1973-1974 Graduate Bulletin

Rochester Institute of Technology

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Graduate
Catalog
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*Photography by John Massey, Communications Services, except as individually credited.*
Graduate Education at RIT

HISTORY AND OBJECTIVES

About fifteen years ago, Rochester Institute of Technology expanded its educational responsibilities to include graduate curricula. Encouragement from a variety of professional sources plus student demand caused the Institute to produce programs in the Arts and Crafts leading to the Master of Fine Arts degree. Shortly thereafter, RIT appointed a Council on Graduate Studies and petitioned for a charter change to give the Institute authority to grant the Master of Science degree. The function of the Council on Graduate Studies was to define the essential character of graduate study at the Institute, to establish policies and procedures for the administration of graduate study, and to provide for a continuous coordination in review of graduate programs. By 1963 student interest and industrial and business requirements caused the College of Science to develop a Master's program in Chemistry. This program was designed to provide opportunities for significant research, additional acquisition of knowledge in appropriate areas of Chemistry, and study in allied areas such as Physics and Mathematics.

Within a year, the Institute received requests from the Armed Forces and many industrial employers for a graduate program in Photographic Science. The new curriculum, in contrast to offerings at European universities, was concerned principally with the application of photography to problems of science and engineering.

By 1965 national and local surveys suggested still another area of responsibility that RIT might undertake. Considerable need was indicated for sophisticated statisticians, particularly individuals who could undertake the complex task of collecting, analyzing, and interpreting data necessary for industrial planning. Accordingly, the College of Continuing Education created a Department of Statistics and began to offer work leading to a Master of Science degree in Applied and Mathematical Statistics.

Soon thereafter the College of Engineering entered the field of graduate education through new programs in Electrical and Mechanical Engineering. These curricula were designed to meet the needs of the academically capable engineers in industry who wished to continue studies in a graduate degree program. The graduate curricula in Engineering provided students with meaningful opportunities to associate with those who were engaged in the daily application of scientific, engineering, and management knowledge in business and industry.
By 1968 important unmet demands for graduate training in Business Administration had been apparent in the Rochester area and beyond. In view of this considerable need, the College of Business developed a Master of Business Administration program which encompassed all of the management and business areas common to middle and upper-middle management. The new curriculum was also designed to provide a balance between the behavioral and quantitative aspects of business management.

As a logical extension of RIT's long experience in technical education, a new area of graduate study for Community and Technical College Faculty was also inaugurated. The Center for Community College Faculty Development was created to provide students with advanced knowledge in their technical specialty, an orientation to the objectives, programs, and philosophy of the two-year college, and those insights and skills required for teaching at the lower division level. An interdisciplinary approach to graduate study was emphasized, since the educational objectives of two-year college faculty varied from those of traditional graduate students. Programs were made available in the fields of Business Technology and Engineering Technology.

Later in 1968, in addition to the two-year M.F.A. program, the College of Fine and Applied Arts developed a program in Art Education leading to the M.S.T. degree. The program was specifically designed for secondary school teachers of fine and applied arts who wished to improve their understanding and skills, and earn Certification.

One of RIT's newer graduate programs has emanated from its School of Printing. The need for additional people with technological training in the graphic arts, as well as teachers who could apply new instructional methods and concepts that would encourage students to enter the printing profession, became apparent from the numerous requests RIT received for a graduate program in Printing. As a result, the School of Printing introduced a graduate program with two majors, operational in January, 1969, leading to the M.S. degree.

Recent additions to the list of graduate degree programs now available include the M.F.A. in Photography, meeting the demand for higher level professional offerings by the School of Photographic Arts and Sciences, and in 1971-72 a new program leading to an M.S. degree in Accountancy. A new program for 1972-73 is the graduate internship leading to a Master of Engineering degree. Also, through the Center for Community/Junior College Relations, there is a new external degree, in cooperation with other graduate learning centers, leading to an M.S. in Engineering Technology.

The Center for Community/Junior College Relations (formerly Center for Community College Faculty Development) is now developing an M.S. degree program in Instructional Technologies for those engaged in teaching or directing multi-media communications. This combines and builds upon the several communication/graphics/visual disciplines long associated with RIT.

The Institute has a continuous concern for the emerging needs of the business, industrial and scholarly communities, and will consider additional graduate programs as these requirements become evident.
Admission Requirements

POLICY Decisions of graduate selection rest within the colleges offering the program to which the student is applying. Correspondence between the student and the Institute will be conducted through the Admissions Office.

PROCEDURE 1. Inquiries about, and applications for graduate study are directed to the Director of Admissions.
2. The Admissions Office will acknowledge the inquiry or application, instructing the student as to the information required of him by the school or department to which he is applying before the admissions decision can be made.
3. Once a student has made formal application, the Admissions Office will prepare an applicant folder for him. All correspondence and admission data will be collected by the Admissions Office, and placed in the applicant's folder.
4. When all relevant admissions data have been received, the Applicant Folder will be sent to the appropriate school or department for action.
5. When the school or department has made a decision on the application, this decision and the Applicant Folder will be returned to the Admissions Office.
6. The Admissions Office will notify the student of the admissions decision.

The Institute reserves the right to alter any of its courses at any time.
Graduation Requirements

The minimum credit requirement for a Master's degree is 45 quarter credit hours (30 semester credit hours). A maximum of 9 quarter credit hours (6 semester credit hours) may be awarded as transfer credit from other institutions except for the External Degree offered through the Center for Community/Junior College Relations. Request for transfer credit must be made at the time of application for graduate student status. A graduate student who wishes to take work at another institution and transfer it to his degree work at the Institute must obtain prior permission. All references to credit in Course Descriptions section are in terms of quarter credit hours. Prerequisites, if any, are shown with course descriptions.

Included as a part of the total credit hour requirement is a research and thesis requirement as specified by each department. The amount of credit the student is to receive for Research and Thesis Guidance in any given quarter must be determined by the time of registration for that quarter, recorded on his registration card and verified on the course list. For the purpose of verifying credit an end-of-quarter grade of "R" should be submitted for each registration of Research and Thesis Guidance by the student's faculty advisor. Before the degree can be awarded the acceptance of the candidate's thesis must be recorded on his permanent record.

A graduate student must be a candidate for an advanced degree for at least one academic quarter prior to receipt of the degree. The basic position of the Council on Graduate Studies is that a student is a candidate for the Master's Degree when he has been formally admitted to the Institute as a graduate student (Policy: GC-Al). The Council, however, recognizes the right of a college, or school or department within a college, to require its graduate students to file a separate application for Candidacy for Master's degree at some specified time after resident study has begun.

A student not formally admitted as a graduate student of the Institute (regardless of the number of graduate credits earned) is a special student and not a candidate for an advanced degree. He cannot be a candidate until he has been formally admitted to the Institute as a graduate student. There is no guarantee that any credits in graduate courses earned as a special student will apply toward an advanced degree.

The Council on Graduate Studies regards some form of integrative experience for candidates of advanced degrees necessary. The nature and format of this experience is a matter of judgment and decision for the individual colleges or schools or departments within the colleges. Such requirements as the comprehensive examination, the oral examination on the thesis, and a summary conference are examples of forms which would be appropriate provided they are designed to help the student integrate the separate parts of his total learning experience.
Tuition

On the date of publication, the tuition for Graduate Students pursuing a Master's degree is as follows:

A. FULL-TIME (12-18 credit hours) -$810.00
B. PART-TIME (11 credit hours or less) -$70.00/credit hour
C. MASTER OF SCIENCE (C.C.E.) $56.00/credit hour
D. INTERNSHIP* $26.00/credit hour

*NOTE: Applies only to the internship portion of the Master of Engineering Degree in the College of Engineering.

1. Any graduate student carrying over 18 credit hours of study will be charged the full-time tuition rate plus $70.00/credit hour for each hour of study exceeding eighteen.
2. The graduation fee charge for those receiving a Master's degree is $20.00, which also includes rental of the Master's Hood.

3. Tuition and fee payments are due on the following dates:
   Fall Quarter - September 10, 1973
   Spring Quarter - March 11, 1974
   Winter Quarter - December 12, 1973
   Summer Quarter - to be announced

REFUND POLICY Advance deposits are non-refundable.

The acceptable reasons for withdrawal with refund during the quarter are:

A. Full Refund:
   1. Active Military Service—A student called to active military service during the first 8 weeks of the term may receive a full tuition refund. If called after the eighth week, he may elect to complete the course by making special arrangements with both his instructor and Department or to withdraw and receive a full tuition refund. If he withdraws, he will have to repeat the course at a later date.
   2. Academic Suspension—Students generally register for a quarter before grades for the first quarter are available. If such a student later finds that he has failed the first quarter, he will be given a full refund. It remains the student's responsibility to contact his Department to assure that the withdrawal form and refund are properly processed.

B. Partial Refund:
   A partial refund will be made during a quarter if withdrawal is necessitated for one of the following reasons:
   1. Illness, certified by the attending physician, causing excessive absence from classes.
   2. Withdrawal for academic reasons at the request of the Institute during a quarter.
3. Transfer by employer, making class attendance impossible.

