if the MS degree in secondary education is the right program for you? Use the follow questions to assess your interest in the education field and in teaching students who are deaf and hard of hearing:

- Do you want to teach deaf and hard-of-hearing students?
- Do you want to teach math, science, social studies or English and respond to the need for more high school teachers?
- Do you want to teach in a variety of K-12 mainstream and residential/center school settings?
- Are you fascinated by the cognitive, cultural and language characteristics of deaf and hard-of-hearing students?
- Are you looking for personal attention and advisement from faculty and staff who are leaders in the field?
- Would you like to learn, live and work on a campus designed for collaboration between deaf and hearing students?
- Do you want training in evidence-based instructional approaches?

Why choose RIT/NTID's MS in secondary education
With the pressing need for more secondary education teachers, especially in science and mathematics, the strong foundation RIT provides in these areas creates an exceptional environment for deaf, hard-of-hearing, and hearing students to pursue a teaching degree. The program offers the following advantages:

- Personal attention from program faculty members.
- Dual certification in a secondary school content area in grades 7-12 for students who are hearing or deaf as well as in deaf education for grades K-12.
- Strong faculty with expertise in pedagogy, language development, teaching and curriculum, speech development, research, educational technology, youth and adolescent development, student advisement and placement, and educational issues.
- Variety of student-teaching placement options.
- Access to a wide array of research materials.
- Extensive library resources on education of students who are deaf or hard of hearing, Deaf culture, sign language, and curriculum materials.
- Thorough and thoughtful personal advising.
- Close proximity to schools for deaf students and mainstream programs.
- A vibrant Deaf community in Rochester, N.Y.
- Numerous seminars and workshops focused on contemporary educational and cultural topics.
- Immersion in American sign language.
- Collaborative projects with faculty, staff members and students.

The RIT 4+2 Teacher Education Program
Be part of an exciting new program that creates a bridge between a four-year RIT bachelor's degree and RIT's two-year master of science degree program in secondary education. The RIT 4+2 Teacher Education Program is an exceptional value and an outstanding choice designed to give you the skills you need for a successful teaching career. In the 4+2 program you will:

- Receive dual certification in education of students who are deaf or hard-of-hearing as well as in an academic subject such as science or math.
- Enjoy small class sizes and one-to-one discussions with faculty who are international leaders in research and the art of teaching.
- Have the opportunity to gain valuable real-world teaching experience before you graduate.
- Enjoy a top-quality education at a substantially reduced tuition rate.

How the program works

- You must be accepted to an RIT bachelor's degree program in one of the following areas: Any major in the College of ScienceAny major in the College of Engineering that requires 30 credits in math or scienceAny major in the College of Liberal Arts that requires 30 credits in English or history/social studiesAn applied arts and sciences program requiring 30 credits in either math, science, or English, history/social studies
- Once you are enrolled in one of the bachelor's degree programs for at least two years, you can complete the application for graduate study to the MS degree in secondary education (during your 4th year of study). You must interview with the department chairperson prior to your admission to qualify for the program.
- Upon completion of your bachelor's degree program, you must have: A cumulative GPA of 3.25 or higher, Graduate Record Exam (GRE) is not needed.A cumulative GPA of 2.8-3.24, GRE scores must be submitted (combined score of at least 280 and analytic writing score of 3.0 or better).Completed 30 credits and earned a 3.0 GPA in your academic subject area (ex. math, science, history/social studies, or English)Successfully taken and passed at least ASL I and ASL II through RIT's College of Liberal Arts, or earned credit by exam.

For more information on the RIT 4+2 Teacher Education Program, contact the NTID Office of Admissions.

Curriculum

Secondary Education of Students who are Deaf or Hard of Hearing, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MSSE-700	History of Deaf Educational Thought and Practice	3
MSSE-701	Psychology and Human Development	3
MSSE-703	Special Education in the Social Context	3
MSSE-704	Teaching Deaf and Hard of Hearing Learners with Special Educational Needs	3
MSSE-710	General Instructional Methods	3
MSSE-712	Practicum	2
MSSE-713	Assessment Principles and Practices	3
MSSE-725	Structures of American Sign Language and English	3
MSSE-726	Language Acquisition and Learning	3
MSSE-727	American Sign Language in Instructional Delivery	3
MSSE-785	Foundations of Educational Research	3
Second Year		
MSSE-702	Educational and Cultural Diversity	3
MSSE-714	Curriculum Content and Methods of Instruction	3
MSSE-715	Issues in Mainstreamed Education	3
MSSE-722	Educational Audiology and Spoken Language Development	3
MSSE-728	Literacy and the Deaf Adolescent	3
MSSE-760	Student Teaching I	6
MSSE-761	Student Teaching II	6
MSSE-790	Professional Portfolio	3
MSSE-794	Inquiry in Teaching (optional elective)	(3)
Total Semester Credit Hours		**62**

Admission requirements

To be considered for admission to the MS program in secondary education of students who are deaf or hard of hearing, candidates must fulfill the following requirements:

- Complete a graduate application.
- Submit a professional resume.
- Hold a baccalaureate degree from an accredited college or university.
- Submit official copy of transcript(s) (in English) of all previously completed undergraduate and graduate course work.
- Have a cumulative GPA of 3.25 or higher, Graduate Record Exam (GRE) is not needed.

- Have a cumulative GPA of 2.8-3.24, GRE scores must be submitted (combined score of at least 280 and analytic writing score of 3.0 or better).
- Have a level of writing proficiency appropriate to graduate study as indicated by a review of undergraduate writing-intensive courses and an expository essay.
- Submit an expository essay that indicates evidence of professional commitment and potential for success in the program.
- Participate in an individual interview.
- Submit minimum of two letters of recommendation–one professional and one academic.
- Complete the Content Area/Certification Questionnaire
- Complete a Sign Language Self-Assessment. Applicants must demonstrate at least basic skills in sign language as measured by a departmental skill assessment or be willing to take the ASL I course (or its equivalent) at RIT/NTID or another college prior to the beginning of the program.
- Deaf and hard-of-hearing applicants must also submit an audiogram.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 550 (paper-based) or 213 (internet-based) are required.

Additionally, 30 semester credit hours in a content area are required by the New York State Education Department for initial certification to teach a secondary content area (grades 7-12). Students who do not have the required number of hours must complete the additional credits before applying for New York State certification. Secondary academic subjects include American Sign Language, English, mathematics, social studies, or science. Please note: The social studies content area includes economics and government, and requires at least 21 semester hours in the history and geography of the United States and the world.

Financial aid

NTID graduate tuition rates are less than one-half of RIT's tuition for U.S. citizens. Students who are interested in applying for financial assistance need to complete the Free Application for Federal Student Aid (FAFSA). International applicants should contact the NTID Admissions Office for additional information. Questions related to program, including scholarship opportunities, should be directed to the NTID Office of Admissions.

Faculty

Dean's Office

Gerard J. Buckley, BS, Rochester Institute of Technology; MSW, University of Missouri; Ed.D., University of Kansas—President, NTID and Vice President and Dean, RIT; Associate Professor

Health Care Interpretation

Kathleen Miraglia, BS, State University College at Brockport; MS, Rochester Institute of Technology—Coordinator Health Care Programs; Director, Senior Lecturer

Jodie M. Ackerman, BS, Rochester Institute of Technology; MS, Gallaudet University—Lecturer

Robyn K. Dean, BA, Maryville College; MA, Colgate Rochester Crozer Divinity School; Ph.D., Heriot-Watt University (United Kingdom)— Assistant Professor, Health Care Interpretation

Daniel V. Maffia, BS, Rochester Institute of Technology; MA, Western Oregon University—Senior Lecturer, Theories of Translation and Interpretation

Secondary Education of Students Who are Deaf and Hard of Hearing

Gerald C. Bateman, BS, MS, State University College at Geneseo; Ed.D., University of Rochester—Professor; Director, Curriculum and Teaching

Melinda J. Hopper, BS, MS, Illinois State University; Ph.D., University of Rochester—Senior Lecturer, Special Education

Baldev Kaur Khalsa, BA, M.Ed., McDaniel College—Associate Professor, Education of Deaf Students

Christopher A. N. Kurz, BS, Rochester Institute of Technology; MS, Ph.D., University of Kansas—Professor, Special Education: Education of Deaf Students

Ila Parasnis, BA, MA, Nagpur University (India); MA, Ph.D., University of Rochester—Professor, Psychology

Amanda L. Picioli, BS, State University College at Geneseo; MED, Smith College; MS, Syracuse University; AuD., University of Florida—Audiologist, Audiology

Thomastine Sarchet, BS, MS, Rochester Institute of Technology—Research Associate Professor, Assessment

Sara Schley, BA, Reed College; MA, Northeastern University; Ed.D., Harvard University—Professor, Human Development and Language Acquisition

Michael Skyer, BFA, MS, Rochester Institute of Technology—Senior Lecturer, English

Jessica W. Trussell, BS, University of Georgia; M.Ed., Ph.D., Georgia State University—Assistant Professor, Deaf Education

College of Science

Sophia Maggelakis, Dean
rit.edu/science

Programs of Study

Online learning option available.

The College of Science offers a unique complement of graduate programs featuring curricula designed with sufficient flexibility to prepare students for direct entry into a variety of careers or further study toward a more advanced graduate degree in a chosen discipline. The college also houses four doctorate programs featuring internationally-recognized, cutting-edge research activities. Whether the focus is on the foundations of matter, the origins of the universe, the modeling of mathematics, the role of chemists in our daily lives, the encoding of life within DNA, the specialized properties of advanced materials, our impact on the environment, or the science and technology of advanced imaging systems, the college's graduate faculty provide a valuable and integrated understanding of today's most important fundamental problems, applied research issues, and industrial applications.

Admission requirements

Each college makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarship

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

School of Chemistry and Materials Science

rit.edu/science/scms
Paul Craig, School Head
(585) 475-6145, paul.craig@rit.edu

Chemistry, MS

www.rit.edu/study/chemistry-ms
Michael Coleman, Associate Professor
585-475-5108, mgcsch@rit.edu

Program overview

With a masters degree in chemistry, you'll be able to solve scientific problems with agility and accuracy. Conduct research specific to your field of interest as you develop skills that translate to infinite career opportunities. With an emphasis on leadership, many graduates excel in leadership positions in dynamic fields such as sustainability, public policy, lobbying, sales, government, imaging science, space exploration, medicine, and much more.

The MS degree in chemistry is offered on a full- or part-time basis. The program is designed to fill the needs of the traditional student or the practicing chemist who is employed full time and wishes to pursue a graduate degree on a part-time basis.

The School of Chemistry and Materials Science has research- and teaching-oriented faculty, as well as excellent equipment and facilities that enable full-time graduate students to carry on a program of independent study and develop the ability to attack scientific problems at the fundamental level. The research can result in either a thesis or a project report.

Through course work and research activities, the program strives to increase the breadth and depth of the student's background in chemistry. Students develop the ability to attack scientific problems with minimal supervision.

Plan of study

The program offers two options: a thesis or a project. Concentrations are available in organic chemistry, analytical chemistry, inorganic chemistry, physical chemistry, polymer chemistry, materials science, and biochemistry. Customized concentrations are available to accommodate specific student interests and needs relating to graduate study in chemistry.

Each student, together with an advisor, chooses courses to create a customized curriculum that best meets their interests, needs, and career aspirations. Each student's curriculum is subject to the approval of the director of the graduate program.

A deliberate effort is made to strengthen any areas of weakness indicated by the student's undergraduate records and the placement examinations. The MS degree consists of the following requirements:

1. A minimum of 30 semester credit hours beyond the bachelor's degree.
Courses in chemistry consist of core and focus area courses. Core courses are designed to increase a student's breadth of chemical knowledge, while focus area courses increase depth. Core courses include four semester credit hours in Graduate Chemistry Seminar (CHEM-771, 772, 773, 774) and one credit hour in Chemistry Writing (CHEM-670). Focus area courses are chosen to address the student's career goals and any undergraduate deficiencies in chemistry. Focus area courses must be at the graduate level and are chosen in consultation between the student and graduate advisor. Focus area courses outside of chemistry are acceptable provided they are approved by the student's graduate advisor.

2. Research
Ten semester credit hours of research are required with the thesis option. For students who opt for the project option, four semester hours of project research are required.

3. Capstone
Students enrolled in the thesis option are expected to complete an independent research thesis and pass an oral defense. Typically, all requirements are met within two years. Students enrolled in the project option have numerous ways of satisfying the capstone requirement for their project. These include but are not limited to conference presentations, papers, journal articles, patents, and seminars.

Cooperative education

Students at the master's level who have, or are able to obtain, industrial employment may be able to earn cooperative education credit for their work experiences. Semesters of co-op can be interspersed with semesters of full-time academic work. Research credits may be obtained through external research credit. If industrial employment does not permit research, then research credits may be obtained within the School of Chemistry and Materials Science.

Curriculum

Chemistry (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CHEM-670	Graduate Chemistry Writing	1
CHEM-771	Graduate Chemistry Seminar I	1
CHEM-772	Graduate Chemistry Seminar II	1
CHEM-790	Research & Thesis	5
	Graduate Chemistry Focus Courses	12
Second Year		
CHEM-773	Graduate Chemistry Seminar III	1
CHEM-774	Graduate Chemistry Seminar IV	1
CHEM-790	Research & Thesis	5
	Graduate Chemistry Focus Course	3
Total Semester Credit Hours		**30**

Chemistry (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CHEM-771	Graduate Chemistry Seminar I	1
CHEM-772	Graduate Chemistry Seminar II	1
CHEM-670	Graduate Chemistry Writing	1
	Graduate Chemistry Focus Courses	12
Second Year		
CHEM-773	Graduate Chemistry Seminar III	1
CHEM-774	Graduate Chemistry Seminar IV	1
CHEM-780	Chemistry Project	1-4
	Graduate Chemistry Focus Courses	9-12
Total Semester Credit Hours		**30**

Chemistry Focus Courses

COURSE		SEMESTER CREDIT HOURS
CHMA-621	Advanced Instrumental Analysis Lab	3
CHMA-650	Separations and Mass Spectroscopy in Biological Chemistry	3
CHMA-670	Advanced Concepts of Environmental Chemistry	3
CHMA-711	Advanced Instrumental Analysis	3
CHMA-725	The Magnetic Resonance Family	3
CHMA-740	Practical NMR	3
CHMA-750	NMR Spectrometer Maintenance	3
CHMB-610	Advanced Protein Biochemistry: Structure and Function	3
CHMB-702	Protein Conformation and Dynamics	3
CHMB-704	Advanced Nucleic Acids Biochemistry; Structure and Function	3
CHMI-664	Modern Inorganic Chemistry	3
CHMO-636	Spectrometric Identification of Organic Compounds	3
CHMO-637	Advanced Organic Chemistry	3
CHMO-640	Mechanisms of Drug Interactions	3
CHMO-710	Literature Explorations of Organic Synthesis	1
CHMO-739	Advanced Physical Organic Chemistry	3
CHMP-747	Principles of Magnetic Resonance	3
CHMP-751	Colloid & Interface Science	3
CHMP-752	Molecular Photophysics and Photochemistry	3
CHMP-753	Computational Chemistry	3
CHPO-706	Comprehensive Polymer Chemistry	3
CHPO-707	Polymer Chemistry II	3
CHPO-708	Polymer Synthesis & Characterization Lab	3
IMGS-730	Magnetic Resonance Imaging	3

Admission requirements

To be considered for admission to the MS program in chemistry, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in chemistry. Applicants with an undergraduate degree in another scientific discipline and the equivalent of a full year of work in analytical chemistry, organic chemistry, physical chemistry, physics, and calculus will also be considered for admission.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit scores from the GRE. (Applicants are encouraged to submit scores from the chemistry GRE.)
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions. Foreign students with English language deficiencies may be required to take the Michigan Test of English Language Proficiency, given by the RIT English Language Center. If a student's score is below standard, additional course work may be recommended. Successful completion of this work is a requirement of the program. This may mean that the student will need additional time and financial resources to complete the degree program.
- As a supplement to the normal application process, it is strongly recommended that students visit RIT.

Additional information

Assistantships

All candidates for teaching assistantships must participate in a personal interview with the department head and/or the director of the chemistry MS program. International students can complete the interview by phone or internet.

Nonmatriculated students
An applicant with a bachelor's degree from an approved undergraduate institution and the background necessary for specific courses is permitted to take graduate courses as a nonmatriculated student. If the student is subsequently admitted to the graduate program, courses taken for credit usually can be applied toward the master's degree. A maximum of 6 semester credit hours (from courses taken at RIT as a nonmatriculated student) may be transferred to the degree program.

Any applicant who wishes to register for a graduate course as a nonmatriculated student must obtain permission from the chair of the graduate program and the course instructor.

Part-time study
Courses are offered in the late afternoons and evenings to encourage practicing chemists to pursue the MS degree without interrupting their employment. Part-time students may take the project option, which includes a capstone project in place of a thesis. Students employed full time normally take one course each semester. At this pace, course work can be completed within four to five years.

Equipment and resources
The School of Chemistry and Materials Science has modern instrumentation in the areas of spectroscopy (NMR, IR, UV-vis, fluorescence, atomic absorption, fluorimetry), chromatography (gas chromatography, high-performance liquid chromatography, capillary electrophoresis, etc.), mass spectrometry (high-performance lc- and gc-mass spectrometry and electrospray mass spectrometry), and materials characterization (rheometry, thermal gravimetric analysis, differential scanning calorimetry, hot-stage microscopy and contact angle goniometry). Visit the school's website for a complete list of equipment and instrumentation.

External research credit
For students currently employed as chemists, the chemistry MS program provides the opportunity to utilize research conducted at their place of employment as project research credit. A maximum of 4 semester credits of research are required. Please consult with the director of the chemistry MS program for more information and approval.

Materials Science and Engineering, MS

www.rit.edu/study/materials-science-and-engineering-ms
Michael Pierce, Associate Professor
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Program overview

The material science masters explore a fascinating area of study that contributes solutions to challenges facing fields as diverse as energy, medicine, clothing, and sporting equipment. The program is designed to satisfy individual and industry needs in the rapidly growing field of materials. The materials science degree offers a serious interdisciplinary learning experience in materials studies, crossing over the traditional boundaries of such classical disciplines like chemistry, physics, and engineering.

The M S degree in materials science and engineering offered jointly by the College of Science and the Kate Gleason College of Engineering, is designed with a variety of options to satisfy individual and industry needs in the rapidly growing field of materials.

The objectives of the program are threefold:

- With the advent of new classes of materials and instruments, the traditional practice of empiricism in the search for and selection of materials is rapidly becoming obsolete. Therefore, the program offers a serious interdisciplinary learning experience in materials studies, crossing over the traditional boundaries of such classical disciplines like chemistry, physics, and electrical, mechanical, and microelectronic engineering.
- The program provides extensive experimental courses in diverse areas of materials-related studies.
- The program explores avenues for introducing greater harmony between industrial expansion and academic training.

Plan of study

A minimum of 30 credit hours is required to complete the program. This includes three required core courses, graduate electives, and either a thesis or project. The core courses are specially designed to establish a common base of materials-oriented knowledge for students with baccalaureate degrees in chemistry, chemical engineering, electrical engineering, mechanical engineering, physics, and related disciplines, providing a new intellectual identity to those involved in the study of materials.

The program has an emphasis on experimental techniques, with one required experimental course as part of the core. Additional experimental courses are available for students who wish to pursue course work in this area. These courses are organized into appropriate units covering many aspects of the analysis of materials. This aspect of the program enhances a student's confidence when dealing with materials-related problems.

Electives
Elective courses may be selected from advanced courses offered by the School of Chemistry and Materials Science or, upon approval, from courses offered by other RIT graduate programs. Elective courses are scheduled on a periodic basis. Transfer credit may be awarded based on academic background beyond the bachelor's degree or by examination, based on experience.

Thesis/Project
Students may choose to complete a thesis or a project as the conclusion to their program. Students who pursue the thesis option take four graduate electives, complete nine credit hours of research, and produce a thesis paper. The project option includes six graduate electives and a 3 credit hour project.

Curriculum

Materials Science and Engineering (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MTSE-601	Materials Science	3
MTSE-704	Theoretical Methods in Materials Science and Engineering	3
MTSE-705	Experimental Techniques	3
MTSE-790	Research & Thesis	6
	Graduate Electives	12
Second Year		
MTSE-790	Research & Thesis	3
Total Semester Credit Hours		**30**

Materials Science and Engineering (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MTSE-601	Materials Science	3
MTSE-704	Theoretical Methods in Materials Science and Engineering	3
MTSE-705	Experimental Techniques	3
MTSE-777	Graduate Project	2
	Graduate Electives	12
Second Year		
MTSE-777	Graduate Project	1
	Graduate Electives	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in materials science and engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in chemistry, physics, chemical engineering, electrical engineering, mechanical engineering, or a related field.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 90 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Candidates not meeting the general requirements may petition for admission to the program. In such cases, it may be suggested that the necessary background courses be taken at the undergraduate level. However, undergraduate credits that make up deficiencies may not be counted toward the master's degree.

Any student who wishes to study at the graduate level must first be admitted to the program. However, an applicant may be permitted to take graduate courses as a nonmatriculated student if they meet the general requirements mentioned above.

Additional information

Part-time study

The program offers courses in the late afternoon and evenings to encourage practicing scientists and engineers to pursue the degree program without interrupting their employment. (This may not apply to courses offered off campus at selected industrial sites.) Students employed full time are normally limited to a maximum of two courses, or 6 credit hours, each semester. A student who wishes to register for more than 6 credit hours must obtain the permission of his or her adviser.

Maximum limit on time

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Materials Science and Engineering, Adv. Cert.

www.rit.edu/study/materials-science-and-engineering-adv-cert
Michael Pierce, Associate Professor
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Program overview

The advanced certificate in materials science and engineering is specially designed to establish a common base of materials-oriented knowledge for students with baccalaureate degrees in chemistry, chemical engineering, electrical engineering, mechanical engineering, physics, and related disciplines. The program provides a new intellectual identity to those interested in the study of advanced materials and offers a serious interdisciplinary learning experience in materials studies, crossing over the traditional boundaries of such classical disciplines as chemistry, physics, and electrical, mechanical, and microelectronic engineering.

Curriculum

Materials Science and Engineering, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MTSE-601	Materials Science	3
MTSE-617	Material Degradation	3
MTSE-632	Solid State Science	3
MTSE-702	Polymer Science	3
MTSE-704	Theoretical Methods in Materials Science and Engineering	3
	Elective	3
Total Semester Credit Hours		**18**

Admission requirements

To be considered for admission to the advanced certificate in materials science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in chemistry, physics, chemical engineering, electrical engineering, mechanical engineering, or a related field.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Candidates not meeting the general requirements may petition for admission to the program. In such cases, it may be suggested that the necessary background courses be taken at the undergraduate level. However, undergraduate credits that make up deficiencies may not be counted toward the advanced certificate.

Any student who wishes to study at the graduate level must first be admitted to the program. However, an applicant may be permitted to take graduate courses as a nonmatriculated student if they meet the general requirements mentioned above.

Additional information

Part-time study

Students employed full time are normally limited to a maximum of two courses, or 6 credit hours, each semester.

Color Science, MS

www.rit.edu/study/color-science-ms
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Program overview

Color science is a fundamental field of science that is dedicated to understanding the creation of colored stimuli, sources of illumination, and ultimately the human perception of color. RIT's graduate color science degree is designed for students who have a background in physics, chemistry, imaging science, computer science, electrical engineering, experimental psychology, cognitive neuroscience, physiology, or any other discipline that lends itself to the quantitative description of color. At the only university in the nation offering this program of study, you will be exposed to the rich, dynamic field of color science through theory and practical application.

Broadly interdisciplinary, encompassing physics, chemistry, physiology, statistics, computer science, and psychology, the curriculum leads to a master of science degree in color science, educates students using a broad interdisciplinary approach. This is the only graduate program in the country devoted to this discipline and it is designed for students whose undergraduate majors are in physics, chemistry, imaging science, computer science, electrical engineering, experimental psychology, cognitive neuroscience, physiology, or any discipline pertaining to the quantitative description of color.

Graduates are in high demand and have accepted industrial positions in electronic imaging, color instrumentation, colorant formulation, and basic and applied research. Companies that have hired graduates include Apple Inc., Dolby Laboratories, Google, Benjamin Moore, Canon Corp., Hallmark, Hewlett Packard Corp., Microsoft Corp., Pantone, Qualcomm Inc., Ricoh Innovations Inc., LG Electronics, and Samsung.

The color science degree provides a graduate-level study in both scientific theory and practical application. The program gives students a broad exposure to the field of color science and affords them the unique opportunity of specializing in an area appropriate for their background and interest. This objective is accomplished through the program's core courses, selection of electives, and completion of a thesis or graduate project.

The program revolves around the activities of the Munsell Color Science Laboratory, which is the pre-eminent academic laboratory in the country devoted to color science. Research is currently underway in color appearance modeling, lighting, image-quality, spectral-based image capture, archiving, reproduction of artwork, color management, computer graphics, AR/VR, and material appearance. The Munsell Laboratory has many contacts that provide students with summer and full-time job opportunities across the United States and abroad.

Plan of study

Students must earn 30 semester credit hours as a graduate student to earn a master of science degree. For full-time students, the program requires three to four semesters of study. Part-time students generally require two to four years of study. The curriculum is a combination of required courses in color science, elective courses appropriate for the

candidate's background, and either a research thesis or graduate project. Students require the approval of the program director if they wish to complete a graduate project, rather than a research thesis, at the conclusion of their degree.

Prerequisites: The foundation program

The color science program is designed for a candidate with an undergraduate degree in a scientific or another technical discipline. Candidates with adequate undergraduate work in related sciences start the program as matriculated graduate students.

Candidates without adequate undergraduate work in related sciences must take foundation courses prior to matriculation into the graduate program. A written agreement between the candidate and the program coordinator will identify the required foundation courses.

Foundation courses must be completed with an overall B average before a student can matriculate into the graduate program. A maximum of 9 graduate-level credit hours may be taken prior to matriculation into the graduate program.

The foundation courses, representative of those often required, are as follows: one year of calculus, one year of college physics (with laboratory), one course in computer programming, one course in matrix algebra, one course in statistics, and one course in introductory psychology. Other science courses (with laboratory) might be substituted for physics.

Course of study

The curriculum, leading to the master of science degree in color science, educates students using a broad interdisciplinary approach. This is the only graduate program in the country devoted to this discipline and it is designed for students whose undergraduate majors are in physics, chemistry, imaging science, computer science, electrical engineering, experimental psychology, cognitive neuroscience, physiology, or any discipline pertaining to the quantitative description of color.

Students must earn 30 semester credit hours as a graduate student to earn a master of science degree. For full-time students, the program requires three to four semesters of study. Part-time students generally require two to four years of study. The curriculum is a combination of required courses in color science, elective courses appropriate for the candidate's background, and either a research thesis or graduate project. Students must indicate to the program director if they will complete a research thesis or graduate project at the conclusion of their degree.

Careers

Graduates are in high demand and have accepted industrial positions in electronic imaging, color instrumentation, colorant formulation, and basic and applied research.