C. Partial Refund Schedule:

- **WITHDRAWAL % OF REFUND**
  - During the first week of classes 90%
  - During the second week of classes 75%
  - During the third week of classes 60%
  - During the fourth week of classes 50%
  - Fifth and subsequent weeks no refund

The partial payment and other fees are not refundable. All withdrawals from courses must be made in writing; otherwise, the refund of tuition will not be given. The student should not consider himself "officially withdrawn" until he receives the student's copy of the Change of Record Form. The postmark date of a letter to the dean or the date on which a change of record form is properly completed shall be the date of "official withdrawal" used to determine the refundable amount.

Students enrolled in chemistry laboratory classes must purchase Breakage Deposit Cards at $5.00 each. In most cases the total will not exceed $15.00 for the year. This requirement applies to students of all departments who are enrolled in chemistry courses.

These are available through the respective departments offering graduate degrees. Interested applicants should write to the appropriate department chairman or dean, as shown in the Correspondence Directory.

Fees for proficiency examination in the External Degree Program, Center for Community/Junior College Relations, are charged at the rate of $10.00 per credit hour covered by the examination. Such examinations will be both oral and written, and will be administered only to students registered in the External Degree Program. Arrangements for such examinations will be made with the Dean of the Center for Community/Junior College Relations.
The Wallace Memorial Library

The Wallace Memorial Library with a capacity of 250,000 volumes, is a true multi-media learning center, with expanded services and innovative procedures to increase its usefulness.

Particularly adapted to an institution of technology, the arts and sciences, the Wallace Library contains a great deal in addition to books. Its Audio-Visual department houses one of the finest art slide collections in the country, over 190 films, and a variety of other non-print media. This department shows between 300-400 films for students each quarter and has preview facilities which faculty and students are welcome to use. The library houses a phonograph record and tape cassette collection and a special listening room in which to use these materials. Located throughout the three floors of the library are over 800 student study stations. There are study carrels, group study rooms with TV sets and lounge areas. Also located in the library are computer terminals for use by students with academic requirements for this equipment.

The library contains a rapidly growing collection of materials on the deaf to serve the National Technical Institute for the Deaf and to support research by anyone who wish to pursue studies in the problems of deafness. Supplementing the main library are the graduate Chemistry Library, and the Melbert B. Cary, Jr. Collection containing rare items of printing.

Adjacent to, and supportive of the purposes of the library, is the RIT Television Center and the Media Design Center.

Student Affairs Division

COUNSELING The counseling and testing services of the Counseling Center are available to graduate students. Any student may see a counselor promptly for assistance in dealing with a personal problem or in clarifying career plans. When appropriate, tests may be used to obtain more evidence about interests, abilities, aptitudes, and personality characteristics. In its offices on the second floor of the George Eastman Building, the Counseling Center maintains a library of educational and occupational information.

In addition to providing counseling services for RIT students, the Counseling Center offers career counseling for individuals and personnel selection services for industrial firms. Brochures describing the types of service and fees may be obtained by telephoning or writing the Counseling Center.

READING AND STUDY CLINIC The Reading and Study Clinic provides individual and group instruction in efficient reading, study procedures, mathematics and writing skills. These services are available at no additional charge to all graduate students of the Institute and may be scheduled at the Clinic Center located on the second floor, north end, of the George Eastman Building.
Those students having automobiles on campus will register these vehicles with the Protective Services Department at the time they first register for classes, or upon bringing the automobile onto campus for the first time.

Any emergency requiring immediate medical attention, fire fighting equipment or security officers' attention (when health or safety of any person is threatened), call Extension 3333. For other security matters, or assistance, call Extension 2853 or 2400.

All of the above extensions are attended on a 24-hour basis.

The function of the RIT Placement Service is to aid students in making appropriate contacts with employers and to provide career guidance.

The office acts in four principal areas as a liaison between employers and those students seeking positions. These areas include: part-time jobs on campus and within the community, summer work, cooperative employment, senior placement, and alumni placement. The office is located on the mezzanine of the College-Alumni Union and is open twelve months a year.

Two physicians and three nurses provide routine out-patient and emergency care at the Student Health Service from 8:30 to 4:30, Monday through Friday. From 4:30 to midnight, Monday—Friday, emergency care is provided in the Residence Halls by a nurse. At other times transportation to the emergency room of a local hospital will be provided as necessary. A consulting gynecologist is available at the Student Health Service one day a week.

The Student Health Service brochure, available at registration or on request from the Student Health Service, details benefits and limitations of services.

Graduate students may apply for a room in the Residence Halls if they desire. Married students may apply for on-campus apartments through the Married Student Housing Office, 113 Kimball Drive, Rochester, N.Y. 14623.

All graduate students are required to have an RIT Identification Card prior to Registration. Such cards may be obtained at RIT on the designated days of Registration.

Courses and programs at the Institute are approved for the education of veterans under P.L. 89-358 (Veterans Readjustment Benefits Act of 1966), P.L. 815 or P.L. 894 (Rehabilitation Acts), and P.L. 634 (War Orphans Act).

To receive benefits, an eligible veteran must submit an application for the Certificate of Eligibility to the Veterans Administration Office in Buffalo, New York, well ahead of the beginning of classes. These application forms are available at the nearest Veterans Administration Office.

A veteran who has been receiving educational assistance at another institution and wishes to transfer to and receive benefits at Rochester Institute of Technology should submit to the VA Form 21E-1995, "Request for Change of Program or School." This form may be obtained from the Veteran Affairs Office at the Institute or the nearest Veterans Administration Office.
This program is planned for professional management education at the graduate level. It is broad in nature, encompassing all of the management and business areas common to middle and upper-middle management. It is equally suitable for students with undergraduate degrees in business as well as non-business graduates. The program provides a balance between the behavioral and quantitative aspects of business management; matriculation may be either on a full or part-time basis.

The College of Business is housed in the Eastman Building on the main campus. The Library and the Institute Computer Center are conveniently located to the College of Business.

Objectives — The main purpose of this graduate program is to provide education for business leadership. Preparation for managerial responsibilities and opportunities, together with the development of the individual, is the primary educational objective. The program is professional in nature and is intended to acquaint the student with all aspects of business activity and to provide a competency in business management. To accomplish these objectives, the program will: 1) provide a core of business subjects covering the functional areas of accounting, marketing, finance, management, production, and personnel; 2) provide the basic tools needed by management in decision making; 3) provide opportunities to analyze business problems using the management tools and the knowledge acquired in the functional areas of business; 4) provide an opportunity to concentrate in depth on specific aspects of business and management through selection of electives in one of
the functional areas of business as well as further study in some of the management tools. These areas include behavioral science, quantitative methods, marketing, finance, and accounting. Some latitude in choice of electives is permitted.

Admission — Full admission will be granted to graduates of accredited baccalaureate degree programs who, in the opinion of the Graduate Admissions Committee of the College of Business have demonstrated, through their achievements in their undergraduate program and through the results of Educational Testing Service Aptitude Test for Graduate Study in Business, their potential to successfully complete graduate studies in business.

The Master of Business Administration full-time program requires a total of seven quarters consisting of four academic quarters and three quarters of Administrative Internship. After an introduction to the functional areas of business in the first two academic quarters, the student spends one quarter (12 weeks) with a business concern in a corporate staff capacity. The student will be located in an area of his interest where he can become involved in the management process, as well as have an opportunity to observe the firm’s total operation.

Upon completion of the quarter’s internship, the student returns to campus for his third academic quarter. During this time, in conjunction with his course in Business Research Methods BBUB-770, he will propose a research project to be completed during the second and third quarters of his Administrative Internship. The faculty and the firm will work closely with the student on his project. In the student’s final academic quarter, the results of the research will be reviewed by faculty and presented to the firm. During the three quarters of Administrative Internship, the participating firm will compensate the M.B.A. candidate in an amount commensurate with his background and experience.

This unique feature of combining management experience with education is only one of the methods used in this graduate program to insure that theory is constantly supported with actual application in business.

In addition to full-time study, the M.B.A. program is available on a part-time basis, with courses offered evenings and Saturdays. Course requirements, faculty, and admissions procedures correspond to the full-time program; however, the Administrative Internship program is not required for part-time students who are currently full-time employees of area firms.
16 M.B.A. (FULL-TIME)

FULL-TIME CURRICULUM: MASTER OF BUSINESS ADMINISTRATION

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Hours</th>
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</thead>
<tbody>
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<td>1st Qtr.</td>
<td></td>
</tr>
<tr>
<td>BBUM-761</td>
<td>Marketing Concepts</td>
</tr>
<tr>
<td>BBUQ-781</td>
<td>Managerial Decision Making I</td>
</tr>
<tr>
<td>BBUB-744</td>
<td>Behavioral Science in Management</td>
</tr>
<tr>
<td>BBUA-713</td>
<td>Basic Financial and Managerial Accounting</td>
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<td></td>
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<tr>
<td>2nd Qtr.</td>
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<tr>
<td>BBUQ-782</td>
<td>Managerial Decision Making II</td>
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<tr>
<td>BBUB-742</td>
<td>Legal &amp; Social Environment of American Business</td>
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<tr>
<td>BBUF-722</td>
<td>Financial Management</td>
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<tr>
<td>BBUB-741</td>
<td>Administrative Theory</td>
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<tr>
<td>3rd Qtr.</td>
<td>Administrative Internship</td>
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<tr>
<td>BBUF-745</td>
<td>Economic Environment of American Business</td>
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<tr>
<td>BBUB-770</td>
<td>Business Research Methods</td>
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<tr>
<td>BBUQ-783</td>
<td>Managerial Decision Making III</td>
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<td>Administrative Internship and Research Option</td>
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<td>6th Qtr.</td>
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<td>7th Qtr.</td>
<td>BBUB-759</td>
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<td>16</td>
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</table>