Curriculum

Color Science, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CLRS-601	Principles of Color Science	3
CLRS-602	Color Physics and Applications	3
CLRS-720	Computational Vision Science	3
CLRS-750	Historical Research Perspectives	1
CLRS-751	Research and Publication Methods	2
CLRS-820	Modeling Visual Perception	3
	Electives	6
Second Year		
CLRS-890	Research & Thesis	6
	Elective	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in color science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a one-page personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions
- Participate in an on-campus interview (when possible).

Additional information

Scholarships and assistantships

Currently, assistantships are only available for qualified color science applicants to the doctoral program. Students seeking RIT-funded scholarships and assistantships should consider apply to the doctoral program, which is identical to the MS program in the first two years. Partial tuition scholarships are available for the MS program. Applicants seeking financial assistance from RIT should contact the Office of Graduate and Part-time Enrollment for current application materials and deadlines.

Color Science, Ph.D.

www.rit.edu/study/color-science-phd
Mark Fairchild, Professor
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Program overview

Color has been an intense topic of interest for thousands of years. Mathematicians, philosophers, physicists, physiologists, poets, and other disciplines have all contributed to our understanding of color. RIT's color science Ph.D. program allows you to contribute to knowledge creation and practical application of color science. You will conduct extensive research that encompasses diverse fields and multiple disciplines of science. The program is designed for students whose undergraduate degrees are in physics, biology, chemistry, mathematics, computer science, engineering, neuroscience, experimental psychology, imaging, or any applied discipline pertaining to the quantitative description of color.

As a generalization, color science can be defined as the quantification of our perception of color. Its mastery requires a multidisciplinary educational approach encompassing physics, chemistry, physiology, statistics, computer science, neuroscience, and psychology. Color science is used in the design and control of most man-made colored materials including textiles, coatings, and polymers and to specify such diverse materials as soil and wine. It is used extensively in color reproduction including digital photography, desktop and projection display, and printing. Color science is ubiquitous.

Color science research at RIT encompasses such diverse fields as medical data visualization, computer graphics and animation, art conservation, spectral and spatial measurements of materials, color printing, digital photography, motion picture and television, and modeling of our perceptions for use in defining color quality. RIT has a long history of research and scholarship in color science dating back half a century.

The program is designed for students whose undergraduate degrees are in physics, biology, chemistry, mathematics, computer science, engineering, neuroscience, experimental psychology, imaging, or any applied discipline pertaining to the quantitative description of color, for example, textiles, graphic arts, animation, material science, and polymer science. All students must earn 60 credit hours as a graduate student. For full-time students, entering with a baccalaureate degree, the program requires about four years of study at the graduate level. The curriculum is a combination of required courses in color science, elective courses appropriate for the candidate's background and interests, a research project during the second year of study, and a research dissertation. Students must pass a qualifying examination during their second year of study and a candidacy examination at least one year prior to completing their dissertation. Candidates who wish to enter the program, but lack adequate preparation, might be required to complete undergraduate foundation courses in mathematics, statistics, computer science, and general science before matriculating with graduate status.

Plan of study

Core courses
The following core courses are completed during the first year of study: Principles of Color Science (CLRS-601), Computational Vision Science (CLRS-720), Color Physics and Applications (CLRS-602), Modeling Visual Perception (CLRS-820), Historical Research Perspectives (CLRS-750), and Research and Publication Methods (CLRS-751).

Electives
Elective courses are selected depending on the student's interests and background. The program director must approve all electives.

Second year project
During the second year, students engage in graduate-level research under the supervision of a graduate program faculty member. The topic may or may not be the same as the dissertation topic. One of the purposes of this project is to evaluate the student's research capabilities and suitability for doctorate-level research.

Years three and beyond
After completing the required courses, students follow their study plan which consists of research and thesis credits and elective courses.

Qualifying examination
All students must pass a qualifying examination, which determines whether the student has a sufficient depth of knowledge in color science and the ability to perform research at the doctoral level.

The qualifying exam consists of a written test and an evaluation of the second-year research project. The written test is given twice each year and is based on the core curriculum in color science and any material deemed appropriate by the committee. Note that the required readings for these courses include textbooks and current literature. An evaluation of the second-year research project includes depth of research, productivity, quality, analytical skills, and the ability to communicate results. A written document is submitted in the style of a published proceedings paper.

Students must successfully pass the qualifying examination to continue in the program. Those who do not pass the qualifying examination may make a written request to the color science program director to change to the MS program. Requests must be received before the end of the semester in which the second written test is taken. Students with permission to enter the MS program will use their second year research project as an MS research thesis topic. A written thesis is required. Students can then graduate with an MS in color science.

Dissertation research advisor and committee
After students pass the qualifying examination, a dissertation research adviser is selected from the graduate program faculty based on the student's research interests, faculty research interests, and discussions with the color science graduate coordinator. A four-member dissertation committee is appointed for the duration of the student's tenure in the program. The committee includes the dissertation research advisor, one other member of the color science faculty, and an external chair appointed by the dean of graduate education. The external chair must be a tenured member of the RIT faculty who is not a current member of the color science faculty. The fourth member may be an RIT faculty member or a professional affiliated with industry or another institution. The color science graduate program director must approve committee members who are not RIT faculty.

The dissertation committee prepares and administers the examination for admission to candidacy; assists in planning and coordinating research; provides research advice; supervises the writing of the dissertation; and conducts the final examination of the dissertation.

Developing a study plan
During the first semester of study, students work with the color science graduate program director to develop a study plan. This plan may be revised as necessary, subject to approval by the graduate program director. For example, the dissertation research adviser or the dissertation committee might recommend a revised study plan to include specific graduate electives.

Admission to candidacy
When the student thoroughly understands the dissertation research topic, the dissertation committee administers an examination to determine if the student can be admitted to candidacy for the doctoral degree in color science. The purpose of the examination is to ensure the student has the necessary intellectual skills and background knowledge to carry out their specific doctoral-level research project. The dissertation research adviser defines the type of examination and any requirements prior to the examination. Requirements include a dissertation proposal and may additionally include a review of literature, preliminary experiments, and the preparation of an oral presentation. The examination must be administered no later than one year prior to defending the dissertation.

Final examination of dissertation
Once the dissertation has been written, distributed to the dissertation committee, and the committee agrees to administer the final examination, the doctoral candidate can schedule the final examination.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The dissertation committee may also elect to privately question the candidate following the presentation. The dissertation committee immediately notifies the candidate and the color science graduate program director of the result of the examination.

Teaching experience
All candidates for the Ph.D. must serve as a teaching assistant for a minimum of one course before scheduling the final examination of the dissertation. Candidates are encouraged to serve as a teaching assistant for two or more courses.

Public presentation experience
All candidates for the Ph.D. must present research in a public forum before scheduling the final examination of the dissertation. The preferred public forum is a technical conference.

Publication requirement
Prior to scheduling the Ph.D. dissertation defense (final examination), all candidates for the Ph.D. must have at least two refereed journal publications on the dissertation research accepted for publication (or published). The student must be a principal (not always first) author on both papers.

Curriculum

Color Science, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CLRS-601	Principles of Color Science	3
CLRS-720	Computational Vision Science	3
CLRS-750	Historical Research Perspectives	1
CLRS-602	Color Physics and Applications	3
CLRS-820	Modeling Visual Perception	3
CLRS-751	Research and Publication Methods	2
	Electives	6
Second Year		
CLRS-890	Research & Thesis (and/or Electives)	18
Third Year		
CLRS-890	Research & Thesis (and/or Electives)	18
Fourth Year		
CLRS-890	Research & Thesis (and/or Electives)	3
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the Ph.D. program in color science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a one-page personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources directly to RIT. Letters must be confidential.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 94 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions
- Participate in an on-campus interview (when possible).

Candidates without adequate undergraduate work in related sciences must take foundation courses prior to matriculation into the graduate program. A written agreement between the candidate and the program director will identify the required foundation courses. Foundation courses must be completed with an overall B average before a student can matriculate into the graduate program.

The foundation courses, representative of those often required, are as follows: one year of calculus, one year of college physics (with laboratory), one course in computer programming, one course in matrix algebra, one course in statistics, and one course in introductory psychology. Other science courses (with laboratory) might be substituted for physics.

Additional information

Assistantships
Students receiving fully funded assistantships tend to have minimum undergraduate cumulative grade point averages of 3.5 and exceptional GRE scores. International applicants who must submit TOEFL scores, must have scores above 100 (internet-based). Students who submit IELTS scores must have a minimum score of 7.0. Applicants seeking financial assistance should contact the Office of Graduate and Part-time Enrollment for current application materials and deadlines.

Residency
All students in the program must spend at least two consecutive semesters (summer may be excluded) as resident full-time students to be eligible to receive the Ph.D.

Time limitations
All candidates for the Ph.D. must maintain continuous enrollment during the research phase of the program. The maximum number of research credits that apply to the degree does not limit such enrollment. Normally, full-time students complete the course of study for the doctorate in approximately four years. Requirements for the degree must be completed within seven years of the date students pass the qualifying examination.

Color science MS graduates
Graduates from the MS program in color science, who are interested in the doctoral program, should contact the color science graduate program

director to discuss their suitability for doctoral-level research. Before matriculating into the program, students must pass the qualifying examination. Once the examination has been passed successfully, students can be admitted into the doctoral program. The doctoral degree can be completed on a full- or part-time basis as long as the residency requirements are met.

MS and MA graduates from related disciplines

Because of the interdisciplinary nature of color science, students with MS and MA degrees often apply to the Ph.D. program. Graduate courses in related disciplines can be used as elective courses toward the degree. Furthermore, for degrees that required a research thesis, the second year research project might be waived. Thus, it might be possible for students with graduate degrees in a related discipline to take the qualifying examination during their first year of study. The color science graduate program director determines the specific courses and credit hours that can be applied toward the Ph.D. in color science.

Chester F. Carlson Center for Imaging Science

cis.rit.edu
David W. Messinger, Director
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Imaging Science, MS

www.rit.edu/study/imaging-science-ms
Charles Bachmann, Associate Professor
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Program overview

The masters in imaging science prepares you for research positions in the imaging industry or in the application of various imaging modalities to problems in engineering and science. This emerging field integrates engineering, math, physics, computer science, and psychology to understand and develop imaging systems and technology. You'll explore the creation and interpretation of image forming systems that are used in a broad range of applications from environmental forecasting and remote sensing to the analysis of the physical properties of radiation-sensitive materials. The masters in imaging science is geared towards advancing and broadening the skills of professionals working in the imaging industry.

Program overview

Faculty within the Chester F. Carlson Center for Imaging Science supervise thesis research in areas of the physical properties of radiation-sensitive materials and processes, digital image processing, remote sensing, nanoimaging, electro-optical instrumentation, vision, computer vision, color imaging systems, and astronomical imaging. Interdisciplinary efforts are possible with other colleges across the university.

Formal course work includes consideration of the physical properties of radiation-sensitive materials and processes, the applications of physical and geometrical optics to electro-optical systems, the mathematical evaluation of image forming systems, digital image processing, and the statistical characterization of noise and system performance. Technical electives may be selected from courses offered in imaging science, color science, engineering, computer science, science, and mathematics. Both thesis and project options are available. In general, full-time students are required to pursue the thesis option, with the project option targeted to part-time and online students who can demonstrate that they have sufficient practical experience through their professional activities.

Plan of study

All students must earn 30 credit hours as a graduate student. The curriculum is a combination of required core courses in imaging science, elective courses appropriate for the candidate's background and interests, and either a research thesis or graduate paper/project. Students must enroll in either the research thesis or graduate paper/project option at the beginning of their studies. The program can be completed on a full- or a part-time basis. Some courses are available online, specifically in the areas of color science, remote sensing, computer vision, and digital image processing.

Core courses

Students are required to complete the following core courses: Fourier Methods for Imaging (IMGS-616), Image Processing and Computer Vision (IMGS-682), Optics for Imaging (IMGS-633), and either Radiometry (IMGS-619) or The Human Visual System (IMGS-620).

Specialty track courses

Students choose two courses from a variety of tracks such as: digital image processing, computer vision, electro-optical imaging systems, remote sensing, color imaging, optics, hard copy materials and processes, and nanoimaging. Tracks may be created for students interested in pursuing additional fields of study.

Research thesis option

The research thesis is based on experimental evidence obtained by the student in an appropriate field, as arranged between the student and their adviser. The minimum number of thesis credits required is four and may be fulfilled by experiments in the university's laboratories. In some cases, the requirement may be fulfilled by work done in other laboratories or the student's place of employment, under the following conditions:

1. The results must be fully publishable.
2. The student's advisor must be approved by the graduate program coordinator.
3. The thesis must be based on independent, original work, as it would be if the work were done in the university's laboratories.

A student's thesis committee is composed of a minimum of three people: the student's advisor and two additional members who hold at least a master's degree in a field relevant to the student's research. Two committee members must be graduate faculty of the center.

Graduate paper/project option

Students with demonstrated practical or research experience, approved by the graduate program coordinator, may choose the graduate project option (3 credit hours). This option takes the form of a systems project course. The graduate paper is normally performed during the final semester of study. Both part- and full-time students may choose this option, with the approval of the graduate program coordinator.

Nature of work

Faculty within the Center for Imaging Science supervise thesis research in areas of the physical properties of radiation-sensitive materials and processes, digital image processing, remote sensing, nanoimaging, electro-optical instrumentation, vision, computer vision, color imaging systems, and astronomical imaging. Interdisciplinary efforts are possible with the Kate Gleason College of Engineering and the College of Science.

The program can be completed on a full- or a part-time basis. Some courses are available online, specifically in the areas of color science, remote sensing, medical imaging, and digital image processing.

Graduation requirements

All students must earn 30 credit hours as a graduate student. The curriculum is a combination of required core courses in imaging science, elective courses appropriate for the candidate's background and interests, and either a research thesis or graduate paper/project. Students must enroll in either the research thesis or graduate paper/project option at the beginning of their studies.

Selected employers

Adobe, Amazon, Apple, Aptiva Imaging, Boeing, CACI, General Electric, Google, Harris Corp., Heidelberg, Hewlett-Packard, Hover Inc., Integrity Applications Inc., Lawrence Livermore National Laboratory, Lexmark, Lockheed Martin, Microsoft, MITRE, Motorola Mobility LLC, NASA, National Geospatial Intelligence Agency, Naval Undersea Warfare Center, NVIDIA, EagleView, LLC, Ricoh Print Production, Sandia National Labs, Science Applications International Corp., Sherwin Williams, Technicolor, The Aerospace Corporation, Valspar, Xerox.

Curriculum

Imaging Science (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
IMGS-606	Graduate Seminar I	1
IMGS-607	Graduate Seminar II	1
IMGS-616	Fourier Methods for Imaging	3
Choose one of the following:		3
IMGS-619	Radiometry	
IMGS-620	The Human Visual System	
IMGS-633	Optics for Imaging	3
IMGS-682	Image Processing and Computer Vision	3
	Specialty Track Course	3
	Elective	3
Second Year		
IMGS-790	Research & Thesis	4
	Specialty Track Course	3
Choose one of the following:		3
IMGS-790	Research & Thesis	
	Elective	
Total Semester Credit Hours		**30**

Imaging Science (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
IMGS-616	Fourier Methods for Imaging	3
IMGS-633	Optics for Imaging	3
IMGS-682	Image Processing and Computer Vision	3
Choose one of the following:		3
IMGS-619	Radiometry	
IMGS-620	The Human Visual System	
	Elective	3
	Specialty Track Course	3
Second Year		
IMGS-740	Imaging Science MS Systems Project Paper	3
	Specialty Track Course	3
	Electives	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS in imaging science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Have completed courses in mathematics (through calculus and including differential equations), and a full year of calculus-based physics (including modern physics). It is assumed that students can write a common computer program.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit scores from the GRE (requirement may be waived for those not seeking funding from the Center for Imaging Science).
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources familiar with the applicant's academic or research capabilities.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Applicants seeking financial assistance from the center must have all application documents submitted to the Office of Graduate and Part-time Enrollment Services by January 15 for the next academic year.

Bridge courses
Applicants who lack adequate preparation may be required to complete bridge courses in mathematics or physics before matriculating with graduate status.

Additional information

Maximum time limit
University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Imaging Science, Ph.D.

www.rit.edu/study/imaging-science-phd
Charles Bachmann, Associate Professor
585-475-7238, cmbpci@rit.edu

Program overview

The Ph.D. in imaging science signifies high achievement in scholarship and independent investigation in the diverse aspects of imaging science. Students contribute their fundamental body of knowledge in science and engineering that is associated with this field of study. As an imaging Ph.D. candidate, you'll acquire the capabilities, skills, and experience to continue to expand the limits of the discipline and meet future scholarly, industrial, and government demands on the field.

Candidates for the doctoral degree must demonstrate proficiency by:
- Successfully completing course work, including a core curriculum, as defined by the student's plan of study;
- Passing a series of examinations; and
- Completing an acceptable dissertation under the supervision of the student's research advisor and dissertation committee.

Plan of study
All students must complete a minimum of 60 credit hours of course work and research. The core curriculum spans and integrates a common body of knowledge essential to an understanding of imaging processes and applications. Courses are defined by the student's study plan and must include core course sequences plus a sequence in a topical area such as remote sensing, digital image processing, color imaging, digital graphics, electro-optical imaging systems, and microlithographic imaging technologies.

Students may take a limited number of credit hours in other departments and must complete research credits including two credits of research associated with the research seminar course, Graduate Seminar (IMGS-606, 607).

Graduate elective courses offered by the Chester F. Carlson Center for Imaging Science (and other RIT academic departments in fields closely allied with imaging science) allow students to concentrate their studies in a range of imaging science research and imaging application areas, including electro-optical imaging, digital image processing, color science, perception and vision, electrophotography, lithography, remote sensing, medical imaging, electronic printing, and machine vision.

Advancement to candidacy
Advancement to candidacy occurs through the following steps:
- Advisor selection
- Submission and approval of a preliminary study plan
- Passing a written qualifying exam
- Study plan revision based on the outcome of qualifying exam and advisor recommendation
- Research committee appointment
- Candidacy exam based on thesis proposal

Following the qualifying exam, faculty decide whether a student continues in the doctoral program or if the pursuit of an MS degree or other program option is more acceptable. For students who continue in the doctoral program, the student's plan of study will be revised, a research committee is appointed, candidacy/proposal exams are scheduled, and, finally, a dissertation defense is presented.

Research committee
Prior to the candidacy exam, the student, in consultation with an advisor, must present a request to the graduate program coordinator for the appointment of a research committee. The committee is composed of at least four people: an advisor, at least one faculty member who is tenured (or tenure-track) and whose primary affiliation is the Carlson Center for Imaging Science (excluding research faculty), a person competent in the field of research who is an RIT faculty member or affiliated with industry or another university and has a doctorate degree, and the external chair. The external chair must be a tenured member of the RIT faculty who is not a faculty member of the center and who is appointed by the dean of graduate education. The committee supervises the student's research, beginning with a review of the research proposal and concluding with the dissertation defense.

Research proposal
The student and their research advisor select a research topic for the dissertation. Proposed research must be original and publishable. Although the topic may deal with any aspect of imaging, research is usually concentrated in an area of current interest within the center. The research proposal is presented to the student's research committee during the candidacy exam at least six months prior to the dissertation defense.

Final examination of the dissertation
The research advisor, on behalf of the student and the student's research committee, must notify the graduate program coordinator of the scheduling of the final examination of the dissertation by forwarding to the graduate program coordinator the title and abstract of the dissertation and the scheduled date, time, and location of the examination. The final examination of the dissertation may not be scheduled within six months of the date on which the student passed the candidacy exam (at which the thesis proposal was presented and approved).

Barring exceptional circumstances (requiring permission from the graduate program coordinator), the examination may not be scheduled sooner than four weeks after formal announcement (i.e. center-wide hallway postings and email broadcast) has been made of the dissertation title and abstract and the defense date, time, and location.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The research committee may also elect to privately question the candidate following the presentation. The research committee will immediately notify the candidate and the graduate program coordinator of the examination result.

Curriculum

Imaging Science, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
IMGS-606	Graduate Seminar I	1
IMGS-607	Graduate Seminar II	1
IMGS-609	Graduate Laboratory I	2
IMGS-613	Probability, Noise, and Systems Modeling	3
IMGS-616	Fourier Methods for Imaging	3
IMGS-619	Radiometry	3
IMGS-620	The Human Visual System	3
IMGS-633	Optics for Imaging	3
IMGS-682	Image Processing and Computer Vision	3
	Specialty Track Course	3
Second Year		
IMGS-890	Research & Thesis	1
	Specialty Track Course	3
	Electives	9
Third Year		
IMGS-890	Research & Thesis	10
Fourth Year		
IMGS-890	Research & Thesis	10
Fifth Year		
IMGS-890	Research & Thesis	2
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the Ph.D. program in imaging science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering, computer science, applied mathematics, or one of the natural sciences.
- Have completed courses in calculus, university physics (one year), modern physics, and a computer language.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit scores from the GRE, if seeking financial assistance.
- Submit a personal statement of educational objectives addressing research interests.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from professional sources directly to RIT. Letters must be confidential.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Imaging science encompasses a wide variety of scientific disciplines. Exceptional candidates from other fields and with diverse backgrounds are accepted into the program.

Admission decisions are made by a committee comprised of graduate faculty of the Center for Imaging Science.

Students with an MS degree in a related field may be granted credit toward the doctoral degree after successful completion of the qualifying examination and approval of their study plan. (Students should consult their academic adviser for more information.) The required research credits may not be waived by experience or examination.

Additional information

Residency

All students in the program must spend at least two consecutive semesters (summer excluded) as resident full-time students to be eligible to receive the doctoral degree. If circumstances warrant, the residency requirement may be waived via petition to the graduate program coordinator, who will decide on the student's petition in consultation with the adviser and graduate faculty. The request must be submitted at least nine months prior to the thesis defense.

Maximum time limit

University policy requires that doctoral programs be completed within seven years of the date of the student passing the qualifying exam. Bridge courses are excluded.

All candidates must maintain continuous enrollment during the research phase of the program. Such enrollment is not limited by the maximum number of research credits that apply to the degree. Normally, full-time students complete the course of study for the doctorate in approximately three to five years. A total of seven years is allowed to complete the degree after passing the qualifying exam.

Financial aid, scholarships, and assistantships

Graduate assistantships and tuition remission scholarships are available to qualified students. Applicants seeking financial assistance from the center should contact the Office of Graduate and Part-time Enrollment for current application materials and deadlines. Students whose native language is not English are advised to obtain as high a TOEFL or IELTS score as possible if they wish to apply for a teaching or research assistantship. These candidates also are encouraged to take the Test of Spoken English in order to be considered for financial assistance.

Thomas H. Gosnell School of Life Sciences

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Bioinformatics, MS

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Feng Cui, Associate Professor
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Program overview

The bioinformatics masters combines biotechnology, computer programming, and computational mathematics to prepare you to utilize and create technologies that will discover, treat, and cure a range of medical illnesses. The MS degree in bioinformatics provides students with a strong foundation in biotechnology, computer programming, computational mathematics, statistics, and database management. Graduates are well-prepared for academia and careers in the biotechnology, bioinformatics, pharmaceutical, and vaccine industries.

In laboratory exercises and assignments, students learn to sequence DNA and use computer programs to analyze DNA sequences and predict molecular models.

Bioinformatics is a field that has been developing over the last thirty years. It is a discipline that represents a marriage between biotechnology and computer technologies and has evolved through the convergence of advances in each of these fields. Today bioinformatics is a field that encompasses all aspects of the application of computer technologies to biological data. Computers are used to organize, link, analyze and visualize complex sets of biological data.

With the advent of high-throughput technologies such as Next Generation Sequencing and proteomics, bioinformatics has become essential to the biological sciences in general. In the past, laboratories were able to manage and analyze their experimental data in spreadsheets. Many research labs now require the expertise of dedicated bioinformatics core centers or their own in-house bioinformaticists.

Graduates of our programs have entered such laboratories, both in industry and academia, as bioinformaticists. Some have also gone on to leverage their biotechnology experiences as wet lab experimentalists themselves. The diversity of skills our students cultivate has given them access to a wide range of career choices.

Based on consultation with individuals within the industry nationwide, the job market is rich with opportunities for those who obtain a graduate degree in bioinformatics, particularly when coupled with research as thesis work. This research provides exposure to real-world problems—and their solutions—not otherwise attainable in an academic setting.

The program provides you with the capability to enter the bioinformatics workforce and become leaders in the field. The curriculum is designed to fulfill the needs of students with diverse educational and professional backgrounds. Individuals entering the program typically have degrees in biology, biotechnology, chemistry, statistics, computer science, information technology, or a related field. The program accommodates this diversity by providing a comprehensive bridge program for students who need to supplement their education before entering the program. The program offers two tracks, one for students with backgrounds in the life sciences and one for those with backgrounds in the computational sciences. Regardless of the track pursued, students are prepared to become professional bioinformaticists upon graduation.

The program is offered on a full- or part-time basis to fulfill the needs of traditional students and those currently employed in the field.

Nature of work

Bioinformatics jobs come with several different areas of focus, which are less strictly hierarchical than bioscience discovery research jobs. The analyst/programmer job provides more focused computational analysis support. Analyst/programmers design and develop software, databases and interfaces used to analyze and manipulate genomic databases. They collaborate with production to develop high-throughput data processing and analysis capability and to design and implement data queries, novel algorithms, and/or visualization techniques. Analyst/programmers also maintain large-scale DNA databases, prepare data for other scientists, monitor new data from integrating sequence-based/ functional knowledge about genes to help scientists analyze and interpret gene-expression data. They also analyze DNA information and identify opportunities for innovative solutions to analyze and manage biological data. In addition, they often assist in developing software and custom scripts to automate data retrieval, manipulation, and analysis; application of statistics; and visualization tools. (Source: Vault Career Guide to Biotech; The Jobs in Lab Research)

Training/Qualifications

Within the bioinformatics field employers tend to look for the following skills/strengths: fundamental training/knowledge in molecular biology, biochemistry and biotechnology, particularly, genomics, relational database administration and programming skills/e.g. using SQL, PERL, C,C++, etc. on a UNIX operating system, strong analytical abilities using relevant mathematical/statistical tools, a strong interest in utilizing computational skills to leverage the data outcomes of those working in the laboratory, meticulous, independent, patient to do the same task repetitively and multitask. (Source: www.geocities.com/bioinformaticsweb/carrier.html)

Curriculum

Bioinformatics, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
BIOL-625	Ethics in Bioinformatics	3
BIOL-630	Bioinformatics Algorithms	3
BIOL-635	Bioinformatics Seminar	3
BIOL-671	Database Management for the Sciences	3
BIOL-694	Molecular Modeling and Proteomics	3
MATH-655	Biostatistics	3
	Graduate Electives*	6
Second Year		
BIOL-790	Research and Thesis	6
Total Semester Credit Hours		**30**

* Any graduate-level course deemed related to the field of bioinformatics by the program director.

Admission requirements

To be considered for admission to the MS program in bioinformatics, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in biology, biotechnology, biochemistry, chemistry, computer science, information technology, statistics, or a related discipline.

- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.2 (or equivalent)
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions..