Total Hours Required — 72 Qtr. hrs. maximum, 48 Qtr. hrs. minimum

*Elective courses may be selected from graduate level courses offered by the College of Business or by other Colleges of the Institute subject to the approval of the Graduate Faculty of the College of Business. Applies to both full-time and part-time curriculum.
## PART-TIME CURRICULUM: MASTER OF BUSINESS ADMINISTRATION

<table>
<thead>
<tr>
<th>Required Courses</th>
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<tr>
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<tr>
<td>BBUA-713 Basic Financial and Managerial Accounting</td>
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<tr>
<td>BBUQ-781 Managerial Decision Making I</td>
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<tr>
<td><strong>2nd Qtr.</strong></td>
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<tr>
<td>BBUB-744 Behavioral Science in Management</td>
<td>4</td>
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<tr>
<td>BBUQ-782 Managerial Decision Making II</td>
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<tr>
<td><strong>3rd Qtr.</strong></td>
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<tr>
<td>BBUM-761 Marketing Concepts</td>
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<tr>
<td>BBUQ-783 Managerial Decision Making III</td>
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<td><strong>4th Qtr.</strong></td>
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<tr>
<td>BBUF-722 Financial Management</td>
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<tr>
<td>BBUB-741 Administrative Theory</td>
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<tr>
<td>BBUF-745 Economic Environment of American Business</td>
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<tr>
<td>BBUQ-743 Operations Management</td>
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<td><strong>6th Qtr.</strong></td>
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<tr>
<td>BBUB-770 Business Research Methods</td>
<td>4</td>
</tr>
<tr>
<td>BBUB-742 Legal and Social Environment of American Business</td>
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<tr>
<td><strong>7th Qtr.</strong></td>
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<tr>
<td>BBUB-759 Approved Elective* Integrated Business Analysis</td>
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<td><strong>Total</strong></td>
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<td><strong>9th Qtr.</strong></td>
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<tr>
<td>Approved Elective* Approved Elective* or Research Option</td>
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<td><strong>Total</strong></td>
<td><strong>8</strong></td>
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</tbody>
</table>

Total Hours Required — 72 Qtr. hrs. maximum, 48 Qtr. hrs. minimum
The increasing demands on the professional accountant have produced a need for a more extensive and broader educational preparation. In recognition of this need, the College of Business offers graduate programs leading to the Master of Science in Accountancy, and the M.B.A. - Accounting Option.

These two programs are registered with the New York State Education Department, which means that graduates meet the educational requirements for the Certified Public Accountant Examination and thus reduce the experience requirement for the Certified Public Accountant Certificate by one year.

The M.S. in Accountancy is a 48 quarter credit hour program and is specifically designed for students with 28 to 32 undergraduate quarter credit hours of accounting in their bachelor's degree program. Students may pursue this program either on a full or part-time basis. The admission standards and procedure are the same as those for the M.B.A. program.

**FULL-TIME CURRICULUM: MASTER OF SCIENCE IN ACCOUNTANCY**

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td><strong>1st Qtr.</strong></td>
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<tr>
<td>BBUB-744</td>
<td>Behavioral Science in Management</td>
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<tr>
<td>BBUQ-781</td>
<td>Managerial Decision Making I</td>
</tr>
<tr>
<td>BBUF-745</td>
<td>Economic Environment of American Business</td>
</tr>
<tr>
<td></td>
<td>Approved Elective*</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
<tr>
<td><strong>2nd Qtr.</strong></td>
<td></td>
</tr>
<tr>
<td>BBUB-741</td>
<td>Administrative Theory</td>
</tr>
<tr>
<td>BBUQ-782</td>
<td>Managerial Decision Making II</td>
</tr>
<tr>
<td>BBUF-722</td>
<td>Financial Management or</td>
</tr>
<tr>
<td></td>
<td>Approved Finance Elective</td>
</tr>
<tr>
<td>BBUA-717</td>
<td>Seminar in Taxation</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
<tr>
<td><strong>3rd Qtr.</strong></td>
<td></td>
</tr>
<tr>
<td>BBUQ-783</td>
<td>Managerial Decision Making III</td>
</tr>
<tr>
<td>BBUA-716</td>
<td>Advanced Public Accounting</td>
</tr>
<tr>
<td>BBUA-718</td>
<td>Seminar in Advanced Accounting and Theory</td>
</tr>
<tr>
<td></td>
<td>Approved Elective *</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

Total Quarter credit hours – 48
Or approved Economic Elective

*Elective courses may be selected from graduate level courses offered by the College of Business or by other Colleges of the Institute subject to the approval of the Graduate Faculty of the College of Business.
# PART-TIME CURRICULUM: MASTER OF SCIENCE IN ACCOUNTANCY

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st Qtr.</strong></td>
<td></td>
</tr>
<tr>
<td>BBU-744 Behavioral Science in Management</td>
<td>4</td>
</tr>
<tr>
<td>BBUQ-781 Managerial Decision Making I</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8</td>
</tr>
</tbody>
</table>

| **2nd Qtr.** | |
| BBUF-745 Economic Environment of American Business! | 4 |
| BBUQ-782 Managerial Decision Making II | 4 |
| **Total** | 8 |

| **3rd Qtr.** | |
| BBUQ-783 Managerial Decision Making III | 4 |
| BBUF-722 Financial Management or Approved Finance Elective | 4 |
| **Total** | 8 |

| **4th Qtr.** | |
| BBUB-741 Administrative Theory | 4 |
| Approved Elective* | 4 |
| **Total** | 8 |

| **5th Qtr.** | |
| BBUA-717 Seminar in Taxation | 4 |
| BBUA-718 Seminar in Advanced Accounting and Theory | 4 |
| **Total** | 8 |

| **6th Qtr.** | |
| BBUA-716 Advanced Public Accounting | 4 |
| Approved Elective* | 4 |
| **Total** | 8 |

Total Quarter credit hours—48

*Or approved Economics Elective

Elective courses may be selected from graduate level courses offered by the College of Business or by other Colleges of the Institute subject to the approval of the Graduate Faculty of the College of Business.
MASTER OF BUSINESS ADMINISTRATION:
ACCOUNTING OPTION

The M.B.A., Accounting Option, enables the student to obtain a broad education encompassing those behavioral and quantitative aspects of management common to middle and upper-middle management, in addition to meeting the previously mentioned educational requirements for the Certified Public Accountant Certificate.

Specifically, the M.B.A., Accounting Option, is designed for students with or without an extensive background in accounting or business at the undergraduate level. The program normally requires the following sequence of accounting courses to be integrated as their approved electives into the regular 72 hours maximum M.B.A. program:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBUA-714 Basic Accounting Theory*</td>
<td>4</td>
</tr>
<tr>
<td>BBUA-715 Accounting Controls*</td>
<td>4</td>
</tr>
<tr>
<td>BBUA-716 Advanced Public Accounting</td>
<td>4</td>
</tr>
<tr>
<td>BBUA-717 Seminar in Taxation</td>
<td>4</td>
</tr>
<tr>
<td>BBUA-718 Seminar in Advanced Accounting and</td>
<td>4</td>
</tr>
<tr>
<td>Theory</td>
<td></td>
</tr>
</tbody>
</table>

*Can be waived with 28 to 32 undergraduate quarter credit hours in accounting. If waived, other approved electives must be taken.
"You need not be a mathematical statistician to do good statistical work, but you will need the guidance of a first class mathematical statistician. A good engineer, or a good economist, or a good chemist, already has a good start, because the statistical method is only good science brought up to date by the recognition that all laws are subject to the variations which occur in nature. Your study of statistical methods will not displace any other knowledge that you have; rather, it will extend your knowledge of engineering, chemistry, or economics, and make it more useful." —W. E. Deming

College of Continuing Education

AUSTIN J. BONIS, Chairman, Department of Statistics

MASTER OF SCIENCE DEGREE IN APPLIED AND MATHEMATICAL STATISTICS

The College of Continuing Education of Rochester Institute of Technology, through the Department of Statistics, offers a program of graduate study leading to the Master of Science degree in Applied and Mathematical Statistics. This program is conducted on a part-time evening basis and is intended primarily for full-time employees of business and industry. Students from other programs at RIT may also participate as may those without a degree objective who desire specialized training in particular statistical fields.

It will be possible for candidates to complete the requirements for the degree in a minimum of 8 quarters although a 10 to 12 quarter period often will be needed.

Admission to the program will be granted to qualified graduates who are holders of a baccalaureate degree from an accredited college or university and who have acceptable mathematics credits through integral calculus. Applicants who fail to meet the latter requirement may, at the discretion of the
Department of Statistics, be accepted provisionally, pending the completion of CASM-701 and one other course in the 700 series with the grade of at least "B" in each course.

The basic requirement for the Master of Science in Applied and Mathematical Statistics is the satisfactory completion of 45 quarter credits of approved work. All courses in Applied and Mathematical Statistics are elective, but a minimum of 21 credits must be earned through courses in the 800 series.

In consultation with a departmental advisor, the candidate will determine a total program structured to achieve his individual professional objectives.

As many as 9 graduate quarter credit hours in science, engineering or advanced courses in mathematics may be accepted for degree credit, as approved by the Statistics Department Chairman.

A student may, with permission of the Department Chairman, elect one of three curricular plans. All candidates under all three plans, upon completion of course work, must pass a final comprehensive examination designed to assure professional competence as a statistician at the Master's level.

Under Plan A, the candidate completes 36 quarter credits, and must submit a satisfactory research project and thesis which counts as 9 quarter credits.

Under Plan B, the candidate completes 45 quarter credits of satisfactory course work.

Under Plan C—Independent Study for qualified students—the candidate is held responsible for his own rate of progress in subject matter achievement rather than pursuing a scheduled course-completion program. He will be assigned to a faculty advisor who will set subject matter goals, as approved by the Department Chairman, for the candidate to attain. The candidate will be free to attend as an auditor, and at his discretion, without the necessity of formal registration in the class, any part or all of any course in the program that he feels may be helpful to him. Registration as a candidate is required each quarter. As determined by the candidate and his advisor, he will periodically stand for both written and oral departmental examinations to measure progress in his achievement of assigned subject matter goals. The number of credits earned by the candidate each quarter will be reported for the record. He may elect at the end of any quarter to transfer to Plan A or Plan B, with attained quarter credits to be assigned at the point of transfer as determined by the Department Chairman.

Normally a minimum of six quarters of work under Plan C should be required to qualify for the M.S. degree, but no minimum is mandatory. The cumulative record will show 45 quarter credits before awarding the degree.

Transfer of a candidate from Plan A or Plan B to Plan C is also possible at the discretion of, and with credit determined by the Department Chairman, but this procedure is exceptional rather than common.
College of Engineering

RICHARD A. KENYON, Dean

MASTER OF ENGINEERING DEGREE

MASTER OF SCIENCE DEGREE IN ELECTRICAL OR MECHANICAL ENGINEERING

The College of Engineering offers graduate programs leading to the Master of Engineering degree, or the Master of Science degree in Electrical or Mechanical Engineering. Descriptions of these programs will be found in the following pages. The purpose of the graduate programs in Engineering is to equip the graduate student with the insight, understanding and competence commensurate with demands of current and future positions in engineering.

Degree programs are available on either a part-time or a full-time basis.

Part-Time Study — The College of Engineering encourages practicing engineers in the greater Rochester industrial community to pursue a program toward the Master of Science degree or the Master of Engineering degree without interrupting their work at their place of employment. Consequently, many of the courses in the graduate programs in Engineering are normally scheduled in the late afternoons or early evenings.

Students employed full-time in industry are limited to a maximum of two courses or eight credits each quarter. A student who wishes to register for more than eight credits while employed full-time in industry must obtain the permission of his advisor and the approval of the Department Head.

It is possible for a student to obtain the M.S. degree in two academic years (or six academic quarters) by taking courses in late afternoons or early evenings only.

A student in the Master of Engineering degree program may earn academic credits for his industrial experience which will be treated as his internship experience while he is enrolled in the program.

Full-Time Study — Even though the graduate programs in Engineering serve the need of a large number of practicing engineers who wish to pursue a part time program, the different programs regularly enroll full-time graduate students also. A full-time student may take up to 16 credits per quarter.

A full-time student in the Master of Engineering degree program alternates academic quarters with his internship. A full-time student can normally complete the degree requirements in one calendar year. A limited amount of financial aid is available to the full-time student. Details of such aid can be obtained from the individual Department Heads.

In-Plant Graduate Courses — In order to enable the practicing engineer to take graduate courses with the minimum amount of inconvenience, a num-
ber of courses for RIT credit are offered in selected industrial locations using a combination of video tapes, and in-person discussion sessions.

Any student who wishes to study at the graduate level must first be admitted to the graduate program.

The prospective graduate student can be admitted in one of the following three categories: regular status, provisional status, or special status.

Regular Status — An applicant is admitted as a regular graduate student if he has received a bachelor’s degree from an approved undergraduate school, and if an examination of the required documents indicates that he is qualified to undertake a graduate program.

Provisional Status — An applicant is admitted as a provisional graduate student if he does not meet all the requirements for regular status, but clearly possesses sufficient promise to warrant a trial period in graduate study. His academic performance is reviewed periodically until a maximum of 16 credit hours has been reached. At or prior to that time, his provisional status will be changed to regular or his admission rescinded, upon the recommendation of the faculty and approval of the Dean.

To be considered for admission as a regular or a provisional graduate student, it is necessary to file an Application for Admission to Graduate Study accompanied by the appropriate transcripts of previous undergraduate and graduate study, two letters of recommendation, and evaluation of Graduate Record Examination, if one has been taken.

Special Status — An applicant is permitted to take graduate courses as a special student if he has a bachelor’s degree from an approved undergraduate school and the necessary background for the specific courses in which he wishes to enroll. The courses taken for credit on special status can usually be applied toward the Master of Science degree when the student is admitted to the regular status at a later date. However, the maximum number of credits which can be transferred to the degree program from courses taken as a special student is normally 16 credits.

To be admitted as a special student, the applicant must file an Application for Admission as a Special Student. For admission as a special student, there is usually no need to submit supporting documents of the type required with the application for admission as a regular or provisional student.

The College of Engineering does not require graduate applicants to take the Graduate Record Examination. When this has been taken, results may be submitted for evaluation.
### Transfer Credits

A maximum of nine quarter credits (or six semester credits) can be transferred from graduate courses taken outside the Institute. To be considered for transfer credit, the course must have been taken within a five-year period prior to the date of the student's initial entry into a graduate program in engineering at RIT as a special, provisional, or regular student. Courses taken at another institution after the student's initial entry into a graduate engineering program at RIT are also eligible for transfer credit. The student should contact the individual Department office about the procedure for obtaining transfer credits.

### Faculty Advisor

A member of the graduate faculty is appointed as a faculty advisor for each graduate student who is on a regular or provisional status. The faculty advisor supervises the progress of the student towards the Master's degree. Special students should direct their questions to either the Department Head or the Chairman of the department's Graduate Committee.

### Grade Requirements

The average of the grades for all courses taken at the Institute and credited toward the Master's degree must be at least a "B." (Transfer credits from other institutions are not included in the computation of the cumulative grade point average.) If at any time a student's average falls below a "B," or if he fails in any required examination, his advisor may recommend to the Dean that the student's performance be reviewed and appropriate action taken.

### Thesis

The thesis requirements vary among the different departments. The requirements of an individual department are stated in the sections describing each department's programs.

When a student writes a thesis, he must comply with the following regulations regarding its submission:

- The thesis must be completed and accepted at least 30 days before the last day of scheduled classes of the quarter in which the student expects to receive his degree. The original and two copies of the thesis must be submitted to the departmental office before the above deadline. These copies are for transmittal to the Institute Library, the departmental office, and the student's thesis advisor. For detailed instructions about the organization of the thesis, the student should consult the brochure "Thesis Format," available at the departmental office.

### Maximum Limit on Time

The required credits for the Master's degree must be completed within five years after the student's initial registration in graduate courses at the Institute as a regular, provisional, or special student.

### Courses of Instruction

Information about the courses that will be offered in a particular quarter will be available from the departmental office prior to registration. The Institute reserves the right to withdraw any course for which enrollment is insufficient, or to make any changes in the schedule of courses if necessary.

Detailed description of the courses will be found in the Course Description Section of this catalog under the individual Department headings.
MASTER OF ENGINEERING DEGREE PROGRAM

This is a post-baccalaureate internship program leading to the professional degree of Master of Engineering. The objective of the program is to provide the Engineering B.S. graduate the means for earning a terminal Master's degree, substituting a well organized and carefully chosen cooperative, industrial internship for the conventional thesis or equivalent requirement of an M.S. degree.

An industrial internship of duration equivalent to two academic quarters in a specially developed full-time engineering position is an integral part of the program. A minimum of eight and a maximum of sixteen credits may be earned by the student from his internship experience. The internship position is selected to reflect each individual student's primary professional interest and is integrated with his curriculum.

The program, although rooted in engineering, will be significantly interdisciplinary. By design, a student's program may range over several colleges of the Institute in assembling courses which will best help him meet his professional objectives. A maximum of sixteen credits can be taken by the student in courses outside the traditional areas of engineering and the sciences, subject to the approval of his advisor.

The requirements and general standards for admission and the selection procedure will be essentially similar to those for the M.S. degree programs. However, the number of full-time students admitted into the program will be limited by the number of internship positions available.

A minimum of 48 credits, including the academic credits awarded for the internship experience, are required for the Master of Engineering degree.

Each student will be assigned a faculty advisor as soon as he is formally admitted to the program. In cases where the student's background warrants it, a committee of two advisors will be assigned to him. The faculty advisor will assist the student in preparing a meaningful plan of study. He will also monitor and evaluate the student's internship experience (in cooperation with the student's industrial supervisor) and recommend to the Graduate Committee of the College of Engineering the number of academic credits to be awarded for the internship experience.
MASTER OF SCIENCE DEGREE PROGRAM

The Master of Science degree in Electrical Engineering is awarded upon successful completion of an approved Graduate program consisting of a minimum of 45 quarter credits. Under certain circumstances, a student may be expected to complete more than the minimum number of credits.