Environmental Science, MS

www.rit.edu/study/environmental-science-ms
Jeffrey Lodge, Associate Professor
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Program overview

Habitat loss, global climate change, water and air pollution, ozone depletion, species invasions, loss of biodiversity, and the accumulation of toxic wastes are among the many environmental dilemmas our society faces each day. These complex problems pit environmental limits against economic development, diverse cultures, ethics, values, and social stability, and therefore require an understanding of science, policy, society, history, and economics in order to address problems realistically and effectively. Environmental scientists must use integrated and holistic approaches to understand and find sustainable solutions to these problems. Graduates of the environmental science masters are well prepared for a variety of environmentally sustainable careers including consulting, research, policy, and outreach, or further graduate work in a doctoral program.

The program's curriculum provides students with a deep understanding of the science behind our environmental problems, the complex set of circumstances that impact environmental issues, and how environmental decisions and policies must attempt to find a balance between environmental conservation, human well-being, and economic development. Students augment their hands-on classroom work with in-depth experiential learning through an individual thesis or project that provides students with the chance to work on real-world environmental problems under the guidance of skilled environmental scientists.

Plan of study

The practice of environmental science demands that students be well-rounded specialists. To accomplish this, each student is required to complete a concentration in one of the following areas: cellular and molecular biology, chemistry, ecology and field biology, economics, mathematics, organismal biology and evolution, public policy, remote sensing, and digital image processing, or statistics. Students also may develop a self-designed concentration in an area of personal interest, subject to approval from an environmental science review committee.

Cooperative education

Cooperative education is optional for environmental science majors, however, it offers students a great way to get a head start on their career with paid, professional work experience. Students can participate in cooperative education as soon as the summer after their second year of study. Co-op placements are typically with local, state, or federal government agencies, nonprofit environmental organizations, and a host of environmental consulting firms. To learn more about co-op, visit RIT's Office of Career Services and Cooperative Education.

Nature of work

Environmental scientists and geoscientists use their knowledge of the physical makeup and history of the earth to protect the environment; locate water, mineral, and energy resources; predict future geologic hazards; and offer environmental site assessments and advice on indoor air quality, hazardous waste site remediation and construction and land-use projects. Most of their time is devoted to office or field work and often includes data analysis and report/proposal writing. (Source: U.S. Bureau of Labor Statistics Occupational Outlook Handbook)

Curriculum

Environmental Science, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ENVS-601	Environmental Science Graduate Studies I	2
ENVS-602	Environmental Science Graduate Studies II	1
ENVS-795	Environmental Science Graduate Research	3
	Graduate GIS Elective	3
	Graduate Statistics Elective	3
	Graduate Public Policy/STS Elective	3
	Graduate Science Core Elective	3
	Professional Electives	6
Second Year		
Choose one of the following:		6
ENVS-780	Environmental Science Project	
ENVS-790	Environmental Science Thesis	
Total Semester Credit Hours		**30**

Electives

COURSE		SEMESTER CREDIT HOURS
Graduate Public Policy/STS Electives		
PUBL-610	Technological Innovation and Public Policy	3
PUBL-630	Energy Policy	3
PUBL-700	Readings in Public Policy	3
PUBL-701	Graduate Policy Analysis	3
PUBL-702	Graduate Decision Analysis	3
PUBL-703	Evaluation and Research Design	3
PUBL-810	Technology, Policy and Sustainability	3
STSO-621	Graduate Biodiversity and Society	3
STSO-710	Graduate Science and Technology Policy Seminar	3
STSO-750	Graduate Sustainable Communities	3
Graduate Science Core Electives		
BIOL-655	Biogeography	3
BIOL-671	Database Management for the Sciences	3
BIOL-673	Marine Biology	4
BIOL-675	Advanced Conservation Biology	3
ENVS-631	Climate Change: Science Technology & Policy	3
ENVS-670	Advanced Concepts of Environmental Chemistry	3
IMGS-632	Advanced Environmental Applications of Remote Sensing	3
ISUS-704	Industrial Ecology	3
Graduate GIS Electives		
ENVS-650	Hydrological Applications of Geographic Information Systems	4
ISTE-742	Introduction To Geographic Information Systems	3

Admission requirements

To be considered for admission to the MS program in environmental science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in environmental science, biological science, or a related discipline.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent) overall and in math/science.
- Applicants with undergraduate degrees from foreign colleges and universities are required to submit GRE scores.
- Submit a personal statement of educational objectives outlining the applicant's research/project interests, career goals, and suitability to the program.
- Submit three letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Students are strongly encouraged to contact program faculty before applying to discuss thesis topics and research projects. Students are matched with a potential thesis advisor at the time of admission.

Additional information

Facilities and equipment

The program provides a wide range of research opportunities. Many faculty members are engaged in field-based projects and the college boasts excellent laboratory facilities that support field research, including wet laboratories and computer facilities (traditional and geographic information systems). For a list of past and present projects, and faculty research interests, please visit the program website.

Monitoring, mapping, and field equipment: ArcGIS and IDRISI GIS software, ENVS and ERDAS Remote Sensing software, Garmin and Trimble GPS receivers, soil sampling and analysis equipment, water sampling devices, multisonde water quality probes and dissolved oxygen meters, SCT meter, ponar dredges, Li-Cor light meter, plankton samplers, macroinvertebrate nets/samplers, and a library of field reference texts.

Other equipment: Fluorimeter, Raman Spectrometer, UV-Vis-IR, GC-MS, ICP, atomic absorption, polarimeter, centrifuge, electrochemical equipment, gas chromatographs, HPLC, viscometer, ESR (built in-house), confocal microscope, infrared carbon dioxide analyzer, Unisense microelectrode system, Lachat autoanalyzer, incubators, capillary electrophoresis, DSCs, DMA, NMR, drying oven, Wiley mill.

School of Mathematical Sciences

math.rit.edu
Matthew Coppenbarger, Head, School of Mathematical Sciences
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Applied and Computational Mathematics, MS

www.rit.edu/study/applied-and-computational-mathematics-ms
Matthew Hoffman, Associate Professor
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Program overview

Sophisticated mathematical tools are increasingly used to solve problems in management science, engineering, biology, financial portfolio planning, facilities planning, control of dynamic systems, and design of composite materials. The goal is to find computing solutions to real-world problems. The applied and computational mathematics master's degree refines your capabilities in applying mathematical models and methods to study a range of problems, with an emphasis on developing and implementing computing solutions.

The ideas of applied mathematics pervade several applications in a variety of businesses and industries as well as the government. Sophisticated mathematical tools are increasingly used to develop new models, modify existing ones, and analyze system performance. This includes applications of mathematics to problems in management science, biology, portfolio planning, facilities planning, control of dynamic systems, and design of composite materials. The goal is to find computable solutions to real-world problems arising from these types of situations.

The masters of science degree in applied and computational mathematics provide students with the capability to apply mathematical models and methods to study various problems that arise in industry and business, with an emphasis on developing computable solutions that can be implemented. The program offers concentrations in discrete mathematics, dynamical systems, and scientific computing. Electives may be selected from the graduate course offerings in the School of Mathematical Sciences or from other graduate programs, with approval from the graduate program director. Students have the option to complete a thesis, which includes the presentation of original ideas and solutions to a specific mathematical problem. The proposal for the thesis work and the results must be presented and defended before the advisory committee.

Nature of work

Mathematicians use mathematical theory, computational techniques, algorithms, and the latest computer technology to solve economic, scientific, engineering, physics, and business problems. The work of mathematicians falls into two broad classes — theoretical (pure) mathematics and applied mathematics. These classes, however, often overlap. Applied mathematicians start with a practical problem, envision its separate elements, and then reduce the elements to mathematical variables. They often use computers to analyze relationships among the variables, and they solve complex problems by developing models with alternative solutions.

Types of mathematics

Most often the work involving applied mathematics is done by persons whose titles are other than mathematician, including engineer, economist, analyst (e.g. operations research), physicist, cryptanalyst (codes), actuary, teacher, market researcher, and financial advisor.

Many mathematicians work for federal or state agencies. The Department of Defense accounts for about 81 percent of the mathematicians employed by the federal government. In the private sector, mathematicians are employed by scientific research and development services, software publishers, insurance companies, and in aerospace or pharmaceutical manufacturing.

Cooperative education

Cooperative education enables students to alternate periods of study on campus with periods of full-time, paid professional employment. Students may pursue a co-op position after their first semester. Co-op is optional for this program.

Curriculum

Applied and Computational Mathematics (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
Choose four of the following core courses:		12
MATH-601	Methods of Applied Mathematics	
MATH-602	Numerical Analysis I	
MATH-605	Stochastic Processes	
MATH-622	Mathematical Modeling I	
MATH-645	Graph Theory	
MATH-722	Mathematical Modeling II	
MATH-606	Graduate Seminar I	1
MATH-607	Graduate Seminar II	1
	Electives	6
Second Year		
MATH-790	Research & Thesis	7
	Elective	3
Total Semester Credit Hours		**30**

Applied and Computational Mathematics (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
Choose four of the following core courses:		12
MATH-601	Methods of Applied Mathematics	
MATH-602	Numerical Analysis I	
MATH-605	Stochastic Processes	
MATH-622	Mathematical Modeling I	
MATH-645	Graph Theory	
MATH-722	Mathematical Modeling II	
MATH-606	Graduate Seminar I	1
MATH-607	Graduate Seminar II	1
	Electives	6
Second Year		
MATH-790	Research & Thesis	4
	Electives	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in applied and computational mathematics, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in mathematics or a related field.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have knowledge of a programming language.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit a personal statement of educational objectives.
- Submit two letters of recommendation from academic or professional sources.

- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Although Graduate Record Examination (GRE) scores are not required, submitting them may enhance a candidate's acceptance into the program.

A student may also be granted conditional admission and be required to complete bridge courses selected from among RIT's existing undergraduate courses, as prescribed by the student's adviser. Until these requirements are met, the candidate is considered a nonmatriculated student. The graduate program director evaluates the student's qualifications to determine eligibility for conditional and provisional admission.

Additional information

Part-time study

The program is ideal for practicing professionals who are interested in applying mathematical methods in their work and enhancing their career options. Most courses are scheduled in the late afternoon or early evening. The program may normally be completed in two years of part-time study.

Nonmatriculated students

A student with a bachelor's degree from an approved undergraduate institution, and with the background necessary for specific courses, may take graduate courses as a nonmatriculated student with the permission of the graduate program director and the course instructor. Courses taken for credit may be applied toward the master's degree if the student is formally admitted to the program at a later date. However, the number of credit hours that may be transferred into the program from courses taken at RIT is limited for nonmatriculated students.

Applied Statistics, MS

www.rit.edu/study/applied-statistics-ms
Robert Parody, Associate Professor
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Program overview

The MS in applied statistics focuses on data mining, design of experiments, health care applications, and the application of statistics to imaging and industrial environments. You'll integrate knowledge learn through engaging courses to solve more complex problems for a wide range of organizations, including industrial, marketing, education, insurance, credit, government, and health care.

The MS program in applied statistics is available to both full- and part-time students with courses available both on-campus and online. Cooperative education is optional. The program is intended for students who do not wish to pursue a degree beyond the MS. However, a number of students have attained doctorate degrees at other universities.

Plan of study

The program requires 30 credit hours and includes four core courses, electives, and a capstone project or thesis.

Core courses

Students are required to complete four core courses: Statistical Software (STAT-611), Foundations of Statistics (STAT-631), Applied Linear Models–Regression (STAT-641), and Applied Linear Models–ANOVA (STAT-642). Students, in conjunction with their advisors' recommendations, should take the core courses early in the program.

Electives

Elective courses are chosen by the student with the help of their advisor. These courses are usually department courses but may include (or transferred from other universities) up to 6 credit hours from other departments that are consistent with students' professional objectives.

Capstone Thesis/Project

The capstone project is designed to ensure that students can integrate the knowledge from their courses to solve more complex problems. This project is taken near the end of a student's course of study. Students, with advisor approval, may write a thesis as their capstone. A thesis may be 3 or 6 credit hours. If a student writes a 6 credit hour thesis, they would be required to complete four elective courses instead of five.

Areas of concentration

- Clinical Trails
- Data Mining/Machine Learning
- Industrial Statistics
- Informatics

Curriculum

Applied Statistics, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
STAT-611	Statistical Software	3
STAT-631	Foundations of Statistics	3
STAT-641	Applied Linear Models - Regression	3
STAT-642	Applied Linear Models - ANOVA	3
	Electives	6
Second Year		
	Electives	9
STAT-790	Capstone Thesis/Project	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in applied statistics, candidates should fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Have satisfactory background in mathematics (one year of differential equations and integral calculus) and statistics (two courses in probability and statistics).
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have knowledge of a programming language.
- Have a minimum cumulative GPA of 3.0 (or equivalent) (recommended but not required).
- GRE scores are not required. However, in cases where there may be some question regarding the capability of the applicant to complete the program. Applicants may be asked to submit scores to strengthen their application.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

Grades

Students must attain an overall program grade-point average of 3.0 (B) for graduation.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Applied Statistics, Adv. Cert.

www.rit.edu/study/applied-statistics-adv-cert
Robert Parody, Associate Professor
585-475-5288, rjpeqa@rit.edu

Program overview

The advanced certificate in applied statistics is designed for engineers, scientists, analysts, and other professionals who want a solid education in the statistical methods that are most closely related to their work. Courses are available both on-campus and online to accommodate diverse schedules.

The program requires 12 credit hours and includes two core courses and two elective courses.

Curriculum

Applied Statistics, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
STAT-641	Applied Linear Models - Regression	3
STAT-642	Applied Linear Models - ANOVA	3
	Electives	6
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in applied statistics, candidates should fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Have satisfactory background in mathematics and statistics (two courses in probability and statistics).
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent) (recommended but not required).
- GRE scores are not required. However, in cases where there may be some question regarding the capability of the applicant to complete the program. Applicants may be asked to submit scores to strengthen their application.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

Grades

Students must attain an overall program grade-point average of 3.0 (B) for graduation.

Maximum time limit

University policy requires that graduate programs be completed within seven years of the student's initial registration for courses in the program. Bridge courses are excluded.

Mathematical Modeling, Ph.D.

www.rit.edu/study/mathematical-modeling-phd
Nathan Cahill, Associate Professor
585-475-5144, ndcsma@rit.edu

Program overview

Mathematical modeling is the process of developing mathematical descriptions, or models, of real-world systems. These models can be linear or nonlinear, discrete or continuous, deterministic or stochastic, and static or dynamic, and they enable investigating, analyzing, and predicting the behavior of systems in a wide variety of fields. Through extensive study and research, graduates of this program will have the expertise not only to use the tools of mathematical modeling in various application settings, but also to contribute in creative and innovative ways to the solution of complex interdisciplinary problems and to communicate effectively with domain experts in various fields.

Plan of study

The degree requires at least 60 credit hours of course work and research. The curriculum consists of three required core courses, three required concentration foundation courses, a course in scientific computing and high-performance computing (HPC), three elective courses focused on the student's chosen research concentration, and a doctoral dissertation. Elective courses are available from within the School of Mathematical Sciences as well as from other graduate programs at RIT, which can provide application-specific courses of interest for particular research projects. A minimum of 30 credits hours of course work is required. In addition to courses, at least 30 credit hours of research, including the Graduate Research Seminar, and an interdisciplinary internship outside of RIT are required.

Students develop a plan of study in consultation with an application domain advisory committee. This committee consists of the program director, one of the concentration leads, and an expert from an application domain related to the student's research interest. The committee ensures that all students have a roadmap for completing their degree based on their background and research interests. The plan of study may be revised as needed.

Qualifying examinations

All students must pass two qualifying examinations to determine whether they have sufficient knowledge of modeling principles, mathematics, and computational methods to conduct doctoral research. Students must pass the examinations in order to continue in the Ph.D. program.

The first exam is based on the Numerical Analysis I (MATH-602) and Mathematical Modeling I, II (MATH-622, 722). The second exam is based on the student's concentration foundation courses and additional material deemed appropriate by the committee and consists of a short research project.

Dissertation research advisor and committee

A dissertation research advisor is selected from the program faculty based on the student's research interests, faculty research interest, and discussions with the program director. Once a student has chosen a dissertation advisor, the student, in consultation with the advisor, forms a dissertation committee consisting of at least four members, including the dissertation advisor. The committee includes the dissertation advisor, one other member of the mathematical modeling program faculty, and an external chair appointed by the dean of graduate education. The external chair must be a tenured member of the RIT faculty who is not a current member of the mathematical modeling program faculty. The fourth committee member must not be a member of the RIT faculty and may be a professional affiliated with industry or with another institution; the program director must approve this committee member.

The main duties of the dissertation committee are administering both the candidacy exam and final dissertation defense. In addition, the dissertation committee assists students in planning and conducting their dissertation research and provides guidance during the writing of the dissertation.

Admission to candidacy

When a student has developed an in-depth understanding of their dissertation research topic, the dissertation committee administers an examination to determine if the student will be admitted to candidacy for the doctoral degree. The purpose of the examination is to ensure that the student has the necessary background knowledge, command of the problem, and intellectual maturity to carry out the specific doctoral-level research project. The examination may include a review of the literature, preliminary research results, and proposed research directions for the completed dissertation. Requirements for the candidacy exam include both a written dissertation proposal and the presentation of an oral defense of the proposal. This examination must be completed at least one year before the student can graduate.

Dissertation defense and final examination

The dissertation defense and final examination may be scheduled after the dissertation has been written and distributed to the dissertation committee and the committee has consented to administer the final examination. Copies of the dissertation must be distributed to all members of the dissertation committee at least four weeks prior to the final examination. The dissertation defense consists of an oral presentation of the dissertation research, which is open to the public. This public presentation must be scheduled and publicly advertised at least four weeks prior to the examination. After the presentation, questions will be fielded from the attending audience and the final examination, which consists of a private questioning of the candidate by the dissertation committee, will ensue. After the questioning, the dissertation committee immediately deliberates and thereafter notifies the candidate and the mathematical modeling graduate director of the result of the examination.

Curriculum

Mathematical Modeling, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MATH-602	Numerical Analysis I	3
MATH-606	Graduate Seminar I	1
MATH-607	Graduate Seminar II	1
MATH-622	Mathematical Modeling I	3
MATH-722	Mathematical Modeling II	3
	Concentration Foundation Courses	6
	Elective	3
Second Year		
MATH-789	High-performance Computing For Mathematical Modeling	3
MATH-790	Research & Thesis	6
	Concentration Foundation Course	3
	Electives	6
Third Year		
MATH-790	Research & Thesis	10
Fourth Year		
MATH-790	Research & Thesis	6
Fifth Year		
MATH-790	Research & Thesis	6
Total Semester Credit Hours		**60**

Concentrations

Applied Inverse Problems

COURSE		SEMESTER CREDIT HOURS
MATH-625	Applied Inverse Problems	3
MATH-633	Measure Theory of Elements and Functional Analysis	3
MATH-741	Partial Differential Equations I	3

Biomedical Mathematics

COURSE		SEMESTER CREDIT HOURS
MATH-631	Dynamical Systems	3
MATH-702	Numerical Analysis II	3
MATH-761	Mathematical Biology	3

Discrete Mathematics

COURSE		SEMESTER CREDIT HOURS
CSCI-665	Foundations of Algorithms	3
MATH-645	Graph Theory	3
MATH-646	Combinatorics	3

Dynamical Systems and Fluid Dynamics

COURSE		SEMESTER CREDIT HOURS
MATH-631	Dynamical Systems	3
MATH-741	Partial Differential Equations I	3
MATH-831	Mathematical Fluid Dynamics	3

Geometry, Relativity and Gravitation

COURSE		SEMESTER CREDIT HOURS
ASTP-760	Introduction to Relativity and Gravitation	3
ASTP-861	Advanced Relativity and Gravitation	3
MATH-702	Numerical Analysis II	3

Admission requirements

To be considered for admission to the Ph.D. program in mathematical modeling, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent) in a primary field of study.
- Submit scores from the GRE.
- Submit a personal statement of educational objectives and research interests.
- Submit a current resume or curriculum vitae.
- Submit a minimum of two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Mathematical modeling encompasses a wide variety of scientific disciplines, and candidates from diverse backgrounds are encouraged to apply. If applicants have not taken expected foundational course work, the program director may require the student to successfully complete foundational courses prior to matriculating into the Ph.D. program. Typical foundation course work includes calculus through multivariable and vector calculus, differential equations, linear algebra, probability and statistics, one course in computer programming, and at least one course in real analysis, numerical analysis, or upper-level discrete mathematics.

Additional information

Financial aid, scholarships, and assistantships

Graduate assistantships and tuition remission scholarships are available to qualified students. Applicants seeking financial assistance must submit all application documents to the Office of Graduate and Part-time Enrollment. Please contact the office for current application materials and deadlines. Students whose native language is not English are advised to obtain as high a TOEFL or IELTS score as possible if they wish to apply for a teaching or research assistantship. These candidates also are encouraged to take the Test of Spoken English in order to be considered for financial assistance.

Residency

All students in the program must spend at least two consecutive semesters (summer excluded) as resident full-time students to be eligible to receive the doctoral degree.

Maximum time limitations

University policy requires that doctoral programs be completed within seven years of the date of the student passing the qualifying exam. All candidates must maintain continuous enrollment during the research phase of the program. Such enrollment is not limited by the maximum number of research credits that apply to the degree.

School of Physics and Astronomy

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Michael Kotlarchyk, Head
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Astrophysical Sciences and Technology, MS

www.rit.edu/study/astrophysical-sciences-and-technology-ms
Andrew Robinson, Professor
585-475-2726, axrsps@rit.edu

Program overview

Students may tailor their programs of study to emphasize astrophysics (including observational and theoretical astrophysics), computational and gravitational astrophysics (including numerical relativity, gravitational wave astronomy), and astronomical technology (including detector and instrumentation research and development). Students can pursue research interests in a wide range of topics, including design and development of novel detectors, multiwavelength studies of protostars, active galactic nuclei and galaxy clusters, gravitational wave data analysis, and theoretical and computational modeling of astrophysical systems including galaxies and compact objects such as binary black holes. Depending on research interests, students may participate in one of three research centers: the Center for Computational Relativity and Gravitation(Video), the Center for Detectors or the Laboratory for Multiwavelength Astrophysics.

The astrophysics degree focuses on the underlying physics of phenomena beyond the Earth, and on the development of the technologies, instruments, data analysis, and modeling techniques that will enable the next major strides in the field.

There has never been a more exciting time to study the universe beyond the confines of the Earth. A new generation of advanced ground-based and space-borne telescopes and enormous increases in computing power are enabling a golden age of astrophysics. The MS program in astrophysical sciences and technology focuses on the underlying physics of phenomena beyond the Earth, and on the development of the technologies, instruments, data analysis, and modeling techniques that will enable the next major strides in the field. The program's multidisciplinary emphasis sets it apart from conventional astrophysics graduate programs at traditional research universities.

Plan of study

The MS program comprises a minimum of 30 credit hours of study. The curriculum consists of four core courses, two to four elective courses, two semesters of graduate seminar, and a research project culminating in a thesis.

Master's thesis

During the first year, most students begin a research project under the guidance of a faculty research advisor. Focus on the project becomes more significant during the second year after the core courses have been completed. A thesis committee is appointed by the program director and oversees the final defense of the thesis, which consists of a public oral presentation by the student, followed by a closed-door examination by the committee.

Curriculum

Astrophysical Sciences and Technology, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ASTP-601	Graduate Seminar I	1
ASTP-602	Graduate Seminar II	1
ASTP-608	Fundamental Astrophysics I	3
ASTP-609	Fundamental Astrophysics II	3
Choose one of the following:		3
ASTP-613	Astronomical Obervational Techniques and Instrumentation	
	Elective	
Choose one of the following:		3
ASTP-610	Mathematical Methods for the Astrophysical Sciences	
	Elective	
ASTP-790	Research & Thesis	4
Second Year		
Choose one of the following:		3
ASTP-613	Astronomical Obervational Techniques and Instrumentation	
	Elective	
Choose one of the following:		3
ASTP-610	Mathematical Methods for the Astrophysical Sciences	
	Elective	
ASTP-790	Research & Thesis	6
Total Semester Credit Hours		**30**

Electives

COURSE	
ASTP-610	Mathematical Methods for the Astrophysical Sciences
ASTP=611	Statistical Methods for Astrophysics
ASTP-720	Computational Methods for Astrophysics
ASTP-730	Stellar Structure & Atmospheres
ASTP-740	Galactic Astrophysics
ASTP-750	Extragalactic Astrophysics
ASTP-760	Introduction to Relativity and Gravitation
ASTP-831	Stellar Evolution & Environments
ASTP-835	High-Energy Astrophysics
ASTP-841	The Interstellar Medium
ASTP-851	Cosmology
ASTP-861	Advanced Relativity and Gravitation
IMGS-628	Design and Fabrication of Solid State Cameras
IMGS-639	Principles of Solid State Imaging Arrays
IMGS-642	Testing of Focal Plane Arrays
PHYS-611	Classical Electrodynamics I
PHYS-612	Classical Electrodynamics II

Admission requirements

To be considered for admission to the MS program in astrophysical sciences and technology, a candidate must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in the physical sciences, mathematics, computer science, or engineering.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.2 (or equivalent) in course work in mathematical, science, engineering, and computing subject areas.
- Submit scores from the GRE.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL

score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

MS to Ph.D. transfer

MS students who have excelled in their course work and research project may be permitted, by program approval, to transition into the doctoral program, with the MS thesis defense serving as the Ph.D. qualifying examination. Such a transition from MS to Ph.D. is contingent on the availability of an adviser and research funding.

Astrophysical Sciences and Technology, Ph.D.

www.rit.edu/study/astrophysical-sciences-and-technology-phd

Andrew Robinson, Professor
585-475-2726, axrsps@rit.edu

Program overview

There has never been a more exciting time to study the universe beyond the confines of the Earth. A new generation of advanced ground-based and space-borne telescopes and enormous increases in computing power are enabling a golden age of astrophysics. The doctoral program in astrophysical sciences and technology focuses on the underlying physics of phenomena beyond the Earth and on the development of the technologies, instruments, data analysis, and modeling techniques that will enable the next major strides in the field. The program's multidisciplinary emphasis sets it apart from conventional astrophysics graduate programs at traditional research universities.

The program offers tracks in astrophysics (including observational and theoretical astrophysics), computational and gravitational astrophysics (including numerical relativity, gravitational wave astronomy), and astronomical technology (including detector and instrumentation research and development). Students can pursue research interests in a wide range of topics, including design and development of novel detectors, multiwavelength studies of proto-stars, active galactic nuclei and galaxy clusters, gravitational wave data analysis, and theoretical and computational modeling of astrophysical systems including galaxies and compact objects such as binary black holes. Depending on research interests, students may participate in one of three research centers: the Center for Computational Relativity and Gravitation(Video), the Center for Detectors, or the Laboratory for Multi-wavelength Astrophysics.

Plan of study

Students complete a minimum of 60 credit hours of study, consisting of at least 24 credit hours of course work and at least 24 credit hours of research. Students may choose to follow one of three tracks: astrophysics, astro-informatics and computational astrophysics (with the option of a concentration in general relativity), or astronomical instrumentation. All students must complete four core courses with grades of B or better, as well as two semesters of graduate seminar. Core course grades below B must be remediated by taking and passing a comprehensive exam on the core course subject matter prior to receiving the doctoral degree. The remaining course credits are made up from specialty track courses and electives. Students must pass a qualifying examination, which consists of completing and defending a master's-level research project, prior to embarking on the dissertation research project.