The inclusion of a thesis as a formal part of the Master of Science degree program in Electrical Engineering is optional. Students who decide to write a thesis can earn a minimum of 6 credits and a maximum of 12 credits toward their degree from the thesis.

Students who do not wish to write a thesis may choose one of the following non-thesis options:

Option 1—A student with significant industrial experience of at least six years after earning his baccalaureate degree may be permitted to make an oral technical presentation on an engineering project he has worked on. The technical presentation carries no academic credits and the student will earn all the required credits for the degree in course work. Proposals for such a technical presentation must be submitted to the Chairman of the Graduate Committee on or before January 31 of the academic year in which the presentation is to be made.

Option 2—A student may choose to write a "graduate paper" in lieu of a thesis. The graduate paper is an extensive term paper on a topic of professional interest. The objective of the graduate paper is to enable the student to undertake an independent and in-depth literature search, and write a report summarizing his findings. A faculty member interested in the topic of the paper will serve as the student's supervisor and direct the scope and depth of the paper as well as the format of the final written version. The paper will normally be used to earn a minimum of four academic credits. The student must first consult a faculty member about a suitable topic for the paper and obtain his consent. The course numbers EEEE-800-801 Graduate Paper are used in registering for the paper. The student choosing this option will earn the remainder of the required credits for the degree by means of course work.

None of the courses is specifically required of all graduate students. The student chooses courses according to his professional objectives, subject to the constraints placed by prerequisites and scheduling.
A maximum of twelve quarter credit hours can be chosen from graduate ELECTIVE COURSES or advanced undergraduate courses offered by any department of the Institute with prior approval of the faculty advisor. The remaining credit hours must be earned from graduate courses in Electrical Engineering.

Most of the graduate courses in Electrical Engineering are scheduled on the COURSE CALENDAR basis of a two-year cycle as shown in the course calendar below. (The calendar does not, however, apply to courses offered off campus at several industrial locations). Courses which are found in the section of this catalog on Course Descriptions but not included in the following calendar, are offered when there is sufficient student interest or on an independent study basis.

Fall 1973 and every odd numbered year
*EEEEE-707 Linear Systems
*EEEEE-711 Integrated Circuit Operational Amplifiers
EEEEE-718 Statistical Design of Control Systems
EEEEE-736 Information Theory
*EEEEE-750 Switching Circuits I

Winter 1974 and every even numbered year
EEEEE-702 Introduction to Random Variables and Signals
EEEEE-713 Modern Control Theory
EEEEE-740 Digital Integrated Circuits
*EEEEE-751 Switching Circuits II

Spring 1974 and every even numbered year
EEEEE-708 Active Filter Design
EEEEE-720 Optimum Control Systems
EEEEE-737 Random Signals and Noise
*EEEEE-753 Logic Fault Diagnosis

Fall 1974 and every even numbered year
*EEEEE-707 Linear Systems
*EEEEE-711 Integrated Circuit Operational Amplifiers
EEEEE-719 Sampled Data Control Systems
EEEEE-738 Physical Basis of Integrated Circuits
*EEEEE-750 Switching Circuits I

Winter 1975 and every odd numbered year
EEEEE-702 Introduction to Random Variables and Signals
EEEEE-713 Modern Control Theory
*EEEEE-734 Communication Techniques
EEEEE-740 Digital Integrated Circuits
*EEEEE-751 Switching Circuits II

Spring 1975 and every odd numbered year
EEEEE-714 Introduction to Nonlinear Control Systems
EEEEE-716 Digital Signal Processing
EEEEE-735 Digital Data Transmission
EEEEE-752 Sequential Machines and Automata

*Courses marked above with an asterisk use a combination of videotapes and live discussion sessions.
INDUSTRIAL ENGINEERING DEPARTMENT
RICHARD REEVE, Department Head

Graduate courses are offered by the Industrial Engineering Department primarily for candidates of the Master of Engineering degree whose professional interests fall within industrial engineering and/or engineering management. Close cooperation with the School of Business insure the Master of Engineering (Engineering Management - Industrial Engineering) candidate a wide selection of courses and a unique opportunity to build a program tailored to his professional interests and goals. There is no Master of Science degree in Industrial Engineering at the present time.
MASTER OF SCIENCE DEGREE PROGRAM

The Master of Science degree in Mechanical Engineering is awarded upon successful completion of an approved Graduate program consisting of a minimum of 45 quarter credits. A minimum of 33 credits are to be earned in course work, while the thesis—when required—carries a minimum of 4 credits and a maximum of 12 credits. Under unusual circumstances the thesis requirement may be waived.

All Graduate students in the Mechanical Engineering Department are expected to have a mathematics background equivalent to SMAM-308, Engineering Mathematics. Students not meeting this prerequisite will be expected to take SMAM-308 as soon as possible after enrolling. Graduate credit is not given for this course.

All Graduate students are required to complete EMEM-731, Introduction to Continuum Mechanics and an 8 credit mathematics sequence to be selected from the following courses:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMEM-701</td>
<td>Applied Engineering Analysis I</td>
<td>4</td>
</tr>
<tr>
<td>EMEM-702</td>
<td>Applied Engineering Analysis II</td>
<td>4</td>
</tr>
<tr>
<td>EMEM-703</td>
<td>Applied Engineering Analysis III</td>
<td>4</td>
</tr>
<tr>
<td>EMEM-705</td>
<td>Numerical Analysis</td>
<td>4</td>
</tr>
</tbody>
</table>

In those cases where students have had the equivalent in graduate level courses of any of the core courses, the Departmental Graduate Committee may permit substitution. Students changing their major discipline to Mechanical Engineering from another field, or having graduated from a non-accredited undergraduate program, should anticipate additional core requirements.

The majority of a student's program will be developed from the Mechanical Engineering graduate courses. However, when the needs of a particular program require additional courses, the student may elect to take up to 12 credits from other departments in the Institute. Under unusual circumstances, up to 9 credits of upper level undergraduate electives in Mechanical Engineering may be included in the student's graduate program. All graduate student programs must be submitted to and approved by the Departmental Graduate Committee.
A number of Assistantships and Fellowships are 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 12 credits per quarter. Appointment as a research assistant also permits taking 12 credits per quarter while the remaining time is devoted to the research effort which serves as a thesis subject. Fellowships generally permit taking courses at the rate of 16 credits per quarter. All appointments provide full tuition and may provide stipends up to $2500 per academic year. Applicants for financial aid should write directly to the Department Head for details.

Examinations — Each student completing a thesis will be required to pass, as a minimum, an oral examination on the thesis subject. Each student in a non-thesis program will be required to pass a comprehensive examination in his major field. This examination will be taken near the end of the formal program of study, but in any case, no sooner than following completion of at least 30 graduate credits.

Some of the graduate courses in Mechanical Engineering are offered in alternate years. The calendar below will be helpful in working out a program sequence.

**Fall 1973**
- EMEM-701 Applied Engineering Analysis I
- EMEM-705 Numerical Analysis
- EMEM-731 Introduction to Continuum Mechanics
- EMEM-739 Experimental Stress Analysis
- EMEM-743 Applied Vibrations
- EMEM-751 Automatic Control Engineering I

**Winter 1974**
- *EMEM-702 Applied Engineering Analysis II
- EMEM-711 Heat Transfer I
- EMEM-717 Thermodynamics

**Spring 1974**
- *EMEM-703 Applied Engineering Analysis III
- EMEM-712 Heat Transfer II
- EMEM-715 Fluid Dynamics
- EMEM-718 Statistical Thermodynamics
- EMEM-738 Vibration Theory and Applications II
- EMEM-752 Automatic Control Engineering II

*Courses marked above with an asterisk as well as the following courses will be offered during the 1974-75 academic year.

- EMEM-713 Heat Transfer III
- EMEM-735 Theory of Elasticity I
- EMEM-736 Theory of Elasticity II
- EMEM-732 Advanced Mechanics of Materials
- EMEM-797 Finite Elements II
College of Fine and Applied Arts

ROBERT H. JOHNSTON, Dean

MASTER OF SCIENCE IN TEACHING
MASTER OF FINE ARTS DEGREE

The College of Fine and Applied Arts, in its School for American Craftsmen, in the Industrial/Environmental Design, Communication Design, and Fine Arts programs of the School of Art and Design, has been preparing artists, craftsmen and designers to operate their own studios and shops, as self-employed professionals, and to work in business and industry as artists and designers. It has also prepared graduates to teach at colleges and at secondary levels.

The College of Fine and Applied Arts of Rochester Institute of Technology provides a center for advanced study in the graphic, plastic and the fine arts in which the student has the opportunity to work in a professional environment which stimulates and encourages work of the highest quality. Students of superior ability who possess a baccalaureate degree in art or crafts may increase their competence in the field of their major interest under the guidance of accomplished professional artists and craftsmen. For those students who have a background in graphic design, painting, sculpture, printmaking, or one of the craft areas, there is opportunity to develop new areas of competence. The Master's programs are also designed to enable the student to broaden his experience in the practice of art in areas other than his major, and also to increase his understanding of the arts in the humanistic sense. Students are expected to participate in the planned non-credit program of assemblies, discussions and exhibits as well as their formal class requirements.

GRADUATE DEGREES The College of Fine Arts offers two graduate degrees: the Master of Science in Teaching (which may be taken as a concentration in Art Education leading to Permanent Certification to teach in the public schools of the State of New York or as concentration in the practice of the creative arts and crafts) and the Master of Fine Arts degree.