Electives

Electives include additional courses in astrophysics and a wide selection of courses offered in other RIT graduate programs (e.g., imaging science, computer science, engineering), including detector development, digital image processing, computational techniques, optics, and entrepreneurship, among others.

Ph.D. qualification requirements: Master's-level research project

During the first year of the program, most doctoral candidates begin a master's-level research project under the guidance of a faculty member. The project gains momentum during the second year, after the core courses have been completed. The master's-level research topic may be different from the eventual doctoral dissertation topic, and the supervising faculty member will not necessarily serve as the dissertation research advisor.

The doctoral qualification requirements consist of a combination of a publication-quality master's-level project report, which may be in the form of a thesis (if the student so chooses), and an oral presentation and defense of the master's-level project. This qualification process, which must be completed by the beginning of the third year of full-time study or its equivalent, is designed to ensure the student has the necessary background knowledge and intellectual skills to carry out doctoral-level research in the subject areas of astrophysical sciences and technology. A director-approved committee consisting of the student's master's-level project research advisor and two additional faculty members will assess the student's project report and defense.

Dissertation research advisor
After passing the qualifying examination, students are guided by a dissertation research advisor who is approved by the program director. The choice of advisor is based on the student's research interests, faculty research interests, and available research funding.

Research committee
After passing the qualifying examination, a dissertation committee is appointed for the duration of the student's tenure in the program. The committee chair is appointed by the dean of graduate education and must be a faculty member in a program other than astrophysical sciences and technology. The committee chair acts as the institutional representative in the final dissertation examination. The committee comprises at least four members and in addition to the chair, must also include the student's dissertation research advisor and at least one other member of the program's faculty. The fourth member may be an RIT faculty member, a professional affiliated in industry, or a representative from another institution. The program director must approve committee members who are not RIT faculty.

Ph.D. proposal review (candidacy exam)
Within six months of the appointment of the dissertation committee, students must prepare a Ph.D. research project proposal and present it to the committee for review. The student provides a written research proposal and gives an oral presentation to the committee, who provides constructive feedback on the project plan. The review must take place at least six months prior to the dissertation defense.

Annual review
Each fall, students provide an annual report in the form of an oral presentation, which summarizes progress made during the preceding year. The program director also monitors student's progress toward meeting the requirements for either the qualifying examination (during the first two years), or the Ph.D. (after passing the qualifying examination). Students may be interviewed, as necessary, to explore any concerns that emerge during the review and to discuss remedial actions.

Final examination of the dissertation
Once the dissertation is written, distributed to the dissertation committee, and the committee agrees to administer the final examination, the doctoral candidate may schedule the final examination. The candidate must distribute a copy of the dissertation to the committee and make the dissertation available to interested faculty at least four weeks prior to the dissertation defense.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The dissertation committee privately questions the candidate following the presentation. The dissertation committee caucuses immediately following the examination and thereafter notifies the candidate and the program director of the results.

Curriculum

Astrophysical Sciences and Technology, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ASTP-601	Graduate Seminar I	1
ASTP-602	Graduate Seminar II	1
ASTP-608	Fundamental Astrophysics I	3
ASTP-609	Fundamental Astrophysics II	3
Choose one of the following:		3
ASTP-613	Astronomical Observational Techniques and Instrumentation	
	Specialty Track Course	
Choose one of the following:		3
ASTP-610	Mathematical Methods for the Astrophysical Sciences	
	Specialty Track Course	
ASTP-790	Research & Thesis	4
Second Year		
Choose one of the following:		3
ASTP-613	Astronomical Observational Techniques and Instrumentation	
	Specialty Track Course	
Choose one of the following:		3
ASTP-610	Mathematical Methods for the Astrophysical Sciences	
	Specialty Track Course	
	Specialty Track Courses	6
ASTP-890	Research & Thesis	6
Third Year		
ASTP-890	Research & Thesis	8
Fourth Year		
ASTP-890	Research & Thesis	8
Fourth Year		
ASTP-890	Research & Thesis	8
Total Semester Credit Hours		**60**

Specialty Tracks

Astrophysics

COURSE		SEMESTER CREDIT HOURS
ASTP-730	Stellar Structure & Atmospheres	3
ASTP-740	Galactic Astrophysics	3
ASTP-750	Extragalactic Astrophysics	3

Astro-informatics and Computational Astrophysics

COURSE		SEMESTER CREDIT HOURS
ASTP-611	Statistical Methods for Astrophysics	3
ASTP-720	Computational Methods for Astrophysics	3

Astro-informatics and Computational Astrophysics—General Relativity

COURSE		SEMESTER CREDIT HOURS
Choose one of the following:		3
ASTP-611	Statistical Methods for Astrophysics	
ASTP-720	Computational Methods for Astrophysics	
ASTP-760	Introduction to Relativity and Gravitation	3
ASTP-861	Advanced Relativity and Gravitation	3
PHYS-611	Classical Electrodynamics I	3
PHYS-612	Classical Electrodynamics II	3

Astronomical Instrumentation

COURSE		SEMESTER CREDIT HOURS
IMGS-628	Design and Fabrication of Solid State Cameras	3
IMGS-639	Principles of Solid State Imaging Arrays	3
IMGS-642	Testing of Focal Plane Arrays	3

*Electives**

COURSE		SEMESTER CREDIT HOURS
ASTP-610	Mathematical Methods for the Astrophysical Sciences	3
ASTP-611	Statistical Methods for Astrophysics	3
ASTP-720	Computational Methods for Astrophysics	3

COURSE		SEMESTER CREDIT HOURS
ASTP-730	Stellar Structure & Atmospheres	3
ASTP-740	Galactic Astrophysics	3
ASTP-750	Extragalactic Astrophysics	3
ASTP-760	Introduction to Relativity and Gravitation	3
ASTP-831	Stellar Evolution & Environments	3
ASTP-835	High-Energy Astrophysics	3
ASTP-841	The Interstellar Medium	3
ASTP-851	Cosmology	3
ASTP-861	Advanced Relativity and Gravitation	3
IMGS-628	Design and Fabrication of Solid State Cameras	3
IMGS-639	Principles of Solid State Imaging Arrays	3
IMGS-642	Testing of Focal Plane Arrays	3
PHYS-611	Classical Electrodynamics I	3
PHYS-612	Classical Electrodynamics II	3

* Students may choose from these elective courses as long as the course is not required by their specialty track.

Admission requirements

To be considered for admission to the Ph.D. program in astrophysical sciences and technology, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in the physical sciences, mathematics, computer science, or engineering.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.2 (or equivalent) in course work in mathematical, science, engineering, and computing subject areas.
- Submit scores from the GRE.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources directly to RIT. These must be confidential.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

Residency

All students in the program must spend at least one year (summer term excluded) in residence as full-time students to be eligible to receive the doctorate degree.

Time limitations

All doctoral candidates must maintain continuous enrollment during the research phase of the program. Normally, full-time students complete the course of study in approximately four to five years. A total of seven years is allowed to complete the requirements after first attempting the qualifying examination.

MS to Ph.D. transfer

Depending on each student's progress in their course work and the research project, students enrolled in the astrophysical sciences and technology MS program may seek program approval to have their MS thesis and thesis defense serve as the Ph.D. qualifying examination. Upon successfully qualifying, students may choose to proceed to Ph.D. candidacy rather than accepting a terminal master of science degree. This transition is contingent on the availability of an adviser and research funding.

Physics, MS

www.rit.edu/study/physics-ms

George Thurston, Professor
585-475-4549, gmtsps@rit.edu

Program overview

RIT's masters degree in physics offers both a research and professional option, and provides advanced knowledge in core areas of physics, including electrodynamics, quantum, and classical mechanics, and statistical physics, as well as one or more sub-areas of physics that correspond to your individual interests and career aspirations. You'll work with program faculty to develop a tailored individual academic plan that supports your individual career aspirations.

The MS program in physics is designed to provide flexible options that can be tailored to the specific career goals and disciplinary interests of students seeking graduate training in fundamental and/or applied areas of physics. The program is suitable as either a means to further career development or as preparation for further graduate study. Nationally, graduates of the program are in demand across all economic sectors, spanning a wide variety of exciting opportunities within the private sector (especially in engineering and computer/information technology), in government labs and agencies, and in university level and secondary education.

Plan of study

The program focuses on providing advanced knowledge in core areas of physics. This includes electrodynamics, quantum and classical mechanics, and statistical physics, as well as one or more sub-areas of physics that correspond to each students' individual interests and career aspirations. Students work with the program director to develop a tailored individual academic plan that includes course work that supports these goals. Sub-areas may include modern and quantum optics; lasers; computational physics; solid-state, materials, and device physics; soft matter and biological physics; radiation scattering spectroscopy; relativity and gravitation; and nanoscale physics. The program also includes professional skills in organization and leadership, managing research teams, promoting innovation or sustainable technologies, entrepreneurship and intellectual property, finance and accounting, data science, scientific visualization, electronics, STEM pedagogy and education research, public policy, and communication skills.

Options

The program offers options in research or professional physics. The research option is research-focused and is intended to leverage each student's acquired physics knowledge in support of furthering the student's research training. Students will conduct research and produce a thesis as part of their studies. The professional option is designed to supplement advanced physics knowledge with a portfolio of electives in professional skills that can be tailored to each student's career goals. Students complete a graduate project.

Curriculum

Physics (research option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PHYS-601	Graduate Physics Seminar I	1
PHYS-602	Graduate Physics Seminar II	1
Choose two of the following:		6
PHYS-610	Mathematical Methods for Physics	
PHYS-611	Classical Electrodynamics I	
PHYS-614	Quantum Theory	
Choose one of the following:		3
PHYS-630	Classical Mechanics	
PHYS-640	Statistical Physics	
Choose one of the following:		3
PHYS-790	Graduate Research & Thesis	
	Physics (or closely related) Elective	
	Physics (or closely related) Electives	6
Second Year		
Choose one of the following:		3
PHYS-610	Mathematical Methods for Physics	
PHYS-611	Classical Electrodynamics I	
PHYS-614	Quantum Theory	
PHYS-790	Graduate Research & Thesis	7
Total Semester Credit Hours		**30**

Physics (professional option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PHYS-601	Graduate Physics Seminar I	1
PHYS-602	Graduate Physics Seminar II	1
Choose two of the following:		6
PHYS-610	Mathematical Methods for Physics	
PHYS-611	Classical Electrodynamics I	
PHYS-614	Quantum Theory	
Choose one of the following:		3
PHYS-630	Classical Mechanics	
PHYS-640	Statistical Physics	
	Physics (or closely related) Elective	3
	Professional Electives	6
Second Year		
PHYS-780	Graduate Physics Project	4
	Professional Elective	3
	Physics (or closely related) Elective	3
Total Semester Credit Hours		**30**

Electives

These lists are representative of the types of elective courses available to students in the physics program. Other RIT courses may be used as electives upon approval by the program director.

Physics (or closely related) electives

COURSE	
ASTP-760	Introduction to Relativity and Gravitation
ASTP-861	Advanced Relativity and Gravitation
CLRS-601	Principles of Color Science
CLRS-602	Color Physics and Applications
EEEE-605	Modern Optics for Engineers
EEEE-689	Fundamentals of MEMS
IMGS-616	Fourier Methods for Imaging
IMGS-619	Radiometry
IMGS-628	Design and Fabrication of Solid State Cameras
IMGS-633	Optics for Imaging
IMGS-639	Principles of Solid State Imaging Arrays
IMGS-642	Testing of Focal Plane Arrays
MATH-602	Numerical Analysis I
MATH-702	Numerical Analysis II
MATH-712	Numerical Methods for Partial Differential Equations
MATH-831	Mathematical Fluid Dynamics
MCEE-620	Photovoltaic Science and Engineering
MCEE-713	Quantum and Solid-State Physics for Nanostructures
MCSE-702	Introduction to Nanotechnology and Microsystems
MCSE-712	Nonlinear Optics
MCSE-713	Lasers
MCSE-731	Integrated Optical Devices & Systems
MCSE-771	Optoelectronics
MCSE-889	Special Topics
MTSE-601	Materials Science
MTSE-632	Solid State Science
PHYS-612	Classical Electrodynamics II
PHYS-667	Quantum Optics
PHYS-689	Graduate Special Topics
PHYS-720	Computational Methods for Physics
PHYS-732	Advanced Solid State Physics
PHYS-751	Soft Matter Physics
PHYS-752	Biological Physics
PHYS-760	Radiation Interactions & Scattering Probes of Matter

Professional electives

COURSE	
ACCT-603	Accounting for Decision Makers
ACCT-794	Cost Management in Technical Organizations
BLEG-612	Legal and Accounting Issues for New Ventures
COMM-705	Technology-Mediated Communication
COMM-706	Crafting the Message
CSCI-603	Computational Problem Solving
CSCI-605	Advanced Object-Oriented Programming Concepts
CSCI-620	Introduction to Big Data
CSCI-714	Scientific Visualization
CSCI-720	Big Data Analytics
DECS-744	Project Management
EEEE-610	Analog Electronics Design
EEEE-620	Design of Digital Systems
ESCB-705	Economics and Decision Modeling
FINC-605	Financing New Ventures
FINC-721	Financial Analysis for Managers
ISUS-704	Industrial Ecology
ISUS-705	Technology, Policy, and Sustainability
ITDS-611	STEM Education: Concepts and Practice
ITDS-613	STEM Education: Research Methods and Theory
MGIS-650	Introduction to Data Analytics and Business Intelligence
MGMT-735	Management of Innovation in Products and Services
MGMT-740	Organizational Behavior and Leadership
MGMT-741	Managing Organizational Change
MGMT-755	Negotiations
PSYC-716	Graduate Social Psychology
PUBL-630	Energy Policy
PUBL-701	Graduate Policy Analysis

Admission requirements

To be considered for admission to the MS program in physics, applicants must fulfill the following requirements:

- Complete an RIT graduate application.
- Hold a baccalaureate degree in physics, applied physics, or a closely-related discipline within the physical/mathematical sciences or engineering fields from an accredited college or university,
- Have a minimum undergraduate GPA of 3.0/4.0
- Submit official transcripts (in English), for all previously completed undergraduate and graduate course work.
- Submit two letters of recommendation,
- Submit scores from the Graduate Record Exam (GRE) General Test
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Bridge courses

If an applicant lacks any prerequisites, bridge courses may be recommended to provide students with the required knowledge and skills needed for the program. If any bridge courses are indicated in a student's plan of study, the student may be admitted to the program on the condition that they successfully complete the recommended bridge courses with a grade of B (3.0) or better (courses with lower grades must be repeated).

Faculty

Dean's Office

Sophia A. Maggelakis, BS, MS, Ph.D., Old Dominion University—Dean

Bioinformatics

Gregory Babbitt, BA, Ohio Wesleyan University; MS, Ph.D., University of Florida—Associate Professor: evolution of the biophysical properties of whole genomes and their interactions with DNA binding proteins

Eli Borrego, BS, Ph.D., Texas A&M University—Assistant Professor: plant biochemistry and pathology

Larry Buckley, BA, University of Missouri; MS, Southern Illinois University at Edwardsville; Ph.D., Southern Illinois University at Carbondale—Associate Dean for Academic Affairs; Associate Professor, Biology: herpetology, anatomy, evolution, biogeography, systematics

Feng Cui, MS, Truman State University; Ph.D., Iowa State University; MD, Hunan Medical University (China)—Assistant Professor, Bioinformatics: Next-generation sequencing data analysis, chromatin organization, epigenomics, cancer genomics and p53-DNA interactions

André Hudson, BS, Virginia Union University; Ph.D., Rutgers University—Head, Thomas H. Gosnell School of Life Sciences; Associate Professor, Biology: amino acid metabolism, bacterial cell wall metabolism, plant- bacterial interactions

Michael V. Osier, BS, University of Vermont; Ph.D., Yale University—Associate Professor; Graduate Program Director, Bioinformatics: high-throughput sequencing analysis, human genetics

Gary R. Skuse, BA, University of Rochester; Ph.D., Syracuse University—Professor, Bioinformatics: cancer genetics, RNA processing, natural language processing to mine the scientific and medical literature, computer networking, wired and wireless communications

Julie A. Thomas, B.App.Sc., Ph.D., LaTrobe University, Bendingo (Australia)—Assistant Professor, virology, phage genetics and genome structure, phage gene expression

Crista Wadsworth, BA, Smith College; Ph.D., Tuffs University—Assistant Professor, microbial evolution, populations dynamics and genomics.

Environmental Science

Larry Buckley, BA, University of Missouri; MS, Southern Illinois University at Edwardsville; Ph.D., Southern Illinois University at Carbondale—Associate Dean for Academic Affairs; Associate Professor, Biology: herpetology, anatomy, evolution, biogeography, and systematics

Sandi Connelly, BS, Juniata College; MS, University at Buffalo; Ph.D., Miami University of Ohio—Thomas H. Gosnell School of Life Sciences; Principal Lecturer, Biology: ecotoxicology, freshwater ecosystems, anthropogenic stresses, UV-radiation, evolution

Carmala Garzione, BS, University of Maryland; MS, Ph.D., University of Arizona—Associate Provost for Faculty Affairs; Professor

Elizabeth Hane, BA, Rice University; MA, University of Kansas; Ph.D., Brown University—Associate Head, Thomas H. Gosnell School of Life Sciences; Associate Professor, Biology: plant community ecology, ecosystem biology, conservation biology

M. Ann Howard, BS, Cornell University; J.D., Rutgers University School of Law—Professor, College of Liberal Arts, Science, Technology and Society/Public Policy: relationship between environmental decision-making and the role of citizen involvement, sustainable community development

Christine Keiner, BA, McDaniel College; Ph.D., Johns Hopkins University—Associate Professor, College of Liberal Arts, Science, Technology and Society/Public Policy: history of ecology and biology, U.S. environmental politics, and relations between science and politics

Karl F. Korfmacher, BA, Carleton College; MS, Ph.D., Duke University—Professor, Environmental Science: GIS-based habitat suitability, transportation, hydrologic, and pollution modelling, green infrastructure land cover analysis, soil science

Jeffrey S. Lodge, BA, University of Delaware; Ph.D., University of Mississippi—Graduate Program Director, Environmental Science; Associate Professor, Biology: bioremediation of oil, pharmaceuticals, personal care products, and other pollutants in soils and water, microbial ecology (especially water systems), use of microalgae to treat various industrial waste streams, wastewater microbiology and food waste to energy

Carmody K. McCalley, BA, Middlebury College; Ph.D., Cornell University—Assistant Professor, Environmental Science: biogeochemistry, global change biology, terrestrial and wetland ecosystem ecology

Susan Smith Pagano, BS, State University College at Oswego; MS, State University College at Brockport; Ph.D., University of Rhode Island—Associate Professor, Biology: avian nutritional ecology and migration physiology

Todd Pagano, BA, State University College at Oswego; MS, Ph.D., Tufts University—Associate Professor, Chemistry/Laboratory Science Technology: aquatic chemistry, environmental chemistry, sensor/instrument design, environmental monitoring

Richard Shearman, BA, Western State College of Colorado; MS, Eastern New Mexico University; Ph.D., State University of New York, College of Environmental Science and Forestry—Associate Professor, College of Liberal Arts, Science, Technology, Society and Public Policy: environmental philosophy and practical problems associated with the conservation of biodiversity

Paul Shipman, BSE, MS, Emporia State University; Ph.D., Oklahoma State University—Associate Professor, Biology: ecological informatics, conservation of amphibians and reptiles, behavioral and evolutionary ecology

Anna Christina Tyler, BS, Cornell University; MS, Ph.D., University of Virginia—Associate Professor, Environmental Science and Biology: aquatic ecology, biogeochemistry, invasive species, ecosystem restoration

Jan van Aardt, BSc, University of Stellenbosch (South Africa); MS, Ph.D., Virginia Polytechnic Institute and State University—Associate Professor, Imaging Science: remote sensing of natural resources, application of hyperspectral, light detection and ranging for spectral-structural characterization of natural systems, integrated modeling approaches, scaling of natural resources remote sensing solutions through sensor interoperability

Jeffrey Wagner, AB, University of Missouri at Columbia; MS, Ph.D., University of Illinois-Urbana—Professor, College of Liberal Arts, Economics: sustainable waste management, green consumption, economics of active transportation, economics of endangered species recovery

Applied and Computational Mathematics, Applied Statistics

Anurag Agarwal, MS, Indian Institute of Technology (India); Ph.D., State University of New York at Buffalo—Associate Professor, number theory, cryptography, algebra, graph theory

Ephraim Agyingi, BS, MS, University of Ilorin (Nigeria); Ph.D., University of Manchester (United Kingdom)—Associate Professor, numerical analysis

Olalekan Babaniyi, BS, MS, Ph.D., Boston University—Assistant Professor, inverse problems, computational mechanics, biomechanical imaging, uncertainty quantification

Peter Bajorski, MS, University of Wroclaw (Poland); Ph.D., Technical University of Wroclaw (Poland)—Professor, regression models, multivariate analysis, nonparametrics, statistical approaches to spectral image processing

Mihail Barbosu, BS, Ph.D., Babes-Bolyai University (Romania); MS, Ph.D., Paris VI University (France)—Professor, mathematical modeling, dynamical systems, celestial mechanics and space dynamics, symbolic computation systems, data analytics, management science

Nate Barlow, BS, Ph.D., Clarkson University—Assistant Professor, stability and propagation of waves in fluids, asymptotic methods

David S. Barth-Hart, BS, Syracuse University; MA, University of Rochester—Associate Professor, algebra, number theory

Maurino P. Bautista, BS, Ateneo de Manila University (Philippines); MS, Ph.D., Purdue University—Professor, numerical analysis, applied mathematics

Bernard Brooks, BS, University of Toronto (Canada); MBA, Rochester Institute of Technology; MS, Ph.D., University of Guelph (Canada)—Professor, mathematical modeling

Nathan Cahill, BS, MS, Rochester Institute of Technology; D.Phil., University of Oxford (United Kingdom)—Associate Dean for Industrial Partnerships; Graduate Program Director, Mathematical Modeling; Associate Professor, Mathematics: scientific computing, biomedical image analysis, computer vision, advanced mathematical approaches to image processing

Manuela Campanelli, Laureate in Mathematics, University of Perugia (Italy); Ph.D., University of Bern (Switzerland)—Director, Center for Computational Relativity and Gravitation; Professor, Mathematics: numerical relativity, gravitational physics, computational astrophysics, black holes, gravitational waves

Lucia Carichino, BS, MS, Politecnico di Milano (Italy); Ph.D., Purdue University—Assistant Professor, mathematical modeling, scientific computing

Linlin Chen, BS, Beijing University (China); MCS, Rice University; MA, Ph.D., University of Rochester—Associate Professor, statistics, biostatistics, statistical consulting, genetics, bioinformatics and computational biology

Elizabeth Cherry, BS, Georgetown University; Ph.D., Duke University—Professor, computational cardiac dynamics

Patricia A. Clark, SB, SM, Massachusetts Institute of Technology; Ph.D., University of Rochester—Professor, mathematical biology

Matthew Coppenbarger, BS, University of Arizona; MA, Ph.D., University of Rochester—Associate Professor, mathematical physics, spectral theory

Michael Cromer, BS, York College of Pennsylvania; MS, Ph.D., University of Delaware—Assistant Professor, mathematical modeling of complex fluids, asymptotics and perturbation methods, simulation

Joshua Faber, BS, State University of New York at Stony Brook; Ph.D., Massachusetts Institute of Technology—Professor, numerical relativity, computational astrophysics, dynamics

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John F. Hamilton, BA, Cornell University; MA, Ph.D., Indiana University—Research Faculty

Anthony A. Harkin, BS, State University College at Brockport; MS, Massachusetts Institute of Technology; Ph.D., Boston University—Associate Professor, applied and computational mathematics, partial differential equations

Matthew J. Hoffman, BA, Williams College; MS, Ph.D., University of Maryland—Graduate Program Director, Applied and Computational Mathematics; Associate Professor, data assimilation, applied mathematics, ocean and atmospheric forecasting, remote sensing; hyperspectral vehicle tracking

Jay Alan Jackson, BS, MS, Ph.D., Florida State University—Associate Professor, mathematical modeling, innovative and interdisciplinary math and science education

Jobby Jacob, BS, Bharata Mata College (India); MS, Indian Institute of Technology (India); MS, Ph.D., Clemson University—Associate Professor, graph theory

Baasansuren Jadamba, BS, National University of Mongolia (Mongolia); MS, University of Kaiserslautern (Germany); Ph.D., University of Erlangen-Nuremberg (Germany)—Associate Professor, partial differential equations, inverse problems, numerical optimization

Akhtar Khan, MS, Technical University Kaiserslautern (Germany); Ph.D., Michigan Technological University—Associate Professor, applied math, optimization, inverse problems, variational inequalities, elasticity imaging

Leonid Khinkis, MS, Chernovtsy State University (Ukraine); MS, Free Ukrainian Institute of Management & Business (Ukraine); Ph. D., Voronezh State University (Russia)—Visiting Professor, statistics

Seshavadhani Kumar, BS, MS, University of Madras (India); Ph.D., University of Delaware—Professor, operations research, simulation

Manuel Lopez, AB, Princeton University; Ph.D., Wesleyan University—Associate Professor, homological algebra

Carlos Lousto, MS, Universidad Nacional De La Plata (Argentina); Ph.D., Universidad De Buenos Aires (Argentina)—Professor, numerical relativity

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Carol E. Marchetti, BS, Case Institute of Technology; MS, Weatherhead School of Management; MA, Ph.D., University of Rochester—Professor, statistics

James E. Marengo, BA, MS, California State University; Ph.D., Colorado State University—Professor, statistics, probability

Laura M. Munoz, BS, California Institute of Technology; Ph.D., University of California at Berkeley—Assistant Professor, mathematical biology, dynamical systems, applied control theory

Darren A. Narayan, BS, State University of New York at Binghamton; MS, Ph.D., Lehigh University—Professor, graph theory, discrete math

Richard O'Shaughnessy, BA, Cornell University; Ph.D., California Institute of Technology—Assistant Professor, gravitational wave astrophysics

Niels F. Otani, BA, University of Chicago; Ph.D., University of California at Berkeley—Associate Professor, mathematical biology

Robert J. Parody, BS, Clarkson University; MS, Rochester Institute of Technology; Ph.D., University of South Carolina— Graduate Program Director, Applied Statistics; Associate Professor, experimental design, response surface methods, quality control and improvement

Minh Pham, BS, Bucknell University; Ph.D., Rutgers University—Assistant Professor, statistics, machine learning

Michael Radin, BA, Rowan University; MS, Ph.D., University of Rhode Island—Associate Professor, differential equations

Mary Lynn Reed, BS, Georgia Institute of Technology; MFA, University of Maryland; Ph.D., University of Illinois—Head, School of Mathematical Sciences; Professor

Brendan Rooney, BSc, Simon Fraser University (Canada); MS, Ph.D., University of Waterloo (Canada)—Assistant Professor , graph theory

David Ross, BA, Columbia College; Ph.D., New York University—Professor, differential equations and numerical analysis

Hossein Shahmohamad, BS, MA, California State University at Long Beach; Ph.D., University of Pittsburgh—Professor, graph theory

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Joseph G. Voelkel, BS, Rensselaer Polytechnic Institute; MS, Northwestern University; Ph.D., University of Wisconsin-Madison—Professor, experimental design, process modeling and improvement, multivariate analysis

John T. Whelan, BA, Cornell University; Ph.D., University of California at Santa Barbara—Professor, computational relativity and gravitation, gravitational wave data analysis

Tamas Wiandt, BS, Jozsef Attila University (Hungary); Ph.D., University of Minnesota—Associate Head of School; Associate Professor, dynamical systems

Tony E. Wong, BA, Ohio Wesleyan University; MS, Ph.D., University of Colorado, Boulder—Assistant Professor, data assimilation, model calibration, geophysical models

Elmer L. Young, BA, Amherst College; MS, Ph.D., The Ohio State University—Associate Professor, topology and analysis

Yosef Zlochower, BS, Ph.D., University of Pittsburgh—Associate Professor, numerical relativity

Chemistry

Jeremy Cody, BS, Indiana University of Pennsylvania; Ph.D., University of Rochester—Associate Professor, Organic Chemistry: synthetic organic chemistry

Christina Goudreau Collison, BA, Colby College; Ph.D., University of Rochester—Professor, Organic Chemistry: synthetic organic chemistry, chemical education

Christopher Collison, BSc, Ph.D., Imperial College of London (United Kingdom)—Professor, Physical Chemistry: photovoltaic chemistry

Michael G. Coleman, BS, Ph.D., University of Buffalo—Associate Professor, Organic chemistry: synthetic organometallic methodologies towards medicinally relevant targets

Paul A. Craig, BS, Oral Roberts University; Ph.D., University of Michigan—Professor, School Head, Biochemistry; computational biochemistry, biochemistry education

Nathan Eddingsaas, BS, University of Wisconsin, Stevens Point; Ph.D., University of Illinois at Urbana-Champaign—Associate Professor, analytical chemistry, atmospheric chemistry

Michael Gleghorn, BS, Clarion University of Pennsylvania; Ph.D., Pennsylvania State University—Assistant Professor, Biochemistry, gene regulation, nucleic acids, molecular cell biology

Joseph P. Hornak, BS, Utica College of Syracuse University; MS, Purdue University; Ph.D., University of Notre Dame— Professor, Joint Appointment with Imaging Science, Physical Chemistry, magnetic resonance spectroscopies and imaging

Lea V. Michel, BA, Colgate University; Ph.D., University of Rochester—Associate Professor, Biochemistry: structural biology, biophysics, vaccine development

Massoud J. Miri, BS, MS, Ph.D., University of Hamburg (Germany)—Associate Professor, Polymer Chemistry: polymerization mechanisms, polymer properties, catalysis

Suzanne O'Handley, BS, Rutgers University; MS, Ph.D., University of Rochester—Associate Professor, Biochemistry: cloning characteristics of nudix hydrolases, novel phosphatase families, novel antibiotic targets, enzyme-substrate specificity

John-David Rocha, BS, MS, University of North Texas; Ph.D., Rice University—Assistant Professor, Physical Chemistry, nanotubes and optical spectroscopy

K. S. V. Santhanam, BSc, MA, Ph.D., Sri Venkateswara University (India)—Professor, Analytical Chemistry and Materials Science: organic conducting polymers, electrochemistry, sensors and carbon nanotubes

Hans Schmitthenner, BS, Massachusetts Institute of Technology; Ph.D., Pennsylvania State University—Associate Research Professor, Analytical and Organic Chemistry: imaging agent synthesis and analysis.