The M.S.T. degree may be earned normally in one academic year through the satisfactory completion of a minimum of 48 credit hours in course work; the M.F.A. is earned normally in two years of full-time study and the completion of a minimum of 85 credit hours including the presentation of an acceptable thesis.

The M.S.T. degree is arranged for the student holding the B.F.A. degree (or a B.A. degree with an art major) who wishes to earn teacher certification, or who holds Provisional Certification (with a B.S. or B.A. degree in Art or Industrial Arts Education) and seeks Permanent Certification. The M.S.T. degree may also be taken as concentrations in the studio areas, with supporting courses chosen on the basis of need and interest from graduate offerings in other schools and departments of the Institute.
The M.F.A. degree is designed as a professional degree for the practicing artist or designer and for those wishing to teach at the college or university level.

Those entering the M.S.T. program and who may wish to change to the M.F.A. program, must petition the Graduate Faculty for permission to change the degree objective. The petition should be presented to the Chairman. In view of the pronounced difference in entrance requirements, students requesting a transfer from the M.S.T. to the M.F.A. program may be required to take additional undergraduate or graduate courses. Such students must also have demonstrated their professional potential by establishing a "B" average (3.0) in at least one quarter (or one Summer Session) of the M.S.T. course of study.

The M.F.A. and the M.S.T. programs are constituted to reflect the goals of Rochester Institute of Technology. They are designed to graduate artists and craftsmen who can meet the needs of the environmental condition through high standards of professional performance.

Admission to the M.S.T. Degree Program — The applicant should have received the baccalaureate degree in a field of the arts from a regionally accredited college or university in the United States or Canada with a major concentration in art, art education, or industrial arts education. Applicants with different backgrounds should refer to the section on Special Students. The undergraduate studies should include a minimum of 54 quarter credit hours (36 semester hours) in drawing, painting, design, or the crafts. If the applicant for admission holds the B.A. or B.F.A. degree and seeks the M.S.T. degree in Art Education, the undergraduate program must have included the studio course distribution required by the New York State Education Department. For those holding the B.S. degree in Art Education and Provisional Certification the graduate concentration should be in the studio area, and the program must include a minimum of 15 quarter credit hours in the liberal studies or humanities.

Admission to the M.F.A. Degree Programs — The applicant should hold the baccalaureate degree in a field of the arts or art education from a regionally accredited college in the United States or Canada and demonstrate, in the quality of the undergraduate record and creative production, a genuine, professional potential. (See also Special Students below.) The undergraduate degree should include 75 quarter credit hours (50 semester hours) in studio courses.

Students are admitted to graduate study only by action of the Graduate Committee; enrollment in graduate courses does not constitute admission to the Graduate Program, and credit is not given for courses taken prior to acceptance unless the grade received in the course is a "B" or higher; in such a case the student, if admitted to graduate study, may petition for a grant of credit, but not in excess of 9 quarter credit hours.
TEACHER TRAINING AND CERTIFICATION
The teacher of arts and crafts in college or high school, the teacher or administrator of art programs in schools and community centers, the instructor in occupational skills, and the private teacher of art will find in the depth and breadth of the Master's programs a way of extending and improving his skills and content background necessary for effective teaching. The student who possesses a baccalaureate degree with Provisional Certification for the teaching of Art or Industrial Arts in the State of New York can achieve permanent certification within the content of the Master of Science in Teaching program.

ADMISSION AS SPECIAL STUDENTS
Students who have a baccalaureate degree and who wish to take particular courses may be admitted as "Special 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, may take upper level undergraduate courses, as advised by the Graduate Committee, to qualify for admission.

Those coming from foreign countries where the Baccalaureate is not given for programs in the practice of art may be admitted to graduate study if the diploma or certificate received approximates the standards of the B.F.A., B.A., or B.S. degrees, and their academic record and portfolio indicate an ability to meet graduate standards. Any foreign student will receive individual evaluation and be considered for admission at the highest level commensurate with his preparation.

ADMISSION PROCEDURE
To apply for admission to graduate study a student must submit evidence of his baccalaureate degree, a portfolio* or other evidence of his creative work, a statement of purpose, and references.

Transfer of Credit — Graduate work pursued in other schools, including the College of Continuing Education of RIT, is transferable to the extent of 9 quarter credits (6 semester hours) and may be applied at the discretion of the Graduate Committee to specific course requirements, depending on the nature of the student's program and major, if completed within the five years preceding.

ACCEPTANCE INTO THE PROGRAM
A Conditional Acceptance into the Graduate Program of the College of Fine and Applied Arts generally means that you have not completed the necessary undergraduate prerequisites. Such prerequisites must be satisfied as defined in the Letter of Acceptance which you will receive prior to your admission as a graduate student.

A Probationary Status refers to an acceptance that is changed after one quarter of involvement in the Program. It is a marginal acceptance that is resolved in one of three ways:
1. A change to full graduate status with the previous quarter's work applying toward the degree.

*The portfolio is to consist of 20-24 slides or photographs (no larger than 8 x 10). No original work is to be sent unless it is specifically requested by the Graduate Committee. Return postage must be included. Receipt of portfolios will be acknowledged. All correspondence and portfolios should be addressed to the Graduate Program, College of Fine and Applied Arts.
2. A change to full graduate status with the previous quarter's work defined as a necessary prerequisite for entrance into the Program and therefore not applying toward the degree.

3. Discontinuation in the Program.

Upon Full Acceptance into any of the Graduate Programs the student is considered qualified to pursue the degree. This status would be changed only by evidence of poor performance in the Program.

The College of Fine and Applied Arts reserves the right to retain student work for educational use or exhibition for a period of time not to exceed one and one-half quarters beyond the year the object has been made. The College also reserves the right to select an example or examples for its permanent collection. In such cases, where work is selected for the permanent collection the material cost only will be paid by the College.

THE PROGRAMS OF GRADUATE STUDIES

The Master of Fine Arts program includes five categories of studies:

<table>
<thead>
<tr>
<th>Quarter Credit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Major Concentration&lt;br&gt;Designed to give depth of experience in the area of the student's major interest and chosen from one of the following:&lt;br&gt;(a) Ceramics and Ceramic Sculpture&lt;br&gt;(b) Metalcrafts and Jewelry&lt;br&gt;(c) Woodworking and Furniture Design&lt;br&gt;(d) Weaving and Textile Design&lt;br&gt;(e) Glassblowing&lt;br&gt;(f) Design Applications&lt;br&gt;(g) Communication Design&lt;br&gt;(h) Fine Art (Painting, Printmaking)</td>
</tr>
<tr>
<td>15</td>
<td>Minor Concentration*&lt;br&gt;From the above, to consist of studio and related electives, or internship.</td>
</tr>
<tr>
<td>18</td>
<td>Electives</td>
</tr>
<tr>
<td>10</td>
<td>Humanities, Art History</td>
</tr>
<tr>
<td>12</td>
<td>Thesis</td>
</tr>
</tbody>
</table>

Total 85

*In certain cases the minor concentration or courses may be taken elsewhere in the Institute (Photography, Printing, Business, etc.) when related to the objectives of the student. Such courses must be approved in advance, normally after arrival on campus, by the Advisor and the Deans of the Colleges.
The Master of Science in Teaching program requirements include two categories of studies:

1. Master of Science in Teaching in Art Education (for those holding the B.F.A. or B.A. [Art Major] Degrees and seeking the Graduate Degree and Permanent Certification).

   The degree offers a concentration consisting of background courses in Education: 20
   (a) Development Psychology
   (b) History of American Educational Thought and Practice
   (c) Educational Psychology
   (d) Educational Sociology
   Art Education Concentration: 22
   (e) Methods and Materials in Art Education
   (f) Seminar in Art Education
   (g) Practice Teaching
   Studio Elective 6
   Total 48

2. Master of Science in Teaching in Studio Art (for those holding the B.S. Degree in Art Education or Industrial Arts Education, who hold Provisional Certification and desire Permanent Certificates, or for the B.A. or B.F.A. student wishing advanced study).

   The degree offers a major concentration of studies designed to meet the needs of individual students, and may include appropriate or relevant courses from other Schools and Departments of the Institute.
   The following general pattern of studies covers requirements for the degree.

   Major Concentration:
   (a) Studio Art, or Crafts 24
   (b) Art History and Humanities 10-15
   Minor Concentration and Electives: 9-14
   (c) From a or b above
   Total 48
College of Graphic Arts and Photography

LOTHAR K. ENGELMANN, Dean

MASTER OF SCIENCE DEGREE IN PHOTOGRAPHIC SCIENCE AND INSTRUMENTATION

The basic objective of this program is to prepare men and women holding a baccalaureate degree in science or engineering for higher-level positions in the photographic industry or in the application of photography to problems of science and engineering. Formal course work includes the physics and chemistry of radiation-sensitive materials and processes, geometrical and physical optics as applied to photo-optical systems, the mathematics of image-forming systems, and the statistics of experimental design and quality control. Technical electives at the graduate level may be selected from courses offered in engineering, science, mathematics, graphic arts, and photographic science and instrumentation. A thesis is required.

Several faculty groups are active in research within the department in areas of the chemistry and physics of radiation-sensitive materials and processes, photo-optical instrumentation, and objective and subjective image evaluation. Thesis work may be done in the field of graphic arts in conjunction with the Graphic Arts Research Center. Other interdisciplinary efforts are possible with the Colleges of Engineering and Science.