Thomas W. Smith, BS, John Carroll University; Ph.D., University of Michigan—Professor, Organic/Polymer Chemistry: synthesis and device applications of block copolymer systems and nano composites

Gerald A. Takacs, BSc, University of Alberta (Canada); Ph.D., University of Wisconsin—Professor, Physical Chemistry: chemical kinetics, atmospheric chemistry, plasma chemistry, and photochemistry

Laura Ellen Tubbs, BA, Hood College; Ph.D., University of Rochester—Professor and Associate School Head: Physical Chemistry; nuclear chemistry, radioisotopes, archeological and environmental, dating and tracing, neutron activation analysis

Scott Williams, BS, Purdue University; Ph.D., Montana State University—Professor, Inorganic Chemistry: pharmaceutical quality assurance through application of point-of-care assays

Materials Science and Engineering

Linda Barton, BS, Massachusetts Institute of Technology; MS, Ph.D., University of Illinois—Associate Professor, Physics: magnetic materials and magnetic measurements, calorimetry, bulk transport measurements, properties of materials at or near phase transitions, critical phenomena

Mishkat Bhattacharya, B.Tech., Indian Institute of Technology (India); MA, Ph.D., University of Rochester—Associate Professor, Physics: quantum optics, nanoscience, superconductivity

David A. Borkholder, BS, Rochester Institute of Technology; MS, Ph.D., Stanford University—Bausch and Lomb Professor of Microsystems Engineering

Christopher Collison, BS, Ph.D., Imperial College of London (United Kingdom)—Associate Professor, Physical Chemistry: polymer chemistry, organic photovoltaics

Denis Cormier, BS, University of Pennsylvania; MS, State University of New York at Buffalo; Ph.D., North Carolina State University—Earl W. Brinkman Professor: additive manufacturing, rapid prototyping

Michael Cromer, BS, York College of Pennsylvania; MS, Ph.D., University of Delaware—Assistant Professor, mathematical modeling of complex fluids, asymptotics and perturbation methods, simulation

Moumita Das, BS, MS, Jadavpur University (India); Ph.D., Indian Institute of Science—Associate Professor, Physics: theoretical soft condensed matter, mechanical response of biological materials and living systems

Scott Franklin, BA, University of Chicago; Ph.D., University of Texas—Professor: granular materials.

Thomas R. Gaborski, BS, Cornell University; MS, Ph.D., University of Rochester—Assistant Professor, nanomaterials, separations, cellular mechanics

Gabrielle Gaustad, BS, Alfred University; MS, Ph.D., Massachusetts Institute of Technology—Associate Professor: sustainability, materials recovery

Anju Gupta, BE, University of Mumbai (India); MS, Worcester Polytechnic Institute; Ph.D., University of Rhode Island—Assistant Professor: Self-assemblies, emulsions, thin films, thermal analysis, cell-membrane interactions, bioremediation, biosensors

Surendra K. Gupta, B.Tech., India Institute of Technology (India); MS, University of Notre Dame; Ph.D., University of Rochester—Professor, Mechanical Engineering: x-ray diffraction, atomic force microscopy, micromechanics modeling, digital image analysis

Richard K. Hailstone, BS, Northern Illinois University; MS, Indiana University—Associate Professor, Imaging Science: silver halide materials and processing, imaging materials

Joseph P. Hornak, BS, Utica College of Syracuse University; MS, Purdue University; Ph.D., University of Notre Dame—Professor, Chemistry: physical chemistry, magnetic resonance spectroscopy and imaging

Seth M. Hubbard, BS, Drexel University; MS, Case Western Reserve University; Ph.D., University of Michigan—Professor, Physics, epitaxial crystal growth, growth and characterization of nanomaterials, high-efficiency photovoltaic devices, semiconductor device design and fabrication, thin films

Patricia Iglesias Victoria, BS, Ph.D., Polytechnic University of Cartagena (Spain)—Assistant Professor: ionic liquids, tribology

Michael A. Jackson, BS, MS, Ph.D., State University of New York at Buffalo—Associate Professor, Microelectronic Engineering: microelectronic device design, fabrication, and test; material characterization techniques, surface analytical instrumentation; vacuum processing, including CVD, plasma, and ion beam techniques, micromachining, ferroelectric thin films, amorphous silicon and polysilicon film deposition and characterization

Michael Kotlarchyk, BS, MS, Ph.D., Massachusetts Institute of Technology—Professor, School Head, Physics: characterization of structure and phase transitions in surfactant systems (micelles, microemulsions, and liquid crystals) using scattering techniques; mass and surface fractals in condensed matter systems, theories of liquids; chaos in simple non-linear physical systems

Santosh Kurinec, BS, MS, Ph.D., University of Delhi (India)—Professor, Microelectronic Engineering; electronic materials and devices, IC processing, quantum and nanoscale devices

Kathleen Lamkin-Kennard, BS, Worcester Polytechnic Institute; MS, Ph.D., Drexel University—Associate Professor, Mechanical Engineering: biomedical engineering and biomaterials

Zhaolin Lu, Changqing University (China); MS, Michigan Technological University; Ph.D., University of Delaware—Associate Professor: Photonics and Metamaterials, Electromagnetics, and Nanoelectronics

Casey Miller, BA, Wittenberg University; Ph.D., University of Texas at Austin—Associate Dean for Research and Faculty Affairs; Associate Professor, Chemistry and Materials Science: thin film magnetism, spintronics, magnetocaloric effect

Massoud Miri, BS, MS, Ph.D., University of Hamburg (Germany)—Associate Professor, Chemistry: polymerization mechanisms, polymer properties, catalysis

Ali Ogut, B.Ch.E., Hacettepe University (Turkey); MS, Ph.D., University of Maryland—Professor, Mechanical Engineering: polymer processing, heat and mass transfer, rheology, transport phenomena

Michael S. Pierce, BS, Rensselaer Polytechnic Institute; MS, Ph.D., University of Washington—Graduate Program Director, Materials Science and Engineering; Associate Professor, Physics: experimental physics, condensed matter physics, surface science, magnetism, x-ray science, and phase transitions

John-David Rocha, BS, MS, University of North Texas; Ph.D., Rice University—Assistant Professor, Physical Chemistry: nanotubes and optical spectroscopy

Sean L. Rommel, BS, Ph.D., University of Delaware—Professor, Microelectronic Engineering; emerging semiconductor devices, photonic devices, integration

K. S. V. Santhanam, BSc, MA, Ph.D., Sri Venkateswara University (India)—Professor, Analytical Chemistry: organic conducting polymers, electrochemistry, sensors and carbon nanotubes

Michael Schertzer, B. Eng. Mgt., M.A.Sc., McMaster University (Canada); Ph.D., University of Toronto (Canada)— Assistant Professor, Bioengineering and Microsystems

Michael Schrlau, BS, University of Pittsburgh; Ph.D., University of Pennsylvania—Assistant Professor, Bioengineering and Microsystems

Bruce Smith, BS, MS, Ph.D., Rochester Institute of Technology—Professor, Microelectronic Engineering: 193 nm lithography, multilayer resist processing, attenuated phase shift mask materials

Thomas W. Smith, BS, John Carroll University; Ph.D., University of Michigan—Professor, Chemistry: synthesis and device applications of block copolymer systems and nano composites

Gerald A. Takacs, BS, University of Alberta (Canada); Ph.D., University of Wisconsin—Professor, Chemistry: physical chemistry, chemical kinetics, photochemistry, atmospheric chemistry, plasma etching and modification of materials

George Thurston, AB, Oberlin College; Ph.D., Massachusetts Institute of Technology—Graduate Program Director, Physics; Professor, Physics: biological and chemical physics, experimental and theoretical studies of phase transitions, physical and chemical basis of protein condensation diseases, nuclear magnetic resonance, light, x-ray, and neutron scattering

Thomas Trabold, BS, Ph.D., Clarkson University—Associate Professor and Head: sustainability; fuel cells; biofuels; waste-to-energy conversion

Benjamin Varela, BS, Institute of Technology of Juarez (Mexico); MS, Ph.D., New Mexico State University—Associate Professor, Innovative Materials, Automation and Fluid Power, Dynamics

Jayanthi Venkataraman, BS, MS, Bangalore University (India); Ph.D., Indian Institute of Science (India)—Professor, Electrical Engineering: electromagnetic fields

Steven J. Weinstein, BS, University of Rochester; MS, Ph.D., University of Pennsylvania—Department Head; Professor, interfacial transport processes, hydrodynamic wave phenomena, applied mathematics

Scott Williams, BS, Purdue University; Ph.D., Montana University—Professor, College of Art and Design: printed electronics, bioactive paper technology, ink chemistry and formulation

Physics

Mishkat Bhattacharya, B.Tech., Indian Institute of Technology (India); MA, Ph.D., University of Rochester—Associate Professor, Physics: quantum optics, quantum information, optomechanics, precision measurement, non-classical state engineering, cold atoms and molecules, superconducting quantum computing

Manuela Campanelli, Laureate in Mathematics, University of Perugia (Italy); Ph.D., University of Bern (Switzerland)—Director, Center for Computational Relativity and Gravitation; Professor, Mathematics: numerical relativity, computational astrophysics, black holes, gravitational waves

Moumita Das, BS, MS, Jadavpur University (India); Ph.D., Indian Institute of Science—Associate Professor, Physics: theoretical soft condensed matter, mechanical response of biological materials and living systems

Pratik P. Dholabhai, BS, MS, Maharaja Sayajirao University of Baroda (India); MS, Ph.D., University of Texas at Arlington—Assistant Professor, Physics: computational condensed matter physics and materials science, materials by design, nanostructured materials, materials for energy technologies

Joshua Faber, BS, State University of New York at Stony Brook; Ph.D., Massachusetts Institute of Technology—Professor, Mathematics: numerical relativity, computational astrophysics, dynamics

Scott Franklin, BA, University of Chicago; Ph.D., University of Texas—Director, Center for Advancing STEM Teaching, Learning & Evaluation; Professor, Physics: granular materials, physics education research

Edwin Hach III, BS, MS, St. Bonaventure University; Ph.D., University of Arkansas—Assistant Professor, Physics: quantum theory, quantum optics, quantum information and computing

Dawn Hollenbeck, BS, University of California at Davis; MS, Ph.D., University of Texas at Dallas—Associate Professor, Physics: electromagnetic theory and optics, computational physics

Gregory A. Howland, BA, Oberlin College; MA, Ph.D., University of Rochester—Assistant Professor, Physics: quantum photonic integrated circuits, high-dimensional quantum systems, quantum information, compressive sensing, few-photon imaging and ranging, fundamental tests of quantum mechanics

Seth Hubbard, BS, Drexel University; MS, Case Western Reserve University; Ph.D., University of Michigan—Director, Nanopower Research Laboratory; Professor, Physics: next generation photovoltaic devices, nanomaterials, novel and wide bandgap semiconductors, semiconducting polymers and devices

Michael Kotlarchyk, BS, MS, Ph.D., Massachusetts Institute of Technology—Head, School of Physics and Astronomy; Professor, Physics: radiation scattering techniques, laser light scattering, small-angle neutron and x-ray scattering, photon correlation spectroscopy, structure and interactions in complex fluids, nuclear magnetic resonance

Santosh Kurinec, BS, MS, Ph.D., University of Delhi (India)—Professor, Microelectronic Engineering; electronic materials and devices, integrated circuit processing, quantum and nanoscale devices

Michael T. Lam, BA, Colgate University; MS, Ph.D., Cornell University—Assistant Professor, Physics and Astronomy: pulsar timing arrays and gravitational waves, interstellar and intergalactic media, fast radio bursts and propagation effects, astronomical cyber-infrastructure

Carlos Lousto, MS, Universidad Nacional De La Plata (Argentina); Ph.D., Universidad De Buenos Aires (Argentina)—Professor, Mathematics: numerical relativity, relativistic astrophysics, black hole physics, perturbation theory

Casey Miller, BA, Wittenberg University; Ph.D., University of Texas at Austin—Associate Dean for Research and Faculty Affairs; Associate Professor, Chemistry and Materials Science: thin film magnetism, spintronics, magnetocaloric effect

Parsian Mohseni, BS, Ph.D., McMaster University (Canada)—Assistant Professor, Microsystems Engineering: solid state physics, optoelectronics, materials characterization, nanoscale engineering and physical chemistry, synthesis paradigms for precise manipulation of material properties at the nanometer scale for next generation device technologies

Richard O'Shaughnessy, BA, Cornell University; Ph.D., California Institute of Technology—Assistant Professor, Mathematics: gravitational wave astronomy, numerical and general relativity

Shima Moghaddam Parsa, B.Sc., Iran University of Science and Technology (Iran); M.Sc., Tabriz University (Iran); Ph.D., Wesleyan University—Assistant Professor, Physics: soft matter, complex fluids, porous media, turbulence, transport, non-linear and chaotic dynamics

Michael S. Pierce, BS, Rensselaer Polytechnic Institute; MS, Ph.D., University of Washington—Graduate Program Director, Materials Science and Engineering; Associate Professor, Physics: experimental condensed matter physics, surface and interface science, x-ray diffraction, coherent scattering, surface microscopy, applications for basic energy science

Stefan Preble, BS, Rochester Institute of Technology; Ph.D., Cornell University—Professor, Microsystems Engineering: integrated photonic circuits and devices, quantum silicon photonics

Andrew Robinson, BSc, Ph.D., University of Manchester (United Kingdom)—Graduate Program Director, Astrophysical Sciences and Technology; Professor, Physics and Astronomy: astronomy, active galactic nuclei, supermassive black holes, radio galaxies, high redshift quasars

George Thurston, AB, Oberlin College; Ph.D., Massachusetts Institute of Technology—Graduate Program Director, Physics; Professor, Physics: biological and chemical physics, experimental and theoretical studies of phase transitions, physical and chemical basis of protein condensation diseases, nuclear magnetic resonance, light, x-ray, and neutron scattering

John Whelan, BA, Cornell University; Ph.D., University of California at Santa Barbara—Professor, Mathematics: quantum physics, gravitational wave data analysis, astrophysical relativity

Michael D. Zemcov, BSc, University of British Columbia (Canada); Ph.D., Cardiff University (United Kingdom)—Assistant Professor, Physics and Astronomy: experimental and observational cosmology, including cosmological structure formation, extragalactic background radiation, cosmic microwave background, near infra-red to submillimeter instrumentation

Yosef Zlochower, BS, Ph.D., University of Pittsburgh—Associate Professor, Mathematics: numerical relativity, relativistic astrophysics, black hole physics

Benjamin M. Zwickl, BS, Purdue University; MS, Ph.D., Yale University—Associate Professor, Physics: physics education research, STEM education and workforce connections, optics and optomechanics

Astrophysical Sciences and Technology

Stefi A. Baum, BA, Harvard University; Ph.D., University of Maryland—Research Professor, Imaging Science: astrophysics, astronomical imaging, and astronomical mission development, including radio, optical, UV, and x-ray observations; active galaxies, black holes, galaxies and cluster of galaxies

Manuela Campanelli, Laureate in Mathematics, University of Perugia (Italy); Ph.D., University of Bern (Switzerland)—Director, Center for Computational Relativity and Gravitation; Professor, Mathematics: numerical relativity, computational astrophysics, black holes, gravitational waves

Sukanya Chakrabarti, B.Sc., North Carolina State University; MS, Georgia Institute of Technology; Ph.D., University of California at Berkeley—Assistant Professor, Physics and Astronomy: computational astrophysics, galactic evolution and dynamics

Joshua Faber, BS, State University of New York at Stony Brook; Ph.D., Massachusetts Institute of Technology—Professor, Mathematics: numerical

relativity, general relativistic magnetohydrodynamics, relativistic astrophysics

Donald F. Figer, BA, Northwestern University; MS, University of Chicago; Ph.D., University of California—Professor, Center for Detectors: massive stars, massive star clusters, galactic center, imaging detectors

Jeyhan S. Kartaltepe, BA, Colgate University; MS, Ph.D., University of Hawaii—Assistant Professor, Physics and Astronomy: galaxy formation and evolution, galaxy mergers and interactions, galaxy morphology, infrared and submillimeter galaxies, active galactic nuclei

Joel H. Kastner, BS, University of Maryland; MS, Ph.D., University of California—Director, Laboratory for Multiwavelength Astrophysics; Professor, Imaging Science: astronomical imaging, including x-ray, infrared and radio spectroscopy; young stars and planet formation; evolved stars and planetary nebulae

Michael T. Lam, BA, Colgate University; MS, Ph.D., Cornell University—Assistant Professor, Physics and Astronomy: pulsar timing arrays and gravitational waves, interstellar and intergalactic media, fast radio bursts and propagation effects, astronomical cyber-infrastructure

Carlos Lousto, MS, Universidad Nacional De La Plata (Argentina); Ph.D., Universidad De Buenos Aires (Argentina)—Professor, Mathematics: numerical relativity, relativistic astrophysics, black hole physics, perturbation theory

Zoran Ninkov, BSc, University of Western Australia (Australia); MS, Monash University (Australia); Ph.D., University of British Columbia (Canada)—Professor, Imaging Science: detector array development and characterization, development of novel astronomical instrumentation, studies of young stellar clusters, planetary detection

Jason Nordhaus, BA, BS, MS, Ph.D., University of Rochester—Assistant Professor, Science and Mathematics, National Technical Institute for the Deaf: computational astrophysics, core-collapse supernovae, binary interactions, strongly magnetized compact objects, physics of common envelopes

Christopher O'Dea, BS, Massachusetts Institute of Technology; Ph.D., University of Massachusetts—Research Professor, Physics and Astronomy: astronomy, active galactic nuclei (Seyfert galaxies, radio galaxies, quasars), clusters of galaxies, cooling flows

Richard O'Shaughnessy, BA, Cornell University; Ph.D., California Institute of Technology—Assistant Professor, Mathematics: gravitational wave astronomy, numerical and general relativity

Michael W. Richmond, BA, Princeton University; MA, Ph.D., University of California at Berkeley—Professor, Physics and Astronomy: observational astronomy, supernovae, variable stars, reduction of optical data, automatic telescopes

Andrew Robinson, BSc, Ph.D., University of Manchester (United Kingdom)—Professor, Physics and Astronomy: astronomy, active galactic nuclei, supermassive black holes, radio galaxies, high redshift quasars

John Whelan, BA, Cornell University; Ph.D., University of California at Santa Barbara—Graduate Program Coordinator, Astrophysical Sciences and Technology; Professor, Mathematics: quantum physics, gravitational wave data analysis, astrophysical relativity

Michael D. Zemcov, BSc, University of British Columbia (Canada); Ph.D., Cardiff University (United Kingdom)—Assistant Professor, Physics and Astronomy: Experimental and observational cosmology, including cosmological structure formation, extragalactic background radiation, cosmic microwave background, near infra-red to submillimeter instrumentation

Yosef Zlochower, BS, Ph.D., University of Pittsburgh—Associate Professor, Mathematics: numerical relativity, relativistic astrophysics, black hole physics

Color Science

Roy S. Berns, BS, MS, University of California; Ph.D., Rensselaer Polytechnic Institute—Richard S. Hunter Professor of Color Science, Appearance, and Technology; Program of Color Science

Mark D. Fairchild, BS, MS, Rochester Institute of Technology; MA, Ph.D., University of Rochester—Head, Integrated Sciences Academy; Professor and Graduate Program Director, Color Science/Munsell Color Science Laboratory

Susan Farnand, BS, Cornell University; MS, Ph.D., Rochester Institute of Technology—Assistant Professor, Program of Color Science

Elena Fedorovskaya, MS, Ph.D., Lomonosov Moscow State University (Russia)—Research Professor, Program of Color Science

James Ferwerda, BA, MS, Ph.D., Cornell University—Associate Professor, Imaging Science

Joseph Geigel, BS, Manhattan College; MS, Stevens Institute of Technology; D.Sc., George Washington University—Associate Professor, Computer Science

Andrew Herbert, BS, McGill University (Canada); MA, Ph.D., University of Western Ontario (Canada)—Associate Dean, College of Liberal Arts; Professor, Department of Psychology, visual perception

David Long, BS, University of Texas at Austin; MS, University of Rochester, Ph.D., Rochester Institute of Technology—Director, RIT Center for Media, Arts, Games, Interaction & Creativity (MAGIC) and MAGIC Spell Studios; Associate Professor, Motion Picture Science

Michael Murdoch, BS, Cornell University; MS, Rochester Institute of Technology, Ph.D., Eindhoven University of Technology (Netherlands)—Assistant Professor, Program of Color Science

Imaging Science

Peter Bajorski, MS, University of Wroclaw (Poland); Ph.D., Technical University of Wroclaw (Poland)—Professor, regression models, multivariate analysis, nonparametrics, statistical approaches to spectral image processing

Charles Bachmann, A.B., Princeton University; Sc.M., Ph.D., Brown University—Associate Professor, Imaging Science; Frederick and Anna B. Wiedman Chair: coastal characterization from remote sensing; advanced retrieval algorithms for hyperspectral and multi-sensor imagery; spectroscopy, BRDF, and advanced instrumentation for calibration and validation; pattern recognition; graph and manifold descriptions of high-dimensional data

Nathan Cahill, BS, MS, Rochester Institute of Technology; D.Phil., University of Oxford (United Kingdom)—Associate Dean for Industrial Partnerships; Graduate Program Director, Mathematical Modeling; Associate Professor, Mathematics: scientific computing, biomedical image analysis, computer vision, advanced mathematical approaches to image processing

Gabriel J. Diaz, BFA, Skidmore College; MS, Ph.D., Rensselaer Polytechnic Institute—Assistant Professor, Imaging Science: visually guided action; human motor control; eye movements; visual prediction; virtual/augmented reality systems

Sohail A. Dianat, BS, Aria-Mehr University (Iran); MS, Ph.D., George Washington University—Professor, Electrical Engineering: digital communication, signal processing and image processing

Vikram Dogra, MD, JIPMER Medical School (India)—Professor of Diagnostic Radiology, Urology and Biomedical Engineering, Department of Imaging Sciences, University of Rochester School of Medicine

Roger L. Easton, BS, Haverford College; MS, University of Maryland; MS, Ph.D., University of Arizona—Professor, Imaging Science: application of imaging technologies to manuscripts of cultural importance; optical holography; digital and optical signal/image processing

James Ferwerda, BA, MS, Ph.D., Cornell University—Associate Professor, Imaging Science: high dynamic range imaging, perceptually-based rendering, material appearance, display systems, low vision and assistive technologies

Ernest Fokoue, Maitrise B.Sc., University of Yaounde (Cameroon); M.Sc., Aston University (United Kingdom); Ph.D., University of Glasgow (United Kingdom)—Professor, statistical machine learning and data mining

Michael Gartley, BS, Binghamton University; MS, Ph.D., Rochester Institute of Technology—Assistant Research Professor, Imaging Science: modeling and simulation of remote sensing signature phenomenology

Richard Hailstone, BS, Northern Illinois University; MS, Indiana University—Associate Professor, Imaging Science: characterization of materials using electron microscopy, synthesis of nanoparticles, imaging system modeling

Maria Helguera, BS, National Autonomous University of Mexico (Mexico); MS, University of Rochester; Ph.D., Rochester Institute of Technology—Associate Research Professor, Imaging Science: medical imaging, ultrasound tissue characterization, digital image processing

Andrew Herbert, BS, McGill University (Canada); MA, Ph.D., University of Western Ontario (Canada)—Associate Dean, College of Liberal Arts; Professor, Department of Psychology, visual perception

Matthew J. Hoffman, BA, Williams College; MS, Ph.D., University of Maryland—Graduate Program Director, Applied and Computational Mathematics; Associate Professor, data assimilation, applied mathematics, ocean and atmospheric forecasting, remote sensing; hyperspectral vehicle tracking

Joseph P. Hornak, BS, Utica College of Syracuse University; MS, Purdue University; Ph.D., University of Notre Dame—Professor, Joint Appointment with School of Chemistry and Materials Science: physical chemistry, magnetic resonance spectroscopy and imaging

Emmett Ientilucci, BS, MS, Ph.D., Rochester Institute of Technology—Assistant Professor, Imaging Science: remote sensing, hyperspectral image processing, multivariate statistics, target detection, radiometry