The Department offers three programs of study leading to the Master of Science degree in Photographic Science and Instrumentation:

1. Bachelor of Science and Master of Science in Photographic Science and Instrumentation.

This program offers qualified undergraduate students in the department the opportunity to obtain both the Bachelor of Science and Master of Science Degrees simultaneously after five years of study. Admission into this program may be requested by the student at the end of the third year, at which time permission may be granted to replace the normal fourth year departmental required courses and thesis by technical electives. If qualified, the student will be formally admitted to the graduate program at the end of the fourth year. Upon completion of the required graduate courses and thesis, the Bachelor of Science and Master of Science degrees are awarded simultaneously. A description of both the undergraduate and graduate phases of this program is given in the Undergraduate Catalog. Persons interested in this program should request information through the coordinator of the departmental graduate program.

2. Master of Science in Photographic Science and Instrumentation for Full-time Students.

This program is designed for persons holding a Bachelor of Science degree in physics, chemistry, or engineering.

Before admission to candidacy and beginning the graduate-level courses in photographic science, the student must have an adequate foundation in
principles of photographic science. This knowledge may be acquired by enrolling in the full-time summer course PPHS-700, Principles of Photographic Science. This course begins in June and runs for ten weeks.

Although the 45 graduate credits required can be accumulated in three quarters, it has been found that only in exceptional cases is this time sufficient for successful termination of the experimental work on the thesis and for the preparation of the report. Hence full-time students should plan on five quarters of residence, beginning with the summer quarter.

3. Master of Science in Photographic Science and Instrumentation for Part-time Students.

This program is identical to the full-time program except that the requirements can be met on a part-time basis. The necessary knowledge in the principles of photographic science may be obtained by taking PPHS-701, 702, 703, Principles of Photographic Science, which is equivalent to PPHS-700 in content. The PPHS-701, 702, 703 sequence is offered during the evening, with Saturday laboratory sessions.

Part-time students must plan to complete the requirements within seven years from registration. The courses will be offered in alternate years on a schedule such that part-time students may complete them in three or four years.

Information concerning the particular courses to be offered during a particular academic year may be obtained from the departmental graduate program coordinator.

Admission to the full-time or part-time programs will be granted to qualified graduates of accredited degree-granting institutions whose undergraduate studies have included at least the following courses in the major areas of study:

1. Mathematics through calculus;
2. A full-year, college-level course in physics, with laboratory;
3. A similar course in chemistry.

Applicants must demonstrate to the Graduate Committee (M.S.) of the School of Photographic Arts and Sciences that they have the capability to pursue graduate work successfully. Normally this will include an interview, the submission of a statement of purpose, presentation of the undergraduate academic record, letters of evaluation from individuals familiar with the applicant's capabilities, and any other pertinent data furnished by the applicant. While previous high academic achievement does not guarantee admission, such achievement or other unusually persuasive evidence of professional promise, is expected.

For graduation, 45 credits in graduate-level courses are required. Of this total, 36 credits must be in courses other than Research and Thesis Guidance. These must include the courses shown in the table on next page, the submission of an acceptable thesis, and an oral examination.
## PROGRAM

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Quarter Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPHS-700 or PPHS-701, 702, 703*</td>
<td>Principles of Photographic Science</td>
<td>No Graduate Credit</td>
</tr>
<tr>
<td>PPHS-711,712,713</td>
<td>Theory of the Photographic Process</td>
<td>3 3 3</td>
</tr>
<tr>
<td>PPHS-721, 722**</td>
<td>Mathematics/Statistics for Photographic Systems</td>
<td>4 4</td>
</tr>
<tr>
<td>PPHS-731,732, 733</td>
<td>Principles of Instrumental and Photographic Optics</td>
<td>3 3 3</td>
</tr>
<tr>
<td>PPHS-741,742, 743</td>
<td>Photographic and Optical System Analysis and Evaluation</td>
<td>4 3 3</td>
</tr>
<tr>
<td>PPHS-890</td>
<td>Research and Thesis Guidance</td>
<td>1 1 7</td>
</tr>
</tbody>
</table>

* The three quarters are covering respectively, photographic chemistry, radiation and color, and sensitometry and tone reproduction. Candidates with appropriate preparation may take examinations in place of any of these quarters. See course descriptions.

** Students with previous course work or experience in statistics may replace this course with technical electives.

The thesis is to be based on experimental evidence obtained by the candidate in an appropriate field as arranged between the candidate and his advisor. The minimum number of thesis credits required is 9. The thesis requirement may be fulfilled by experiments in the Institute laboratory. In some cases, the requirement may be fulfilled by work done in other laboratories. An example might be the candidate's place of employment, under the following conditions:

1. The results must be fully publishable.
2. The candidate shall have an advisor assigned by the School of Photographic Arts and Sciences, and the thesis must be based on his independent, original work, as it would be if the work were done in the Institute laboratories. The work shall not have started prior to the assignment of the advisor.
3. In exceptional cases, it may be possible that the candidate is able to present published results of original work which can be accepted in lieu of a thesis or that he can present non-classified work done outside of RIT, and essentially fulfilling the requirements for a completed thesis. Then, the thesis requirement may be waived, and the credits may be acquired by elective courses.

The average of the grades for all courses taken at the Institute and credited toward a Master's degree must be at least a "B". Research and Thesis guidance do not carry a letter grade and, hence, are not included in the average.
MASTER OF FINE ARTS DEGREE IN PHOTOGRAPHY

The M.F.A. is the highest appropriate degree available to the creative photographer. It is the degree needed by photographic artists who also wish to teach at the college level.

The offering of this degree is made possible by the presence at RIT of one of the largest photographic faculties available in one school. Their skills in the full spectrum of photography are supplemented by an equally comprehensive faculty in the related area of printing.

Programs, courses and faculty of the College of Fine and Applied Arts are available to broaden the experience and skills of the photographic M.F.A. student in art history, theory, design and visual media. Properly advised selections of this work can be used as a minor, or it can be supplemental to the photographic major.

The M.F.A. program is intended to give individuals an opportunity to build on their undergraduate and personal backgrounds, expanding their knowledge, skills and aesthetic sensitivities.

Applicants should be baccalaureate graduates of accredited degree granting institutions, or have appropriate demonstrable equivalent experience. If there is insufficient undergraduate preparation, the applicant will be advised that appropriate undergraduate credit course work will be required.

The M.F.A. Committee will make this determination based upon:
(1) Official transcripts and other submitted materials,
(2) A portfolio, and
(3) An interview if required.

The Office of Admissions will furnish an itemized list of the materials to be submitted.

Applicants are accepted with diverse educational backgrounds:
(1) Graduates of photographic schools having B.F.A., B.A., or B.S. degrees, or the equivalent, are admitted to majors in Still Photography, Film Making, or Museum Practice.
(2) Graduates of schools of art with B.F.A. or B.A. degrees are admitted to majors in Still Photography or Film Making. In exceptional cases, Museum Practice may be available to them as a major.
(3) Graduates of schools of journalism or in the humanities, with B.A. or B.S. degrees, who have become interested and functional in Photography, are accepted to major in Still Photography or in Film Making.

Conditional acceptance refers to any changes in an individual's program which are required to be met before he or she will be accepted into the M.F.A. program. These conditions are stated in the letter of acceptance.

Additional prerequisite course work may be required:
(1) Those with insufficient photographic background will ordinarily be required to take a summer M.F.A. preparation program.
(2) History and Aesthetics of Photography will be required unless an equivalent course is of record.

(3) Other course work—The conditions of acceptance may also include acceptance of previous work for direct transfer or by specification of the areas open for a major or minor.

**MATRICULANT STATUS**

Probationary Status refers to the fact that the School of Photographic Arts and Sciences M.F.A. applicant is not automatically admitted to candidacy for the degree. After the student has completed one full quarter of graduate work, his advisor will review what has been done, and submit this information to the M.F.A. Committee for consideration.

The Committee may accept or reject the student as a matriculant. If rejected, the student's status will be reviewed after the second quarter. If matriculant status cannot be awarded, a hearing will be held to determine whether the student will be allowed to continue, and under what conditions.

**TRANSFER OF CREDIT**

Up to 9 quarter-hours (6 semester-hours) of graduate work is transferrable toward the degree on application to, and approval by, the M.F.A. committee. Work taken prior to admission to the program should be submitted for approval no later than the time the student applies for matriculant status. Work to be credited subsequent to this time must receive approval prior to the student registering for the course.

**ADVISORS**

The M.F.A. coordinator is the advisor for all entering candidates. At the time matriculant status is requested (after a full-quarter of graduate work), the student and the coordinator will determine a permanent advisor for the remainder of the program. The thesis advisor is determined separately. (See under "Thesis Board").

**THESIS BOARD**

This is essentially an ad-hoc faculty committee formed to service the Thesis proposal of an individual student. During, or before, the fourth quarter of the student's program, the student should submit a Thesis proposal naming a three-man Thesis Board. One member of this board is to be designated by the proposal as Thesis Advisor.

The Thesis Board membership should include:

1. One member of the School of Photographic Arts and Sciences M.F.A. faculty;
2. One faculty member from the School;
3. One other person, not necessarily from the School or the Institute, who can serve the student in the context of the Thesis.