Christopher Kanan, BS, Oklahoma State University; MS, University of Southern California, Ph.D., University of California, San Diego—Assistant Professor, Imaging Science: computer vision, object categorization, active vision, visual saliency, eye movement analysis

Joel H. Kastner, BS, University of Maryland; MS, Ph.D., University of California, Los Angeles—Professor, Imaging Science: astronomical imaging, including x-ray, infrared and radio spectroscopy; young stars and planet formation; evolved stars and planetary nebulae

John P. Kerekes, BS, MS, Ph.D., Purdue University—Professor, Imaging Science: multispectral remote sensing systems, multidimensional imaging system, pattern recognition

Robert L. Kremens, BS, The Cooper Union; MS, University of Rochester; MS, Ph.D., New York University—Research Professor, Imaging Science: wildland fire behavior and effects, remote sensing instrumentation, autonomous remote instruments for environmental monitoring, electronics measurement systems

Cristian Linte, BSc, University of Windsor (Canada); MESc, Ph.D., University of Western Ontario (Canada)—Assistant Professor, Biomedical Engineering: image-guided visualization and navigation for minimally invasive therapy

David W. Messinger, BS, Clarkson University; Ph.D., Rensselaer Polytechnic Institute—Director, Professor, and Xerox Chair, Imaging Science: remote sensing image exploitation, advanced mathematical approaches to spectral image processing, LWIR hyperspectral processing, cultural heritage imaging

Zoran Ninkov, BSc, University of Western Australia (Australia); MS, Monash University (Australia); Ph.D., University of British Columbia (Canada)—Professor, Imaging Science: detector array development and characterization, development of novel astronomical instrumentation, studies of young stellar clusters, planetary detection

Jeff Pelz, BFA, MS, Rochester Institute of Technology; Ph.D., University of Rochester—Frederick Wiedman Professor, Imaging Science: visual perception and cognition, understanding high- level visual processing by examining eye movements in the execution of complex tasks in natural environments

Raymond Ptucha, BS, State University of New York at Buffalo; MS, Ph.D., Rochester Institute of Technology—Assistant Professor, Computer Engineering; machine learning, computer vision, robotics, and embedded control

Jie Qiao, BS, University of Science and Technology Liaoning (China); MS, Tsinghua University (China); MBA, University of Rochester; Ph.D., University of Texas at Austin—Associate Professor, Imaging Science: optical metrology, optical instrumentations, adaptive optics and active optics, ultrafast laser systems and applications (remote sensing, material processing), optical system design and performance evaluation

Eli Saber, BS, State University of New York at Buffalo; MS, Ph.D., University of Rochester—Professor, Electrical and Microelectronic Engineering: signal, image and video processing; computer vision

Carl Salvaggio, BS, MS, Rochester Institute of Technology; Ph.D., Syracuse University and the State University of New York College of Environmental Science and Forestry—Professor: novel techniques for the measurement of spectral optical properties, quantitative reflective and emissive remote sensing, digital image processing, three-dimensional geometry extraction from imagery, and scene simulation and modeling

Andreas Savakis, BS, MS, Old Dominion University; Ph.D., North Carolina State University—Professor, Computer Engineering: digital image processing, computer vision

Grover Swartzlander, BS, Drexel University; MSEE, Purdue University; Ph.D., Johns Hopkins University—Professor, Imaging Science: optical vortices, optical coronagraphs and high contrast imaging, pattern formation in linear and nonlinear optics, optical tweezers, optical coherence, solar sailing, metamaterials

Brian Tomaszewski, BA, University of Albany; MA, University of Buffalo; Ph.D., Pennsylvania State University—Associate Professor, Interactive Games and Media: geographic information science and technology, visual analytics, context modeling and representation, disaster management

Jan van Aardt, BSc, University of Stellenbosch (South Africa); MS, Ph.D., Virginia Polytechnic Institute and State University—Professor, Imaging Science: remote sensing of natural resources, application of hyperspectral, light detection and ranging for spectral-structural characterization of natural systems, integrated modeling approaches, scaling of natural resources remote sensing solutions through sensor interoperability

Anthony Vodacek, BS, University of Wisconsin; MS, Ph.D., Cornell University—Professor, Imaging Science: imaging spectrometry applications environmental characterization and monitoring; remote sensing data assimilation in environmental models; thermal and non-thermal techniques for wildland fire detection; coastal remote sensing and aquatic optics

Richard Zanibbi, BA, MSc, Ph.D., Queen's University (Canada)—Associate Professor, Computer Science: pattern recognition, machine learning, document recognition, CAPTCHAs, human-computer interaction, and programming languages

Mathematical Modeling

Ephraim Agyingi, BS, MS, University of Ilorin (Nigeria); Ph.D., University of Manchester (United Kingdom)—Associate Professor, numerical analysis

Mihail Barbosu, BS, Ph.D., Babes-Bolyai University (Romania); MS, Ph.D., Paris VI University (France)—Professor, mathematical modeling, dynamical systems, celestial mechanics and space dynamics, symbolic computation systems, data analytics, management science

Nate Barlow, BS, Ph.D., Clarkson University—Assistant Professor, stability and propagation of waves in fluids, asymptotic methods

Maurino P. Bautista, BS, Ateneo de Manila University (Philippines); MS, Ph.D., Purdue University—Professor, numerical analysis, applied mathematics

Bernard Brooks, BS, University of Toronto (Canada); MBA, Rochester Institute of Technology; MS, Ph.D., University of Guelph (Canada)—Professor, mathematical modeling

Nathan Cahill, BS, MS, Rochester Institute of Technology; D.Phil., University of Oxford (United Kingdom)—Associate Dean for Industrial Partnerships; Graduate Program Director, Mathematical Modeling; Associate Professor, Mathematics: scientific computing, biomedical image analysis, computer vision, advanced mathematical approaches to image processing

Manuela Campanelli, Laureate in Mathematics, University of Perugia (Italy); Ph.D., University of Bern (Switzerland)—Director, Center for Computational Relativity and Gravitation; Professor, Mathematics: numerical relativity, gravitational physics, computational astrophysics, black holes, gravitational waves

Elizabeth Cherry, BS, Georgetown University; Ph.D., Duke University—Professor, computational cardiac dynamics

Matthew Coppenbarger, BS, University of Arizona; MA, Ph.D., University of Rochester—Associate Professor, mathematical physics, spectral theory

Michael Cromer, BS, York College of Pennsylvania; MS, Ph.D., University of Delaware—Assistant Professor, mathematical modeling of complex fluids, asymptotics and perturbation methods, simulation

Moumita Das, BS, MS, Jadavpur University (India); Ph.D., Indian Institute of Science—Associate Professor, Physics: theoretical soft condensed matter, mechanical response of biological materials and living systems

Joshua Faber, BS, State University of New York at Stony Brook; Ph.D., Massachusetts Institute of Technology—Professor, Mathematics: numerical relativity, computational astrophysics, dynamics

Raluca Felea, BS, University of Iasi (Romania); Ph.D., University of Rochester—Associate Professor, microlocal analysis

Anthony A. Harkin, BS, State University College at Brockport; MS, Massachusetts Institute of Technology; Ph.D., Boston University—Associate Professor, applied and computational mathematics, partial differential equations

Matthew J. Hoffman, BA, Williams College; MS, Ph.D., University of Maryland—Graduate Program Director, Applied and Computational Mathematics; Associate Professor, data assimilation, applied mathematics, ocean and atmospheric forecasting, remote sensing; hyperspectral vehicle tracking

Bonnie C. Jacob, BA, Smith College; MS, Ph.D., Clemson University—Assistant Professor

Jobby Jacob, BS, Bharata Mata College (India); MS, Indian Institute of Technology (India); MS, Ph.D., Clemson University—Associate Professor, graph theory

Baasansuren Jadamba, BS, National University of Mongolia (Mongolia); MS, University of Kaiserslautern (Germany); Ph.D., University of Erlangen-Nuremberg (Germany)—Associate Professor, partial differential equations, inverse problems, numerical optimization

Akhtar Khan, MS, Technical University Kaiserslautern (Germany); Ph.D., Michigan Technological University—Associate Professor, applied math, optimization, inverse problems, variational inequalities, elasticity imaging

Cristian Linte, BSc, University of Windsor (Canada); MESc, Ph.D., University of Western Ontario (Canada)—Assistant Professor, Biomedical Engineering: image-guided visualization and navigation for minimally invasive therapy

Carlos Lousto, MS, Universidad Nacional De La Plata (Argentina); Ph.D., Universidad De Buenos Aires (Argentina)—Professor, numerical relativity

Carl V. Lutzer, BS, Michigan State University; MA, Ph.D., University of Kentucky—Professor, mathematical physics

Kara L. Maki, BS, University of New Hampshire; MS, Ph.D., University of Delaware—Associate Professor, mathematical modeling, scientific computing

Nishant Malik, BS, MS, University of Delhi (India); Ph.D., University of Potsdam (Germany)—Assistant Professor, network science, nonlinear dynamics, stochastic processes

Panos P. Markopoulos, BS, MS, Technical University of Crete (Greece); Ph.D., University at Buffalo—Assistant Professor, Communication and Signal Processing

Laura M. Munoz, BS, California Institute of Technology; Ph.D., University of California at Berkeley—Assistant Professor, mathematical biology, dynamical systems, applied control theory

Darren A. Narayan, BS, State University of New York at Binghamton; MS, Ph.D., Lehigh University—Professor, graph theory, discrete math

Jason Nordhaus, BA, BS, MS, Ph.D., University of Rochester—Assistant Professor, Science and Mathematics, National Technical Institute for the Deaf: computational astrophysics, core-collapse supernovae, binary interactions, strongly magnetized compact objects, physics of common envelopes

Jennifer O'Neil, BS, Rochester Institute of Technology; Ph.D., Purdue University—Assistant Professor, Mechanical Engineering Technology: fluid dynamics, non-Newtonian liquids

Richard O'Shaughnessy, BA, Cornell University; Ph.D., California Institute of Technology—Assistant Professor, gravitational wave astrophysics

Niels F. Otani, BA, University of Chicago; Ph.D., University of California at Berkeley—Associate Professor, mathematical biology

Poornima Padmanabhan, B.Tech., Indian Institute of Technology, Madras (India); Ph.D., Cornell University—Assistant Professor, Chemical Engineering: self-assembly, thermodynamics, materials design, soft matter

Mary Lynn Reed, BS, Georgia Institute of Technology; MFA, University of Maryland; Ph.D., University of Illinois—Head, School of Mathematical Sciences; Professor

David Ross, BA, Columbia College; Ph.D., New York University—Professor, differential equations and numerical analysis

George Thurston, AB, Oberlin College; Ph.D., Massachusetts Institute of Technology—Graduate Program Director, Physics; Professor, Physics: biological and chemical physics, experimental and theoretical studies of phase transitions, physical and chemical basis of protein condensation diseases, nuclear magnetic resonance, light, x-ray, and neutron scattering

John T. Whelan, BA, Cornell University; Ph.D., University of California at Santa Barbara—Professor, computational relativity and gravitation, gravitational wave data analysis

Steven J. Weinstein, BS, University of Rochester; MS, Ph.D., University of Pennsylvania—Department Head; Professor, interfacial transport processes, hydrodynamic wave phenomena, applied mathematics

Tamas Wiandt, BS, Jozsef Attila University (Hungary); Ph.D., University of Minnesota—Associate Head of School; Associate Professor, dynamical systems

Yosef Zlochower, BS, Ph.D., University of Pittsburgh—Associate Professor, numerical relativity

Golisano Institute for Sustainability

Nabil Nasr, Associate Provost and Institute Director
rit.edu/gis

Programs of Study

Doctor of Philosophy degree in:	Page
Sustainability, Ph.D.	170

Master of Science degree in:	
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Master of Architecture degree in:	
Architecture, M.Arch. (offered in collaboration with the College of Art and Design)	168

Golisano Institute for Sustainability is a comprehensive academic, training, and technology-transfer center focusing on multidisciplinary studies in sustainable production systems and the built environment. The institute's research areas include sustainable products, sustainable mobility, alternative energy systems, Eco-IT, and pollution prevention.

Admission requirements

Each college makes all decisions regarding graduate admission. Please refer to the individual program descriptions for information regarding specific admission criteria. For general graduate admission information, please refer to the Admission section of this bulletin.

Financial aid and scholarships

Please refer to the Financial Aid and Scholarship section of this bulletin for information regarding financial aid, scholarships, grants, loans, and graduate assistantships.

Research

The Golisano Institute for Sustainability is home to six different research centers and institutes, each with a highly specific mission in sustainability.

- *National Center for Remanufacturing and Resource Recovery* is internationally recognized as a leading center for applied research in remanufacturing.
- *Center for Integrated Manufacturing Studies* combines applied research with technology transfer to help manufacturers remain competitive in the global marketplace.
- *Center for Sustainable Mobility* assesses and evaluates the environmental and economic impact of different alternative fuel and propulsion technologies on the entire U.S. public transportation system.
- *Center of Excellence in Sustainable Manufacturing* is dedicated to enhancing the environmental and economic performance of products and processes.
- *New York State Pollution Prevention Institute* enhances the understanding of pollution prevention techniques while disseminating technologies to enhance these efforts.
- *NanoPower Research Labs* is dedicated to the creation and utilization of nano devices and materials for power generation and storage.

Facilities

The institute's headquarters are located in the new 84,000 sq. ft. Sustainability Institute Hall, which is certified LEED® (Leadership in Energy and Environmental Design) Platinum by the U.S. Green Building Council—the highest standard that can be achieved in the rating system. The building is adjacent to the Center for Integrated Manufacturing Studies that houses additional laboratories. Labs and facilities include:

- *Clean Technologies Demonstration Lab:* Features a wide variety of environmentally friendly cleaning technologies utilized in remanufacturing processes.
- *Eco-Design Lab:* Focuses on developing and testing product design solutions that reduce the environmental impact of information technology products throughout their lifecycle.
- *Electronics Lab:* GIS' focal point for the development and testing of embedded systems for prognostic applications.
- *Environmental Chemistry Lab:* Fundamental chemistry techniques are used to reduce life-cycle environmental impacts of products and processes with an emphasis on end-of-life material recovery processes.
- *Fuel Cell Testbed:* Innovations in fuel cell technologies are developed and tested with research focused on improving reliability and reducing costs.
- *Imaging Products Laboratory:* Provides state-of-the-art evaluation and research to enhance the sustainability of imaging products.
- *Materials Integration Lab:* Investigates how the bulk physical properties of materials lead to wear and the failure of components and subsystems.
- *Materials Science Lab:* Focuses on the analysis of material composition and how material properties drive failure of components.
- *Microgrid Testbed:* Information about the building's variable energy production and usage is analyzed to determine how to optimally use this energy in Sustainability Institute Hall.
- *Rapid Reverse Engineering Lab:* Equipped with instruments to accurately reconstruct missing product design information to enable new production, improve design, and enhance opportunities for remanufacturing.
- *Staples Sustainable Innovation Lab:* Supports the innovation and development of products having low environmental impact.
- *Sustainable Manufacturing Testbed:* This lab is devoted to developing advanced manufacturing, remanufactuirng, and recycling processes.
- *Vehicle Dynamics Lab:* Testing of engines, as well as complete vehicles, is conducted in order identify ways of improving energy efficiency and reducing emissions due to alternative fuels.

Architecture, M.Arch.

www.rit.edu/study/architecture-march
Architecture Department
585-475-4990, archdept@rit.edu

Program overview

Sustainability concerns are changing how we think about architecture. Buildings account for a large percentage of the world's energy expenditures and carbon emissions, which has driven demand for more sustainable architecture. In RIT's accredited master of architecture program, we're moving sustainability forward to elevate the value of architectural design. As a student here, you'll learn how to design with context and substance in areas such as positive energy, performance building, climate-responsive designs, passive resiliency, and more.

Our accredited architecture program offers an immersive program focused on investigating the complexity of designing buildings with people, space, and the environment in mind. Whether you have a background in the building design sector or are new to the field, the program will prepare you for a path to positively contribute to the design of tomorrow's buildings, neighborhoods, and communities.

Our program offers foundation courses as well as more in-depth classes exploring integrated building systems, urban planning, industrial ecology, and more. You'll also have the flexibility to choose electives in other subject areas based on your unique talents and career goals, such as business, engineering, energy, or additional design skills.

What Sets Us Apart

1. Design matters: As a program emphasizing design, the program's core education takes place in the studio. Our studio curriculum integrates construction technologies, material science, and mechanics into design.
2. Hands-on education: Expect a hands-on learning environment, working on real-world projects and utilizing our 75,000-square-foot, LEED Platinum-certified building to observe and test building efficiency. The City of Rochester and the western New York region also serve as an active learning environment for our students.
3. Work experience: A professional co-op will help you build your resume before you graduate. RIT's cooperative education program lets you work in the field with local architects and present neighborhood improvement ideas to planning boards.
4. Global experience: Our global experience requirement lets you experience new cultures, settings, and contexts to expand your understanding of diverse architectural interests and needs.
5. STEM-designated: Our program is STEM-designated, which increases scholarship and research opportunities for students, and offers up to two additional years of work/study for international students.
6. NAAB-accredited: We're one of the few master of architecture degree programs in the U.S. to be accredited by the National Architectural Accrediting Board (NAAB)—that means you're getting one of the best architecture educations in the country.
7. Thesis: Our thesis option allows you to integrate everything you learn into a comprehensive project. Past student theses include designs for an urban master plan for Rochester's downtown, a net-zero or positive energy building, and a turbine system to harvest rainwater for energy.

Plan of Study

There are two primary tracks of study offered in the M.Arch. program. We work with each student individually to determine the best track and can customize course requirements based on levels of prior experience.

1. For those with previous experience and an undergraduate degree in architecture, an Advanced Standing track provides a two to two-and-a-half year path with a requirement of 78 credit hours.
2. For those with no prior experience or background in architecture, the Standard Admissions track is available, providing a three and half year path and a requirement of 105 credit hours.

Designed as a full-time program, courses are offered on campus, primarily during the day, and often include open periods between classes to allow time for students to gain work experience with an architectural firm while they complete their degree.

With design, creative exploration, and critical thinking as key underpinnings, our program is grounded around four primary areas:

- Sustainability: With a global need for a more sustainable world, including buildings and their impact on energy consumption and carbon footprints, the focus of many courses reflect the conditions of sustainable design and practice.
- Technology: Design exploration is enhanced through the understanding of the implication of technology on both design process and product. The program enables students to focus and collaborate in many specialized areas of technology, including engineering, computer science, imaging science, materials and construction, and products and remanufacturing.
- Urbanism: The complexity of the urban environment requires an interdisciplinary approach to architecture education—one that references economics, public policy, sociology, and regional culture. With this in mind, the program also focuses on the practices and principles of preservation and adaptive reuse.
- Integrated learning/practice: From the outset, students often approach design problems within teams, learning to value and leverage collective and collaborative participation. Through integrated learning and evidenced-based models, we prepare students for the increasingly integrated practice of architecture, where architects are orchestrating teams of professionals from a variety of fields, including engineering, management, science, and computer science.

Enhanced Career Opportunities

RIT's master of architecture program is proud of the 100 percent job placement rate among our graduates. Our alumni are employed in architectural firms around the world and are working in diverse fields, from community development to smart growth to green building materials. Within firms and elsewhere, they serve as architectural designers, research scientists, sustainability consultants, planning engineers, start-up entrepreneurs, and more. Plus, our professional co-ops are a compelling program requirement that often leads to employment offers from architects and other firms working in construction, urban design, and facilities management.

Innovation Through Diversity

Enhancing the value of design requires constructive collaboration and a breadth of skills and viewpoints, interwoven in a way that elevates and celebrates everyone's differences and strengths at RIT. The master of architecture degree is suited for students with or without a background in

the architecture or sustainability fields. Many of our students have been former art teachers, film students, engineers, interior designers, lawyers, and more before beginning their studies. They bring these backgrounds to the program in ways that enriched conversations and perspectives about design and human needs. Plus, approximately one-third of our students are international students, bringing cultural experiences and architectural design concepts from every continent.

Accreditation

The RIT master of architecture program is what is often referred to as a Type I program whereby students can enter with either an architecture or non-architecture related undergraduate degree and fulfill the prerequisite for licensure. Prospective students may find The "NCARB Handbook for Interns and Architects" and "Toward an Evolution of Studio Culture" helpful to learn more about the benefits of attending an accredited program.

Curriculum

Architecture, M.Arch. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ARCH-611	Architectural Representation I	3
ARCH-612	Architectural Representation II	3
ARCH-621	Architectural History I	3
ARCH-622	Architectural History II	3
ARCH-631	Architectural Design I	6
ARCH-632	Architectural Design II	6
ARCH-641	Fundamentals of Building Systems	3
ARCH-761	Understanding Sustainability	3
Second Year		
ARCH-731	Architectural Studio I: Site	6
ARCH-734	Architectural Studio II: Urban	6
ARCH-741	Integrated Bldg Systems I	3
ARCH-742	Integrated Building Systems II	3
ARCH-751	Architectural Theory	3
ARCH-752	Urban and Regional Planning	3
ARCH-762	Industrial Ecology Fundm	3
ARCH-763	Sustainable Building Metrics	3
Third Year		
ARCH-733	Architectural Studio III: Adaptive	6
ARCH-735	Architecture Studio IV: Integrative	6
ARCH-743	Integrated Building Systems III	3
ARCH-744	Integrated Building Systems IV	3
ARCH-753	Research Seminar/Thesis Prep	3
	Graduate Sustainability Elective	3
	Graduate Electives	6
Fourth Year (fall only)		
ARCH-771	Professional Practice	3
ARCH-790	Thesis	6
	Graduate Electives	6
Summers		
ARCH-698	Global Experience	0
ARCH-699	Coop Architecture	0
Total Semester Credit Hours		**105**

Admission requirements

To be considered for admission to the M.Arch. program in architecture, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (B.Arch., BS, BA, BFA, or equivalent) from an accredited university or college from an accredited institution.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Successfully complete at least one semester each of college-level math (e.g. algebra, pre-calculus, calculus, etc.) and science (e.g. physics, earth science, chemistry, etc.).
- Submit a personal statement of educational objectives.
- Submit scores from the GRE.
- Submit two letters of recommendation from academic or professional sources.
- Submit a PDF digital portfolio of creative work, which may include sketches, constructions, graphics, and/or photographs. While student portfolios do not require examples of architectural drawing/design, evidence of creative talent will be important in determining admission. (Refer to Portfolio Requirements for more information.)
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Portfolio Guidelines

All applications must be accompanied by a PDF digital portfolio. Print or bound portfolios or digital portfolios in formats other than PDF will not be accepted or reviewed. Please note, all PDF portfolios should be less than 6.0mb. Larger files will not be accepted or reviewed. In the event the review committee requires additional information or higher resolution images, the applicant will be notified.

Guidelines for portfolio preparation:

- Image quality: A medium quality image setting on a digital camera is sufficient. No images should be pixelated.
- File size: The total size in an 8.5"x11" format and cannot exceed 6.0mb. Alternatively students may use the PDF portfolio feature (found under FILE, in more recent versions of Adobe Acrobat) to create a portfolio.
- Orientation: Landscape orientation is preferred.
- Cropping: Crop out unnecessary objects from the images so that there are no distractions from work presented.
- Image enhancement: If the image files of your work are not accurate after photographing, image-editing software is allowed to correct the appearance of the files submitted. Please use caution. It is important to maintain the integrity of the original artwork.
- File name: Only one PDF portfolio file is allowed. It should be labeled using the following format: UARC_XX_LASTNAME.PDF, (XX is equal to the code for the academic year to which you are applying, ex: 2019 would be 19, 2020 would be 20, etc.) Enter last name in all capital letters in place of LASTNAME. Do not enter given names or middle names in this field.
- Submission: All PDF portfolio files must be submitted via email to gradinfo@rit.edu. Students should include their name in the subject line of the email. Files delivered on CD/ROM or USB drives will not be reviewed or accepted.

Sustainability, Ph.D.

www.rit.edu/study/sustainability-phd
Sustainability Department
585-475-7363, sustdept@rit.edu

Program overview

Our approach to sustainability means working in the broader context of environmental assessment, economics, and policy. Each faculty member in the Golisano Institute for Sustainability sponsors a select number of students for specific research projects, with the scope varying from fundamental science to applied engineering to corporate sustainability applications. On acceptance into a sponsored research project, you will receive a fully funded education, a stipend to help with living expenses, your own office space, and the time to develop your technical expertise in sub-areas dependent on your research.

In the sustainability Ph.D. program, you'll have the opportunity to learn from areas across the entire university to develop your own innovative approach to the field, building off of methodologies such as life cycle assessment, environmental risk and impact assessment, design for the environment, pollution prevention, closed loop supply chain management, and product life assessment. Moreover, you'll work side-by-side with our world-renowned faculty who are avid researchers in diverse areas including biofuels, transportation, energy policy, resource recovery, smart products and systems, and more.

The Ph.D. degree helps you think innovatively about how sustainability can positively impact systems all over the world through big-picture solutions, from training future business leaders to maximizing natural resources. You don't need a background in sustainability to join this program; you just need a desire to create positive change in the world. We bring in students of all ages, from all backgrounds—from biotechnology to business—and from all over the world. You'll also find a wide range of experience—many of the program's students have more than 10 years of career experience and/or education when they enroll.

The faculty are well-known scholars and active researchers who not only bring their knowledge into the classroom but also directly involve students in their scholarship. This work includes a wealth of hands-on experience in our impressive research facilities, including a 75,000-sq.-ft., LEED Platinum certified research building with over nine labs and six technology testbeds. With this level of experience, you'll be prepared for diverse academic and industry jobs where you can make an impact on the way the world views and utilizes sustainable practices, from the macro to the micro.

Plan of study

With the Ph.D. degree's integrative curriculum, you will develop a deep foundation in sustainability science, sustainable systems, risk analysis, and more. You can also choose several electives from across colleges at RIT—from Computational Modeling and Simulation to Principles of Statistical Data Mining—to tailor your degree and create interdisciplinary relationships throughout the university.

Through your sponsored research project, you'll have the opportunity to make novel and impactful contributions to the development and understanding of sustainable technologies. Recent dissertation examples include:

- Implications of Consumer Lifestyle Changes and Behavioral Heterogeneity on U.S. Energy Consumption and Policy
- Criticality of Byproduct Materials: Assessing Supply Risk, Environmental Impact, and Strategic Policy Response for Tellurium
- Development of an Integrated Reformer and Fuel Cell System for Portable Power Applications

You must complete 60 semester credit hours of course work and research to conclude this program.

Active research areas

Sustainable Energy
- Fuel cells
- Photovoltaics
- Energy supply/demand models
- Energy policy

Circular Economy
- Life cycle assessment
- Electronic waste and battery recycling
- Waste-to-energy processes
- Food waste management
- Remanufacturing

Sustainable Urban Systems
- Smart Cities
- Transportation systems analysis
- Food Waste Management
- Food-Energy-Water Nexus

Community involvement

Rochester, NY, is a hub for sustainability professionals and home to rich natural resources, such as fertile farmland and the nearby Finger Lakes. Many students share their passion for sustainability with the local community by working in volunteer service on projects like K-12 education, community gardens, farmer's markets, and more. In addition, you will connect with the larger sustainability world by attending and presenting at professional conferences all over the world.

Curriculum

Sustainability, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISUS-702	Fundamentals of Sustainability Science	3
ISUS-704	Industrial Ecology	3
ISUS-706	Economics of Sustainable Systems	3
ISUS-806	Risk Analysis	3
ISUS-808	Multicriteria Sustainable Systems	3
	Elective	3
Second Year		
Complete 8 credits from the following:		8
ISUS-807	Research	
ISUS-890	Dissertation Research	
PUBL-810	Technology, Policy and Sustainability (or approved substitute)	3
	Electives	9
Third Year		
ISUS-890	Dissertation Research	8
	Electives	6
Fourth Year		
ISUS-890	Dissertation Research	8
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the Ph.D. program in sustainability, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college from an accredited institution. Course work must

include at least one year of college science and one year of college mathematics, including calculus and statistics.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit scores from the GRE.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit at least two letters of recommendation from academic or professional sources. Letters should be submitted directly to RIT and must be confidential.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Sustainable Systems, MS

www.rit.edu/study/sustainable-systems-ms
Sustainability Department
585-475-7363, sustdept@rit.edu

Program overview

Sustainable systems accepts students from any academic background and encompasses a wide range of interdisciplinary studies in sustainability science. Here, you won't be restricted to one sustainability topic or methodology. You will comprehensively learn and experience the methods that lead to environmental, social, technological, and business success, working one-on-one with a faculty advisor to tailor the degree to your sustainability interests.

In the sustainable systems MS, you will start with a broad foundation of knowledge in environmental life cycle assessment, sustainable decision making, economic and policy strategies, and more. Then, you will have the opportunity to customize your degree in areas that suit your interests and career goals—such as renewable energy or mobility—as well as get the hands-on experience that employers are seeking. In as little as one year of study, you will be prepared to make sustainability decisions that you can apply to any career.

Not only will you be able to focus on an area that interests you, but you will be able to get hands-on in your projects with the use of one of our many labs or through design modeling tools. This degree allows you the flexibility to adapt your career over time and in response to the ever-changing developments in sustainability. The Golisano Institute for Sustainability is dedicated to groundbreaking sustainability research and its business applications. Our research facilities are second to none, including Sustainability Institute Hall, a 75,000-sq.-foot, LEED Platinum certified research building and multiple state-of-the-art research centers.

You don't need a background in sustainability to join this program; just a desire to create positive change in the world. We bring in students of all ages, from all backgrounds—from mechanical engineering to political science—and from all over the world so that your learning experience comes not just from the classroom, but from the different perspectives of fellow students.

Plan of study

Through a flexible and interdisciplinary curriculum, you'll begin your degree with core courses in industrial ecology, risk assessment, the economics of sustainability, and more. Several electives from across the university will allow you to further tailor your degree to your talents and career goals, from sustainable craft brewing and distilling to corporate social responsibility.

Your degree culminates with a research thesis or a capstone project. Recent thesis examples include:
- Techno-Environmental Analysis of Generating Animal Feed from Wasted Food Products
- Fabrication and life cycle assessment of organic photovoltaics
- Characterizing adaptive capacity to climate change in developing countries: a case study on Peru

You must complete 24 credit hours of course work plus a 6 credit hour thesis or capstone project, which can be completed in as little as one year by full-time students.

Potential tracks

Sustainable Energy
- Sustainable Energy Systems

- Food-Energy-Water Nexus
- Energy Policy

Example research project: Inspection of wind turbine blades with unmanned aerial vehicles (UAVs)

Circular Economy
- Intro to Geographic Info Systems (GIS)
- Data Analysis for Sustainability
- Innovation Policy
- Corporate Social Responsibility (CSR)

Example research project: Assessing a baseline case for reaching carbon neutrality in Monroe County by 2027

Sustainable Urban Systems
- Sustainable Mobility Systems
- Graduate Sustainable Communities
- Sustainable Building Metrics

Example research project: Evaluating strategies for sustainable renovation of RIT campus buildings

Enhanced career opportunities

Our graduates have a 100 percent placement rate, in part because of RIT's dedication to career counseling and ongoing relationships with employers. This means that all of our graduates gain employment or choose to further their education shortly after graduating. And If you're interested in pursuing a career more focused in academia or research, the master's degree is also an excellent stepping stone to a doctoral program, such as RIT's Ph.D. in sustainability, if you take the route of completing a thesis while here.

Community involvement

Rochester, NY, is a hub for sustainability professionals and entrepreneurship. Students in the sustainable systems degree program are often regularly involved with local companies and organizations, from teaching about sustainability practices at inner-city high schools to completing a capstone project for companies including Rochester Regional Health or Wegman's Food Market's corporate headquarters.

Curriculum

Sustainable Systems (capstone option), MS degree, typical course sequence (semesters)

COURSE		SEMESTER CREDIT HOURS
First Year		
ISUS-702	Fundamentals of Sustainability Science	3
ISUS-704	Industrial Ecology	3
ISUS-706	Economics of Sustainable Systems	3
ISUS-780	Capstone	6
ISUS-806	Risk Analysis	3
ISUS-808	Multicriteria Sustainable Systems	3
PUBL-810	Technology, Policy and Sustainability (or approved substitute)	3
	Electives	6
Total Semester Credit Hours		**30**

Sustainable Systems (thesis option), MS degree, typical course sequence (semesters)

COURSE		SEMESTER CREDIT HOURS
First Year		
ISUS-702	Fundamentals of Sustainability Science	3
ISUS-704	Industrial Ecology	3
ISUS-706	Economics of Sustainable Systems	3
ISUS-806	Risk Analysis	3
ISUS-808	Multicriteria Sustainable Systems	3
	Electives	3
Second Year		
ISUS-790	Thesis	6
PUBL-810	Technology, Policy and Sustainability (or approved substitute)	3
	Elective	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in sustainable systems, candidates must fulfill the following requirements:
- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college from an accredited institution.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Have fulfilled the following curriculum requirements: one year of college science and one year of college mathematics (inclduing calculus and statistics).
- Submit scores from the GRE.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Participate in an interview with the academic department.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Additional information

Non-matriculated students

An applicant with a bachelor's degree from an approved undergraduate institution and the appropriate background is permitted to take graduate courses as a non-matriculated student. If the student is subsequently admitted to the graduate program, a limited number of credit hours from courses taken at RIT as a non-matriculated student can be transferred to the degree program. Any applicant who wishes to register for a graduate course as a non-matriculated student must obtain permission from the chair of the graduate program and the course instructor.

Faculty

Nabil Nasr, BS, Helwan University (Egypt); M.Eng., Pennsylvania State University; MS, Ph.D., Rutgers University— Associate Provost and Director, Golisano Institute for Sustainability

Dennis A. Andrejko, B.Arch., Arizona State University; M.Arch., Massachusetts Institute of Technology—Head, Department of Architecture, Associate Professor

Thomas A. Trabold, BS, Ph.D., Clarkson University—Head, Department of Sustainability, Associate Professor

Nana-Yaw A. Andoh, B.Arch., M.ADU., University of Notre Dame—Assistant Professor

Callie W. Babbitt, BS, Georgia Institute of Technology; ME, Ph.D., University of Florida—Associate Professor

Jules Chiavaroli, B.Arch., University of Notre Dame; MBA, Rochester Institute of Technology—Professor

Eric Williams, BA, Macalester College; Ph.D., State University of New York at Stony Brook—Associate Professor

Alissa D. DeWit-Paul, BS, Cornell University; M.Arch., State University of New York at Buffalo—Visiting Lecturer

Nathaniel Williams, BS, The Evergreen State College; Ph.D., Carnegie Melon University—Assistant Professor

Online Learning

www.rit.edu/online

Online graduate programs

Master's degrees:

- Applied Statistics
- Business Administration (Online Executive MBA)
- Computing Security
- Construction Management
- Data Science
- Environmental, Health and Safety Management
- Health Care Interpretation
- Health Informatics
- Health Systems Management
- Human Resource Development
- Human-Computer Interaction
- Imaging Science
- Information Sciences
- and Technologies
- Manufacturing Leadership
- Microelectronics Manufacturing Engineering
- Networking and System Administration
- Product Development
- Professional Studies
- Service Leadership and Innovation

Advanced certificates:

- Applied Statistics
- Communication and Digital Media
- Cybersecurity
- Health Care Finance
- Information Assurance
- Lean Six Sigma
- Network, Planning and Design
- Organizational Learning
- Project Management
- Service Leadership and Innovation
- Workplace Learning and Instruction

RIT is a recognized leader in the delivery of online asynchronous education. Since 1980, the university has offered distance learning courses and was among the first universities nationwide to utilize the Internet as a mode of delivery. In 1991, the university began offering full degrees through online learning.

RIT offers numerous degree and certificate programs in an online format—most of which may be earned without ever coming to campus. The university offers hundreds of graduate and undergraduate courses online annually. Each year nearly 5,000 students enroll in an online learning course. Students are encouraged to select and apply to their chosen academic program, but in some cases may enroll in courses prior to matriculation into a program.

Online learning offers students the flexibility to learn on their own time, when and where it best meets their needs. All online courses are taught using Internet and Web-based technologies. Students must have Internet access, a computer, DVD player and monitor, and a telephone to participate in courses. Not all courses use the same technologies. Some take advantage of toll-free phone or Web conferences, while others use text-based chat or CD-ROMs. Some have Web-based simulations and some require additional software to complete course requirements. All courses use asynchronous Internet/Web-based tools for the fundamental class structure.

Online students have full access to customer and technical support through phone and e-mail. Online learners also have full access to the library and its services. Other online services include registration, orientation, access to student records, and course material ordering. Officially registered students receive e-mails about three weeks before the online course begins welcoming them to the online learning experience and directing them to orientation information. Here, students can visit the Online Student Community to access information on courses, order course materials, and review any proctored exam requirements.

All courses offered online meet the same rigorous objectives set for traditional classroom experiences. Faculty members who teach online courses often teach the same class in a traditional format.

However, just as each professor establishes the learning outcomes for a traditional course, their individual choices are also reflected in the online classroom. Most classes establish either a weekly schedule for learning activities or a project-based learning approach, in which deliverables (assignments, projects, discussion participation, etc.) are due after certain learning outcomes are accomplished. Most classes also include various readings either from textbooks or electronic reserves. Students interact online with other students to exchange ideas and collaborate much as they would face-to-face.

Online learning serves students throughout the United States and in nearly 40 countries. Students living near Rochester may choose to take both online and traditional courses as a way of increasing flexibility and remaining on target to complete a degree.

Graduate Admission

www.rit.edu/admissions/graduate

Admission decisions for graduate applicants are made by the department or college offering the program, and upon receipt of a completed application file from the Office of Graduate Enrollment Services. Correspondence between the student and the university is conducted through the Office of Graduate Enrollment Services, according to the following policies and procedures:

1. Inquiries regarding academic programs, as well as all applications for graduate study, are directed to the Office of Graduate Enrollment Services, Rochester Institute of Technology, Bausch & Lomb Center, 58 Lomb Memorial Drive, Rochester, NY 14623-5604. 585-475-2229, gradinfo@rit.edu.
2. The Office of Graduate Enrollment Services will acknowledge the inquiry or application, instructing the student as to the information required for admission by the school or department to which he or she is applying.
3. Once a student has submitted a formal application, the Office of Graduate Enrollment Services will prepare an applicant file. All correspondence and admission information is collected by the Office of Graduate Enrollment Services and placed in the applicant's file. The file will include an RIT application, previous college records (transcripts), applicable test scores, letters of recommendation, and other documents that may support admission of the candidate.
4. When all relevant admission data has been received, the applicant's file is sent to the appropriate school or department for review and an admission decision.
5. When the school or department has made a decision on the application, the decision form is returned to the Office of Graduate Enrollment Services.
6. The Office of Graduate Enrollment Services notifies candidates of admission decisions.
7. Academic units may informally advise non-degree students, but no formal program of study can be approved prior to admission.
8. The formal program is laid out by the dean's designee (department head, coordinator or program director, etc.) and is the one that must be followed by all students applying for admission or readmission in that program.
9. The basic entry requirements for graduate degree candidates include the completion of a baccalaureate degree and whatever other evidence of the applicant's potential to complete graduate studies may be required by the particular program. Rare exceptions to the baccalaureate requirement can be made in the case of candidates who have demonstrated unusual competence in their field of specialization. For these exceptions the recommendation of the department chairperson or director and the approval of the appropriate dean and the dean of graduate education are required.

The U.S. Government expects international students to prove competency in the English language prior to their acceptance to an American college or university. In keeping with this expectation, students whose native language is not English and whose secondary or higher education was completed in a non-native English speaking country must take a test of English language proficiency. Students must achieve the following minimum scores prior to consideration for admission into graduate studies: 550 (paper-based) or 79 (Internet-based) on the Test of English as a Foreign Language (TOEFL), 6.5 on the International English Language Testing System (IELTS), or 58 on the Pearson Test of English – Academic. Individual academic units may require higher standards or additional requirements.

Applicants whose test results fall below the minimum scores for admission but who otherwise meet academic requirements will be referred to the English Language Center. They will not be admitted to academic programs until they meet proficiency criteria established by the English Language Center.

In certain cases graduate students may be admitted prior to, but conditional upon completion of the baccalaureate degree. Applicants should not be considered for admission prior to the start of their final year of undergraduate study. The student must present a final transcript signifying successful completion of their baccalaureate degree by the end of the first term they are enrolled in the graduate program.

Graduate applicants who do not fully satisfy all admission criteria as to grades, test scores or other credentials, but do show sufficient promise to qualify for a trial period of graduate study may be admitted on probation to the university. Such students must achieve a 3.00 (B) program grade point average by the end of their first 9 credit hours of graduate study. Those students who do not meet this criterion will be suspended. Responsibility for specific requirements and maintenance of the student's appropriate status rests with the academic unit in consultation with the Office of Graduate Enrollment Services and the Office of the Registrar.

New York State immunization requirement

All students registered for four or more credits and born after January 1, 1957, must comply with New York state and RIT immunization requirements. New York State Law requires proof of immunity to measles, mumps, and rubella through either two MMR immunizations or positive blood titers for each disease. New York state also requires all students, regardless of age, to sign a meningococcal awareness form. RIT requires students age 26 and under to have the meningitis shot. Required immunizations should be obtained before arrival to avoid delay in registration or interruption of classes for which students have enrolled. Contact the Student Health Center (www.rit.edu/studentaffairs/studenthealth) with questions. Additional information and forms are available online.

Readmission

Students who leave a graduate program, or have a lapse in enrollment greater than or equal to three terms, including summer, and wish to return to that program must reapply through the Office of Graduate Enrollment Services. All student applications are subject to admissions standards at the time of reapplication. The program of study shall be subject to review and may be rewritten. Previous waiver and/or transfer credit may be lost, and program deficiencies may need to be made up.

Each college has the responsibility, upon a student's readmission, of determining which previous courses if any, are applicable toward the degree. Be aware that standards and degree requirements may have changed and previous waiver, transfer, or competency credit may be lost and program deficiencies may need to be made up. All readmission decisions are made by the academic unit. Readmission is not guaranteed.

Graduate students must complete the graduate program
within seven years of the date of matriculation into their program. This does not apply to prerequisites, bridge program courses or similar requirements.

Costs and Payment Procedures

Costs and Payment Procedures

The university reserves the right to change its tuition and fees without prior notice. Nonmatriculated students are charged graduate rates for graduate courses.

Graduate costs are listed in the table on this page. In addition, any graduate student carrying more than 18 credit hours of study will be charged the full-time tuition rate plus $1,980/credit hour for each hour of study exceeding 18.

Room and board for full-time students: A variety of housing options (residence halls and apartmentd) and meal plans are available to graduate students. Costs vary according to options selected. For information about housing and meal plan options, please visit Housing Operations at: rit.edu/fa/housing/.

The cost of books and supplies varies depending on the area of study and the number of courses taken by a student. The estimated cost for books and supplies ranges from $500 to $2,500 a year for full-time students and $300 to $700 a year for part-time students.

Charges for tuition, fees, and room and board are computed on a semester basis. University billing statements may be paid by cash, check, or electronic check (e-check). The university does not accept credit card payments for tuition, fees, and room and board that appear on the student billing statement. However, we have an arrangement for a third-party vendor to accept MasterCard, Visa, and Discover Card when payment is made online. The vendor does charge a percentage fee for each credit card transaction. Billing-related payments (check) may be mailed to: Rochester Institute of Technology, Student Financial Services, P. O. Box 92878-200, Rochester, NY 14692-8978. Payment also may be made in person at the Office of Student Financial Services on the first floor of the University Services Center. Credit card and e-check payment information can be found at www.rit.edu/fa/sfs/billing-dates-and-payment-options.

Due dates are clearly designated on the billing statement and our website. Failure to pay the amount due or arrange an optional payment by the due date will result in a late payment fee. Charges less anticipated financial aid and other credits reflected on billing statement will be divided into four installments. Payments due are:

- **Fall semester: August 15, 2019**
- **Spring semester: January 15, 2020**

Payment plan option information can be found at: www.rit.edu/fa/sfs/billing-dates-and-payment-options.

Graduate Costs

FALL 2019-2020	TWO SEMESTERS
Tuition (12–18 credit hours)	$47,522
Student Activities Fee	$296
Student Health Services Fee	$350
Estimated Living Expenses*	$13,548
Estimated costs for books, supplies, transportation, and personal expenses†	$2,088
TOTAL	**$63,796**

* Estimates based on combined costs for rent, utilities and food in RIT apartments. Choice of housing will determine (and possibly increase) actual cost. If you live in RIT housing, your living expenses will vary depending on where you live. Additional information regarding on-campus housing options and costs can be reviewed online at Housing Operations.

† Photography and art students should estimate an additional $2,000 for materials and supplies per 9-month period of study.

Electronic Billing

The university has an electronic billing (E-Bill) program for students. Each semester, all students receive an e-mail notification to their official university e-mail account stating that their E-Bill is available. Students have the option of granting additional access to allow for a parent, guardian, sponsor, or other authorized user to receive E-Bill notifications (www.rit.edu/eservices).

Student Accident and Sickness Insurance

All registered students are required to maintain medical insurance while attending RIT. Insurance coverage can be through RIT, a family member's policy, or a personal policy.

A student accident and sickness insurance plan is available through RIT. There is a separate charge for this insurance. The plan provides coverage, within limits specified in the policy, for sickness and injury, outpatient services, emergency care, and prescriptions.

Enrollment in this plan is voluntary for all students except registered international undergraduate students (full- and part-time) on A, B, E, F, G, I, J, K, O, Q, R, and V visas. These students will be enrolled automatically in the basic accident and sickness policy on a semiannual basis.

There is no need to waive coverage if it is not desired. Students who want to enroll in this plan may enroll online or by mail. An open enrollment period is available at the beginning of each academic semester. Payment can be made by check, money order, or credit card, or the premium can be added to the student's account.

The open enrollment period ends 30 days after the start of the academic semester in which the student first registers.

For plan and enrollment information, visit the web at www.universityhealthplans.com or call 800-437-6448. Students are not required to obtain the student accident and sickness insurance plan to receive services at the Student Health Center.

Refund Policies

For information regarding refund policies for withdrawal during the semester, please contact the Student Financial Services Office or visit their website at www.rit.edu/fa/sfs/refund.

Partial refund schedule for room and board

To complete a withdrawal from RIT, a resident student must check out with Housing Operations. All students on a meal plan should check out with the Food Service administrative office, located in the Student Alumni Union, room A520 (lower level). Refunds, when granted, are from the date of official check out. Room and board refund policies are established by the Center for Residential Life and RIT Food Service.

Room

1. During the first week of classes—90 percent of unused room charge
2. During the second week of classes—75 percent of unused room charge
3. During the third week of classes—60 percent of unused room charge
4. During the fourth week of classes—50 percent of unused room charge
5. Fifth and subsequent weeks—no refund

Board

1. Within the first four weeks—75 percent of the unused meal/debit charges
2. After the fourth week—50 percent of the unused meal/debit charges
3. During the last two weeks of classes—no refund

Any student who intentionally defrauds or attempts to defraud the university of tuition, fees, or other charges, or who gives false information in order to obtain financial aid, is subject to legal liability, prosecution, and university disciplinary action.

Financial Aid

www.rit.edu/admissions/aid

General Information

RIT offers a full range of financial aid programs to assist graduate students with their educational expenses. The information provided in this section is an overview of the sources of assistance available. Please consult the Office of Financial Aid and Scholarships' website for more detailed information.

Scholarships and assistantships are available in most graduate departments. In addition, some departments offer externally funded tuition remission and stipends from corporate or government sponsors. Please contact the appropriate graduate program director or the Office of Graduate Enrollment Services for additional information.

Financial aid awards are offered only once a student is accepted. Awards are generally given to full-time students, but exceptions are made for qualified part-time students.

All federal student aid programs require submission of the Free Application for Federal Student Aid (FAFSA). The FAFSA may be completed online at www.fafsa.gov. Only US citizens or eligible non-citizens may use the FAFSA.

International students (F-1 or J-1 visa holders) may generally work on campus for up to 20 hours per week. Special authorization from International Student Services and/or the USCIS is needed for all other employment, including co-ops and internships. Please consult International Student Services at (585) 475-6943 or www.rit.edu/iss for employment or visa questions.

Federal Satisfactory Academic Progress Requirements

To be eligible for federal financial aid, students who are U.S. Citizens or permanent resident aliens (i.e. green card) are required by the U.S. Department of Education (34 CFR 668.34) to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. RIT has established this SAP policy to ensure student success and accountability and to promote timely advancement toward degree objectives.

All students receiving federal assistance (i.e. Direct Loans, Direct Graduate PLUS Loans, Federal Work-Study) must remain admitted in a degree program. Regulations require a maximum time frame for degree completion, a quantitative measurement (at RIT a student must complete 67% of credit hours attempted), and a qualitative measurement (at RIT a student must have at least a 3.0 cumulative grade point average).

Credit hours attempted include withdrawals, repeated courses, grade exclusions, non-matriculated courses, and credit by exam. Transfer credit count toward both attempted and completed credit hours.

Students must also complete their program within 150 percent of the standard time frame it would normally take to attain the degree. For example, a thirty (30) credit hour master's degree program would allow a student a maximum of forty-five (45) attempted credit hours to degree completion.

Review of academic records occurs at the end of each semester. Any student who has attempted or earned nine (9) or more credit hours but does not have a cumulative GPA of a 3.0 or higher will be considered not to be making SAP for federal financial aid programs (Direct Loans, Direct Graduate PLUS Loans). In addition, a student must have completed at least 67% of his total attempted credit hours. A student who does not meet this pace requirement also will not be making SAP. A student who does not appear to be able to meet degree completion within 150% of the program of study is not making SAP.

With the exception of the 150 percent degree completion requirements, students who do not make SAP may request Federal Financial Aid Probation by submission of a Request for Federal Financial Aid Probation available from the Office of Financial Aid and Scholarships. In addition to this form, the student must provide a Federal SAP Action Plan developed by the student's primary academic unit that demonstrates what the student must accomplish in order to regain federal SAP. The Office of Financial Aid and Scholarships will notify the student of the results of the request for probation. If approved, a student may continue to receive federal financial aid, as long as the individual meets the goals outlined within the SAP Action Plan. The probation period may not be longer than two semesters in length. A student is only eligible for one Federal Financial Aid Probation for his entire graduate career at RIT. As such, the student should only request Federal Financial Aid Probation if seeking federal financial aid.

In addition, loan eligibility for students with full-time equivalent status who are registered for less than six (6) credit hours is limited to a maximum of three (3) semesters unless a detailed academic plan is provided for approval by the Office of Financial Aid and Scholarships.

Course work not applicable to the student's program of study cannot be counted toward enrollment status nor in the determination of federal financial aid eligibility.

Financial Aid Refund Policy

Return of federal funds

In accordance with federal regulations, the Office of Financial Aid and Scholarships recalculates federal aid eligibility for students who withdraw, drop out, are suspended, or take a leave of absence prior to completing more than 60 percent of a term. "Withdrawal date" is defined as the actual date the student initiated the withdrawal process, the student's last date of academic related activity or the midpoint of the term for a student who leaves without notifying the university. Recalculation is based on the percent of earned aid using the following formula: number of days completed up to the withdrawal date/total days in the term. Aid returned to federal programs is then equal to 100 percent minus the percentage earned multiplied by the amount of federal aid disbursed.

Funds are returned to the federal government in the following sequence: Federal Direct Unsubsidized Loans, Federal Direct PLUS Loans, and other federal aid.

Late disbursement

If the student is otherwise eligible, the first disbursement of Federal Direct Unsubsidized Loan and/or Federal Direct Graduate Plus Loan proceeds is allowed up to 180 days after the student has ceased to be enrolled. Subsequent disbursements are not allowed.

State scholarships
Regulations vary. Any adjustments are done in accordance with the specific requirements of the sponsoring state.

Privately funded grants and scholarships
In the absence of specific instructions from the sponsor, 100 percent of the semester award will be credited to the student's account.

RIT grants and scholarships
Institutional funding such as RIT grants and scholarships are prorated based on the tuition refund schedule for withdrawal during a semester. For more information, please contact the Office of Financial Aid and Scholarships or visit their website at rit.edu/financialaid.

Financial Aid Programs

GRANTS/SCHOLARSHIPS	ELIGIBILITY	AMOUNT	HOW TO APPLY
Graduate Assistantships	Graduate student matriculated into an RIT graduate degree program.	Amounts vary	Complete Graduate Admissions Application and check appropriate box to be considered for graduate assistantships.
Graduate Merit-based Scholarships	Graduate student matriculated into an RIT graduate degree program.	Amounts vary	Complete Graduate Admissions Application and check appropriate box to be considered for graduate scholarship.
Vietnam Veterans Tuition Award Program	Eligible Veterans who are New York state residents.	$7,070 per year for full-time study; available for undergraduate or graduate study.	File the Free Application for Federal Student Aid (FAFSA) and TAP Application. Also file the Vietnam Veterans Tuition Award Supplement at www.hesc.ny.gov.
Veterans Benefits	Eligible veterans and children of deceased veterans, or service-connected disabled veterans.	Amounts vary.	Contact: Office of Veterans Affairs at (888) 442-4551, or visit their website at www.va.gov.
Bureau of Indian Affairs Graduate Fellowship Grants	Enrolled full-time and recognized by Secretary of the Interior as a member of an Indian tribe and demonstrating financial need and academic achievement.	Amounts vary	Contact American Indian Graduate Center (AIGC) at (800) 628-1920, or on the Web at www.aigcs.org.

LOANS	ELIGIBILITY	AMOUNT	HOW TO APPLY
Federal Direct Loans	Matriculated students who are enrolled at least half-time and who are U.S. citizens or permanent residents.	Maximum amount: $20,500. The maximum amount cannot exceed the cost of education minus all other financial aid awarded.	File the Free Application for Federal Student Aid (FAFSA). (must be a U.S. citizen or Permanent Resident)
Federal Direct PLUS Loans for Graduate Students	Matriculated students who are enrolled at least half-time and who are U.S. citizens or permanent residents.	The maximum amount cannot exceed the cost of education minus all financial aid awarded.	File the Free Application for Federal Student Aid (FAFSA) and complete a Federal Direct PLUS Loan application.
Private Alternative Loans	Enrolled student who is credit-approved by lender.	Up to the cost of education minus all other financial aid awarded.	Consult the Office of Financial Aid and Scholarships website at www.rit.edu/financialaid or contact the private lender directly. Students should always consider federal loans before private loans.

EMPLOYMENT	ELIGIBILITY	AMOUNT	HOW TO APPLY
Federal Work Study Program	Students who are U.S. citizens or permanent residents with financial need: most jobs provided are on campus, and some community service positions are available.	Varies, depending on hours and wage rate (RIT wage rates start at $11.10 per hour).	File the Free Application for Federal Student Aid (FAFSA). Contact the RIT Student Employment Office at www.rit.edu/emcs/seo.
RIT Employment Program	No financial need requirement; may be on campus or off campus.	Varies, depending on hours and wage rate (RIT wage rates start at $11.10 per hour).	Contact the RIT Student Employment Office at www.rit.edu/emcs/seo.

This chart covers the most commonly awarded financial aid programs available to full-time graduate students at RIT. Information is correct as of August 2019. Most graduate programs require satisfactory progress toward degree completion to maintain eligibility. Filing the FAFSA by April 1 will ensure priority consideration for all programs. Applications filed after this date will receive consideration as long as funds remain available. Scholarships provided by RIT will be prorated for NTID-sponsored students to reflect lower NTID tuition rates.

University Policies and Procedures

www.rit.edu/academicaffairs

Academic Policies and Procedures

The complete library of student academic policies and procedures may be found online at: www.rit.edu/academicaffairs/policiesmanual/policies/student.

A graduate degree at RIT may be obtained in more than 70 programs ranging from business administration to imaging science. (Please refer to page 4 for a complete listing of graduate programs of study.)

Upon completion of the stipulated requirements, students are certified by their academic departments for their degrees. A statement verifying that a degree has been awarded will be posted to the transcript and diplomas are mailed to all graduates.

Enrollment

1. Student should complete the enrollment and payment process in accordance with university enrollment/billing procedures, as indicated in the current enrollment guide.
2. It is the responsibility of the student to update their address online through the Student Information System (SIS), or to advise the registrar of any change of address.
3. University ID cards are required for students to use many campus facilities and services (e.g., the library, Student Life Center, meal plans, check cashing). Identification cards are available at the Registrar's Office.
4. Students are expected to pursue their degree without a substantial break. Failure to enroll (register) for three successive academic terms, including summer but excluding Intersession, can result in the loss of active student status.
5. RIT considers graduate-level students to be "full time" in every academic term in which they are enrolled for at least 9 semester credit hours. With approval of the department chair and associate provost for academic programs, additional equivalent credit can be granted for such activities as thesis work, teaching assistantships, and internships.

Student classification

Active graduate students are those who have applied to and been formally accepted into a graduate program through the Office of Graduate Enrollment Services. Such students may enroll for graduate-level courses (600 and above) that fit their home department-approved programs. When enrolling for graduate courses outside the home department, students may need to secure the approval of the department offering the course.

Non-degree-seeking students will be allowed to take graduate courses on a space-available basis with the department's approval, and with the knowledge that course work completed while a non-degree-seeking student will not necessarily apply to any given academic program.

Active and non-degree-seeking graduate students may enroll for undergraduate-level courses with the understanding that these courses will not apply to any RIT graduate program.

Degree Requirements

Credit requirements

The minimum credit requirement for a master's degree is 30 semester credit hours. At least 80 percent of these credit hours must be earned at the graduate level and in residence at the university.

Transfer credit

A maximum of 20 percent of the total required semester hours for the graduate degree may be awarded through any combination of transfer credit, waived credit, and credit by competency. Only a course with a grade of B (3.0) or better may be transferred.

Transfer credits are not calculated in the student's grade point average but will count toward overall credit requirements for the degree. Transfer credits do not count toward the satisfaction of residency requirements.

A graduate student who wishes to take courses at another institution and transfer them toward degree work at RIT must obtain prior permission from the appropriate departmental officer or dean.

Candidacy for an advanced degree

A graduate student must be a candidate for an advanced degree for at least one term prior to receipt of the degree. The position of the Graduate Council is that a student is a candidate for the master or doctoral degree when they are formally admitted to RIT as a graduate student.

Dissertation, thesis, or project requirements

Included as part of the total credit-hour requirement may be a research, dissertation, thesis, or project requirement, as specified by each department. The amount of credit the student is to receive must be determined by the time of enrollment for that term. For the purpose of verifying credit, an end-of-term grade of R should be submitted for each enrollment of research and thesis/dissertation guidance by the student's faculty adviser. Before the degree can be awarded, the acceptance of the thesis/dissertation must be recorded on the student's permanent record. Students also should note the following continuation of thesis/dissertation policy. Students who submit a project recieve a letter grade upon completion.

Students who complete a thesis or dissertation are required to submit an electronic copy of the thesis or dissertation to ProQuest/UMI for publication.

Continuation of thesis/project/dissertation

Once work has begun on a thesis, project or dissertation, it is seen as a continuous process until all requirements are completed. If a thesis, project, or dissertation is required, or such an option is elected, and if the student has completed all other requirements for the degree, the student must enroll for the Continuation of Thesis/Project/Dissertation course each term (including summer but excluding intersession). This course costs the equivalent of one-semester credit hour, although it earns no credit.

1. Enrollment for the Continuation of Thesis/Project/Dissertation course preserves student access to RIT services; e.g., Wallace Library, academic

computing, and faculty and administrative support. With payment of appropriate user fees, access to the Student Life Center and Student Health Center also is preserved.
2. If circumstances beyond students' control preclude them from making satisfactory progress on their thesis/project/dissertation, they should consider taking a leave of absence and discuss such a leave in advance with their adviser/department head. The dean's signature of approval is required on the Leave of Absence or course, or take an approved leave of absence, their departments may elect to remove them from the program.
3. The length of time to complete a thesis/project/dissertation is at the discretion of the department. Be sure to read, however, the first point under "Summary of requirements for master's degree" on this page.

Note: The dissertation is required only of Ph.D. students.

Summary experience

The Graduate Council regards some form of integrative experience as necessary for graduate students. Such requirements as the comprehensive examination, a project, the oral examination of the thesis, and a summary conference are appropriate examples, provided they are designed to help the student integrate the separate parts of their total educational experience. The nature of the experience will be determined by the individual college or department.

Overlapping credit for second degree

At the discretion of the Graduate Committee in the specific degree area, a maximum of 20 percent of previous RIT master's degree earned hours can normally be applied toward satisfying requirements for a second master's degree. The use of a given course in two different programs can be allowed only if the course that was used for credit toward the first degree is a required course for the second degree. The course must be used in both programs within five years; i.e., no more than five years between the time used for the first degree and when applied again toward the second degree.

In no case shall fewer than the minimum 30 semester credit hours be required for the second degree. If duplication of courses causes a student to go below the 30-hour limit in the second degree program, he or she would be exempted from these courses but required to replace the credit hours with departmentally approved courses. An RIT student will not be admitted through the Graduate Enrollment Services Office to the second degree program until the first program has been completed.

Financial standing

Tuition and fees paid to the university cover approximately 60 to 70 percent of the actual expense of a student's education. The rest of the cost is borne by the university through income on its endowment, gifts from alumni and friends, and grants from business and industry. Students, former students, and graduates are in good financial standing when their account is paid in full in the Student Financial Services Office. Any student whose account is not paid in full will not receive transcripts or degrees. The university reserves the right to change its tuition and fees without prior notice.

Summary of requirements for master's degree

1. Successfully complete all required courses of the university and the college. These requirements should be met within seven years of the date of matriculation into the student's program. Extension of this rule may be granted through petition to the dean of graduate education.
2. Complete a minimum of 30 semester credit hours for the master's degree. At least 80 percent of graduate-level course work and research (courses numbered 600 and above) must be earned in residence at RIT.
3. Achieve a program cumulative grade point average of 3.0 (B) or better.
4. Complete a thesis/project or other appropriate research or comparable professional achievement, at the discretion of the degree-granting program.
5. Pay in full, or satisfactorily adjust, all financial obligations to the university.

Note: The dean and departmental faculty can be petitioned, in extraordinary circumstances, to review and judge the cases of individual students who believe the spirit of the above requirements have been met yet fall short of the particular requirement. If the petition is accepted and approved by the faculty and dean of graduate education, a signed copy will be sent to the registrar for inclusion in the student's permanent record.

Definition of grades

Grades representing the students' progress in each of the courses for which they are enrolled are given on a grade report form at the end of each term of attendance. The letter grades are as follows:

GRADE	DESCRIPTION	QUALITY POINTS
A	Excellent	4.0
A-		3.67
B+		3.33
B	Above Average	3.0
B-		2.67
C+		2.33
C	Satisfactory	2.0
C-		1.67
D	Minimum Passing Grade	1.0
F	Failure	0.0

C- and below grades do not count toward the fulfillment of program requirements for a graduate degree. **The grades of all courses attempted by graduate students will count in the calculation of the cumulative grade point average.** The program cumulative grade point average shall average 3.0 (B) as a graduation requirement. The dean of the college or their designee must approve all applications for graduate courses a student wishes to repeat.

The GPA is computed by the following formula: GPA = total quality points earned divided by total credit hours attempted. There are other evaluations of course work that do not affect GPA calculations. Only I

and R (as described below) can be assigned by individual instructor at the end of a term.

Registered (R)—A permanent grade used in graduate coursework indicating that a student has registered for a given course but has yet to meet the total requirements for the course or has continuing requirements to be met. The grade is given in graduate thesis work. Completion of this work will be noted by having the approved/accepted thesis or dissertation title, as received by the registrar from the department, added to the student's permanent record. Full tuition is charged for these courses. "R" graded courses are allowed in the calculation of the residency requirement for graduate programs; however, they do not affect GPA calculations. A student may receive a grade of "U" or "I" in a given term of an "R" graded course. A "U" grade in this case carries no credit and the course must be repeated.

Withdrawn (W)—A grade that indicates an official course withdrawal has been processed. See policy D05.IV.

Satisfactory (S)—A satisfactory grade at the graduate level may only apply to seminar, cooperative work experience, study abroad affiliate programs, and internship courses where programs have determined that a traditional alpha system letter grade is inappropriate. An "S" grade at the graduate level carries no quality points and therefore does not enter into a GPA calculation. A student may receive a grade of "U" or "I" in an "S" graded course. In this case, a "U" grade carries no credit and the course must be repeated. No more than 15% of a program's degree credits may be "S" graded courses.

Incomplete (I)—When an instructor observes conditions beyond the control of a student such that the student is unable to complete course requirements in the given term or session, the instructor may assign an Incomplete notation ("I") to a student. The instructor determines and advises the student of the due date, not to exceed two terms including summer session but excluding intersession, by which the student must complete course requirements. If the registrar has not received a "Change of Grade" form from the professor after two terms including summer session but excluding intersession, then the Incomplete becomes an "F" grade or a "U" grade if the "I" was associated with an "R" or "S" graded graduate course. An extension of time may be granted at the discretion of the instructor. Credit hours are not earned and the GPA is not affected until a permanent grade is assigned.

Unsatisfactory (U)—A permanent grade used in certain graduate coursework indicating that a student made unsatisfactory progress towards completing the course requirements. No credit hours are earned for a "U" grade and the "U" grade does not affect the calculation of quality points or GPA. A "U" grade in an "R" or "S" graded course carries no credit and the course must be repeated.

If there are extenuating circumstances which render an instructor unable to assign a grade or evaluate a student's work and assign a grade to replace an "Incomplete" notation, the head of the academic unit in which the course was taught will select an instructor to act in the place of the original instructor. After appropriate evaluation of the student's work, that instructor will assign a grade in place of the "Incomplete" notation.

Waived courses (WV)—Those courses eliminated from the list of requirements that a student must take to graduate. For undergraduate students, only physical education courses and cooperative work experience may be waived because of previously completed experience.

For graduate students, required courses may be waived because of previously completed academic work but in no case shall the resulting graduate program requirements be reduced below 30 semester credit hours. In addition, waiver credit for graduate courses can be applied only towards required courses and not towards elective courses. The process of waiving courses and thereby reducing graduate program requirements is not to be confused with the process of substituting specific courses for published requirements with an equal number of credit hours, thus retaining the total number of credit hours in the specified program. The total combined amount of credit applied through external (non-RIT) transfer credit, waived courses, and credit by competency may not exceed 20% of the total credits in the graduate program as noted in the graduate catalog.

X Grade (X)—Assigned for successful completion of various assessments as defined in Policy D.02.0 Admissions. "X" grade for graduate students indicates Credit by Competency (graduate) (See policy D02.I.2).

"X" graded courses do not count toward the residency requirement and do not affect GPA calculations. Credit hours are included as hours earned.

For graduate students, the total combined amount of credit applied through external (non-RIT) transfer credit, waived courses, and credit by competency may not exceed 20% of the total credits in the graduate program as noted in the graduate catalog. Exceptions to the maximum credit by exam for graduate programs can be granted by the Graduate Council in unusual circumstances upon appeal from the dean of the college involved. For programs housed outside the college structure, the approval of the director of the academic unit is required.

Audit (AU)—Indicates a student has officially registered for the course for no credit. Courses available for audit are at the discretion of the college or academic unit. With permission of the instructor, the student may elect to take examinations and do course assignments. Audited courses do not count toward the residency or other degree requirements. Credit hours are not earned and GPA calculations are not affected.

A student may register for audit any time during the official registration period for the term. However, a student may not change from audit to credit or credit to audit after the official add/drop period (first seven calendar days, excluding Sundays and holidays, of the full fall, and spring terms and summer session). See Policy D03.0 - Registration. Changes from audit to credit must be accompanied by full payment of tuition.

Excluding audit courses, degree-seeking undergraduate students enrolling for 12 or more credit hours or graduate students enrolling for 9 or more credit hours may take any additional hours for audit at no incremental charge provided the total hours do not exceed 18 credit hours.

Excluding audit courses, undergraduate students enrolled for less than 12 credit hours or graduate students enrolled for less than 9 credit hours may take any additional hours for audit at a charge of one-half the normally assessed tuition rate.

Changing grades

Once a grade has been reported by an instructor, it is not within the right of any person to change this unless an actual error has been made in computing or recording it. If an error has been made, the instructor must complete the appropriate form. The completed form must be approved by the head of the department in which the instructor teaches. When approved, the form is then sent to the registrar. There is, however, an appeal procedure for disputed grades through the Academic Conduct Committee of the college in which the course is offered.

Academic probation and suspension

Any active graduate student whose cumulative or program cumulative GPA falls below a 3.0 after 9 credit hours (attempted or earned) will be placed on probation and counseled by the departmental adviser concerning continuation in the graduate program.

Those students placed on probation must raise their cumulative and program cumulative GPA to the 3.0 level within 9 credit hours or be suspended from the graduate program.

Should it be necessary to suspend a graduate student for academic reasons, the student may apply for readmission to the dean of the college or his designee upon demonstration of adequate reason for readmission.

Student Conduct Policies and Procedures

Standards for student conduct

The RIT community intends that campus life will provide opportunities for students to exercise individual responsibility and places high priority on self-regulation by its members. All members of the community are responsible for encouraging positive behavior by others, as well as preventing or correcting conduct by others that is detrimental to RIT's educational mission and values.

As an educational community, RIT strives for a campus environment that is free from coercive or exploitative behavior by its members. Moreover, it sets high standards that challenge students to develop values that enhance their lives professionally and will enable them to contribute constructively to society.

RIT enjoys a diversity of backgrounds, lifestyles, and personal value systems among those who compose the academic community. Students, however, are expected to observe and respect the policies and standards of the university and the right of individuals to hold values that differ from their own and those expressed by RIT. Students are encouraged to review the Student Rights and Responsibilities Handbook for information regarding campus policies and expectations of student conduct.

Students must recognize that they are members of the local, state, and federal communities, and that they are obliged to live in accord with the law without special privilege because of their status as students or temporary residents.

RIT offers a number of services for graduate students. Those described in the following pages are among the most frequently used.

RIT honor code

Integrity and strong moral character are valued and expected within and outside of the RIT community. Members of the campus community, including students, trustees, faculty, staff, and administrators, have adopted an honor code to:

- demonstrate civility, respect, decency, and sensitivity toward our fellow RIT community members, recognizing that all individuals at this university are part of the larger RIT family and as such are entitled to support and respect.

- conduct ourselves with the highest standards of moral and ethical behavior. Such behavior includes taking responsibility for our own personal choices, decisions, and academic and professional work.

- affirm through the daily demonstration of these ideals that RIT is a university devoted to the pursuit of knowledge and a free exchange of ideas in an open and respectful climate.

Computer security and safeguards

RIT's Code of Conduct for Computer and Network Use guides campus-wide use of all computers and networks. This document, found online at www.rit.edu/computerconduct, outlines RIT's official policy related to ethical use of computing and network resources. ITS put into place multiple safeguards to protect RIT's network environment and the integrity of individual user accounts. Additionally, ITS provides all students, faculty, and staff with antivirus software free of charge.

Health Policies

Health/Medical records

Medical records are confidential. Information will not be released without the written consent of the student. Exceptions to this rule are made only when required by the public health laws of New York state or a court-ordered subpoena or in a life-threatening situation.

New York state and RIT immunization requirements

New York state public law requires that all students enrolled for more than six credit hours in a term and born after January 1, 1957, must provide proof of having received the appropriate immunizations against measles, mumps, and rubella, and to sign a meningitis awareness form. The law applies to

all full time and part time students including RIT employees. Immunization requirements include:

- Two MMR vaccinations at least one month apart and after the first birthday;
- A Meningitis Awareness Form, signed by all students regardless of age; and
- Immunization against meningitis, which is required by RIT for all students age 21 and under.

Failure to comply with the New York State immunization law may result in exclusion from classes and the campus, and a $200 fine.

NOTE: An email notification is sent to students' RIT email account with directions to complete the necessary health information through the Student Health Center portal. Please note that the immunization form is to be completed by the student online and then downloaded and taken to the student's health provider or school official for verification. The form must then be forwarded to the Student Health Center for approval (fax: 585-475-7530).

Consumer Information

Student retention

RIT's graduation rate for freshmen seeking bachelor's degrees is 66 percent. Additionally, 88 percent of first-time, full-time freshmen register for their second year (source: IPEDS 2010 Enrollment and Graduation Rate Surveys).

Public Safety

The Public Safety Department is open 24-hours-a-day and is located in Grace Watson Hall. The department encourages the RIT community to take responsibility for their safety by staying informed of these services and reporting suspicious activity. Although each individual is ultimately responsible for their own personal safety, learning and practicing basic safety precautions can enhance one's well being. The department provides the following services:

Blue light call boxes—Identified by a blue light and located across campus these call boxes provide a direct line to Public Safety 24-hours-a-day. The location of the call is automatically recorded at the Public Safety Communications Center, making it possible for hard-of-hearing individuals to also use the call boxes. The call boxes may be used to request an escort, assist a motorist, report suspicious individuals or activity, or request access to a locked building or room.

Mobile escort service—Available to anyone, seven-days-a-week, on a timed schedule between 11 p.m. and 3 a.m.

Lost and found—All items lost and found on campus are stored by the Public Safety Department. To report an item lost, please visit rit.edu/publicsafety/safety/lostitems.html to submit information related to lost property (requires RIT computer account).

Emergency notification—If a family member needs to make an emergency notification to a student, he or she should contact Public Safety at (585) 475-2853 or TEXT at (585) 205-8333. Public safety will locate the student and relay the message.

Awareness programs—Public safety hosts a variety of prevention awareness programs and services on various topics including crime prevention, personal safety, and alcohol awareness. A monthly newsletter, RIT Ready, is distributed to students, faculty, and staff to bolster emergency preparedness on campus.

Annual Security and Fire Safety Report—Public safety's Annual Security and Fire Sadety Report is available online and offers a description of security practices and information on reported occurrences of crime. The report may be accessed online at: www.rit.edu/fa/publicsafety/sites/rit.edu.fa.publicsafety/files/2018AnnualSecurityReport.pdf

Confidential tip line—This service is to obtain information that is unattainable through conventional methods and to alert public safety to endangering behavior that might go otherwise unreported. Individuals who utilize the tip line are encouraged to leave their names and contact information; however, they will not be contacted. An online form is available at rit.edu/publicsafety/forms/tipline.

Crime statistics—The Advisory Committee on Public Safety will provide, upon request, all campus crime statistics as reported to the Department of Education. RIT crime statistics can be found at the Department of Education website (ope.ed.gov/security) or by contacting the Public Safety Department. A hard copy of reported crime statistics required to be ascertained under Title 20 of the U.S. Code Section 1092(f) will be mailed to the interested party within 10 days of the request.

Sexual assault information and CARES—Confidential counseling services are available to anyone in need by calling (585) 546-2777 (voice/TTY). RIT's Campus Advocacy Response and Support (CARES) is located on campus and provides confidential and crisis intervention and support services for relationship concerns. Contact (585) 295-3533 at any time for assistance.

Emergency Preparedness—RIT regularly communicates, prepares, and practices emergency management with public safety personnel and campus managers from various departments. If necessary, we will provide updated information through broadcast email, mass notification system (RIT ALERT), voicemail, ALERTUS beacons, and the university's website at rit.edu.

Outcomes Rate

In compliance with the federal Student-Right-to-Know and Campus Security Act, and regulations of the U.S. Department of Education, RIT provides the following information to current and prospective students:

- Of the cohort of full-time degree-seeking undergraduate students who first enrolled at RIT in fall 2009, 70.0 percent had earned their bachelor's degrees as of August 2015. While these beginning and end dates meet the act's requirements for determining a graduation rate (150 percent of the normal length of full-time study [4 years]), it is important to recognize that nearly two-thirds of entering freshmen enroll in programs with mandatory cooperative education requirements. These requirements range from three to 14 months depending upon the academic program, thus extending the reported program length to five years.

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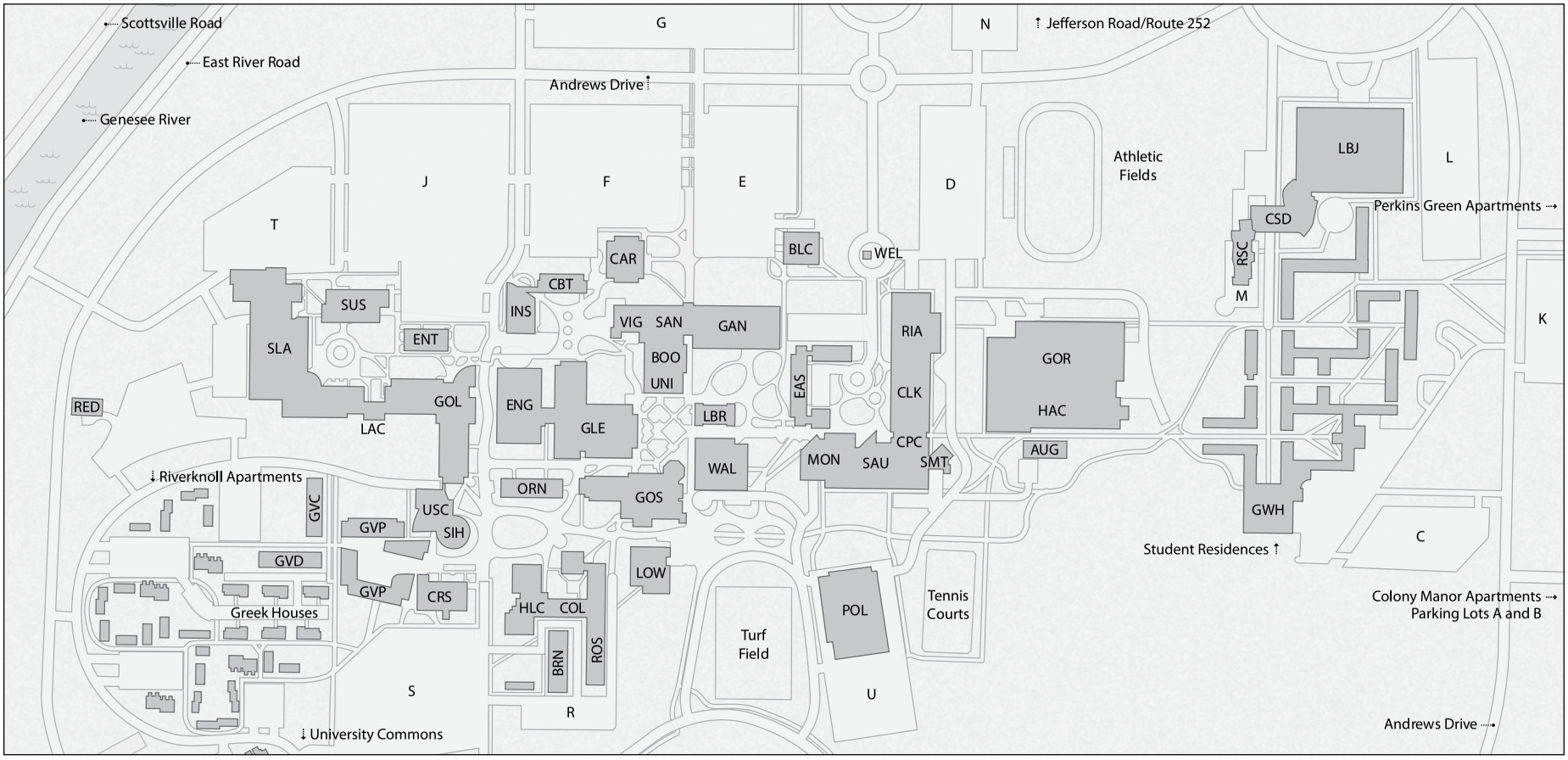

RIT CAMPUS MAP

AUG	August Center
BLC	Bausch & Lomb Center
BOO	James E. Booth Hall
BRN	Brown Hall
CAR	Chester F. Carlson Center for Imaging Science
CBT	Center for Bioscience Education & Technology
CLK	George H. Clark Gymnasium
COL	Color Science Hall
CPC	Campus Center
CRS	Crossroads
CSD	CSD Student Development Center
EAS	George Eastman Hall
ENG	Engineering Hall
ENT	Engineering Technology Hall
GAN	Frank E. Gannett Hall
GLE	James E. Gleason Hall
GOL	Golisano Hall
GOR	Gordon Field House and Activities Center
GOS	Thomas Gosnell Hall
GVC	Global Village Way C
GVD	Global Village Way D
GVP	Global Village Plaza
GWH	Grace Watson Hall
HAC	Hale-Andrews Student Life Center
HLC	Hugh L. Carey Hall
INS	Institute Hall
LAC	Laboratory for Applied Computing
LBJ	Lyndon Baines Johnson Hall
LBR	Liberal Arts Hall
LOW	Max Lowenthal Hall
MON	Monroe Hall
ORN	Orange Hall
POL	Gene Polisseni Arena
RED	Red Barn
RIA	Frank Ritter Ice Arena
ROS	Lewis P. Ross Hall
RSC	Rosica Hall
SAN	Sands Family Studios
SAU	Student Alumni Union
SIH	Student Innovation Hall
SLA	Louise Slaughter Hall
SMT	Schmitt Interfaith Center
SUS	Golisano Institute for Sustainability
UNI	University Gallery
USC	University Services Center
VIG	Vignelli Center for Design Studies
WAL	Wallace Library
WEL	Welcome Center