The M.F.A. Coordinator receives all proposals and forwards them to the M.F.A. Committee for their recognition and comment.

The Thesis Board may determine that the student has to take more than the minimum 9 quarter hours thesis credit. The Board is also responsible for setting time limits on completion of the thesis.
Thesis hours are usually taken over several quarters. Only the letter "r" is recorded, indicating a thesis in process. No letter grade is assigned. The entire Thesis Board accepts or rejects the thesis.

The thesis is an original body of work appropriate to the major commitment of the degree candidate. A thesis of record shall be prepared for inclusion in the Library. Specific directions are available from the M.F.A. coordinator on the preparation of this item.

It is intended that this program will give competent individuals an opportunity to build on their undergraduate and personal backgrounds so that they can operate professionally with visual tools.

As part of this process, the program is intended to extend their knowledge and application of technical information which may be missing from their experience.

Technically competent individuals will be given an emphasis on aesthetic controls in order to provide the balance needed by a professional individual.

The M.F.A. degree in Photography normally requires a minimum of two years of full-time resident graduate study. A minimum of 72 quarter hours of graduate work is outlined below. These minimums may be exceeded through the intent of the candidate or as a result of a necessity to cover certain areas of study.
The 72 hours do not include undergraduate work required by action of the M.F.A. admissions committee in accepting a particular applicant, or undergraduate course prerequisites which may exist for desirable graduate courses.

<table>
<thead>
<tr>
<th>Major concentration</th>
<th>30 Qtr. Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor concentration</td>
<td>18 Qtr. Hrs.</td>
</tr>
<tr>
<td>Electives (Humanities)</td>
<td>15 Qtr. Hrs.</td>
</tr>
<tr>
<td>Thesis</td>
<td>9 Qtr. Hrs.</td>
</tr>
</tbody>
</table>

Distribution of work within these guidelines is subject to modification based upon the candidate's background, abilities, and interests. An individualized course of study will be prepared with the help of an advisor. Modifications in this prescribed program thereafter must be approved by the M.F.A. coordinator and made a matter of record.

The major and minor requirements are defined as areas of concentration. Because the program accepts applicants as individuals, each with a distinctive background, there is only a core of common instruction. At least one half of the course work is taken outside of this core. Roughly three major areas are defined: Still Photography, Film Making, and Museum Practice. Still Photography and Film Making can be blended with each other and/or with Design, Aesthetics, or some other subject-area combination having relevance for an individual student. There are more rigid limits placed on Museum Practice, but this area can also be flexible according to the preparation or interests of the person concerned.

A minor may be created from abridged parts of either Still Photography or Film Making. Museum Practice is not ordinarily available as a minor. Minors can be taken in various phases of printing or in appropriate areas of the College of Fine and Applied Arts. Minors external to the School of Photographic Arts and Sciences must be arranged through the M.F.A. coordinator and appropriate administrative channels.

The elective courses as specified are humanities courses given in the College of General Studies. These elective hours may be released, on application through the M.F.A. coordinator, for students having a broad background and high achievement in humanities courses taken on the undergraduate level.

If these hours become available in this fashion, the student can either explore an additional area, or can improve his involvement in either his major or his minor field.

The average of all grades for graduate courses taken at the Institute must be at least a "B." The M.F.A. committee will determine whether courses lower than "B" can be included in the hours counting toward graduation, regardless of the overall grade average.

Course work submitted for graduation must have been completed within the previous five full years, unless accepted by the M.F.A. committee.
MASTER OF SCIENCE DEGREE IN PRINTING:
PRINTING TECHNOLOGY OR PRINTING EDUCATION

The curriculum leading to a Master of Science degree in the School of Printing is a professional program designed to provide graduate education in printing for students whose undergraduate majors were in the arts, sciences, education, or other non-printing areas, as well as for graduates with a major in printing.

The program is formulated to allow the individual student to specialize in a particular area and develop research skills. The goal of the program is to educate students who will have, in addition to a broad understanding of the procedures and theoretical concepts in printing processes, an appreciation of particular problems in special areas at an advanced level. This can normally be completed in six academic quarters.

Special libraries housed in the College include the Graphic Arts Research Center Library, and the Melbert B. Cary, Jr. Graphic Arts Collection. The latter contains over 3,500 volumes including many rare books and other materials illustrating past and present fine printing, book design and illustration, papermaking, and other aspects of the graphic arts. The Frederic W. Goudy—Howard W. Googeshall Memorial Workshop contains letters, papers, photos, memorabilia and cases of Goudy types which can be seen and used only at RIT, since matrices for their manufacture were destroyed by fire in 1939.

The student may major in either Printing Technology or Printing Education. There is a program in the technology major for the student who has an undergraduate degree in printing as well as a program for the student who has an undergraduate degree in another area. These programs are normally followed by those whose career will be in the printing industry or as specialists in related fields.

The printing education major offers two options, related to certification. The printing education major emphasizing teacher preparation for the secondary school has separate programs for the student with an undergraduate degree in printing, in education, or in some different field. Upon successful completion of this printing education major program the student will qualify for permanent New York State certification as a teacher of graphic arts as a trade subject. This program culminates in a Master of Science in Teaching degree. Students wishing to pursue the M.S.T. degree should note this in the appropriate place on the graduate application form.

The printing education major emphasizing teacher preparation for the two-year college has a program for students with varying undergraduate backgrounds. This culminates in the M.S. degree.

Those teachers within the secondary school system who already hold permanent certification will normally follow a program leading to the M.S. degree.
Using IGT Pick Tester to determine properties of printing surface for accepting certain inks.

It is desirable for students entering the education major programs to have taken basic courses in psychology and sociology at the undergraduate level. All students may elect certain graduate courses which will be beneficial in introducing them to particular areas of the graphic arts, updating their knowledge in the area, and helping them with their research problems. However, regardless of the major which the student chooses, there is a “core” of instructional areas vital to advanced instruction.
This "core" is to develop:

1. An increased awareness of an emerging theory of graphic reproduction and an appreciation of how this theory may be applied to graphic arts procedures in the future.

2. An understanding of the importance and value of statistical techniques as they apply to the graphic arts today.

3. An understanding of how computer technology can be applied to graphic arts management and reproduction at the present time and what potential the computer has in the future for reproduction, management, and educational applications.

4. An ability to carry through an acceptable research project on either an experimental or survey basis.

A goal of the technology major is to graduate students with well-rounded backgrounds in both the theoretical and practical aspects of graphic arts technology. An additional goal is to provide graduates with the education to approach printing problems by an orientation to processes and materials based on systematic analysis. The printing education programs, on the other hand, are designed to develop teachers with sufficient breadth in printing-technology education so that they will be equipped to encourage and assist students who are interested in printing as a career, whether at the high school or two-year college level. Such development is necessary to support the growth of the printing industry.

Prior to being admitted to the Master of Science degree program, applicants must satisfy the Graduate Admissions Committee of the School of Printing that their previous training, ability, and practical experience indicate a reasonable chance of success. Applicants may be admitted who hold a baccalaureate degree from an accredited institution. The School of Printing encourages applicants with undergraduate records at the "B" level or higher. Normally, all applicants are required to take the Graduate Record Examination. An on-campus interview is encouraged for all applicants.

The Master of Science degree program in printing requires the completion of 70 quarter hours of study including eight hours for the thesis. Normally this study would be completed in six quarters. Depending on the student's graphic arts experience, however, the total number of hours may be reduced. Programs are individually tailored for each student according to his needs, interests, and educational-industrial experience. A typical distribution of credits might be:

Core to the Program.................................................................22 Quarter Credit Hours
Core to the Major .................................................................16 Quarter Credit Hours
Electives .................................................................24 Quarter Credit Hours
Thesis ................................................................. 8 Quarter Credit Hours
# CORE COURSES: PRINTING GRADUATE PROGRAMS

<table>
<thead>
<tr>
<th>REQUIRED FOR ALL MAJORS AND PROGRAMS</th>
<th>PPRM-701</th>
<th>Computers in the Graphic Arts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPRT-701</td>
<td>Research Methods in the Graphic Arts</td>
</tr>
<tr>
<td></td>
<td>PPRT-702</td>
<td>Graphic Reproduction Theory</td>
</tr>
<tr>
<td></td>
<td>PPRT-703</td>
<td>Statistical Inference</td>
</tr>
<tr>
<td></td>
<td>PPRT-704</td>
<td>Design of Experiments</td>
</tr>
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</table>

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<tbody>
<tr>
<td>TECHNOLOGY MAJOR: Undergraduate Degree in Printing</td>
<td>PPRT-708</td>
<td>Introduction to Systems Analysis</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>TECHNOLOGY MAJOR: Undergraduate Degree in Printing</th>
<th>PPRT-709</th>
<th>History of Printing Technology</th>
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<tbody>
<tr>
<td>TECHNOLOGY MAJOR: Undergraduate Degree in Printing</td>
<td>PPRT-710</td>
<td>Ink and Substrates</td>
</tr>
<tr>
<td>TECHNOLOGY MAJOR: Undergraduate Degree in Printing</td>
<td>PPRT-711</td>
<td>Tone and Color Analysis</td>
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<table>
<thead>
<tr>
<th>EDUCATION MAJOR: Required for all Education Programs</th>
<th>PPRE-701</th>
<th>Introduction to Graphic Arts Education</th>
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<table>
<thead>
<tr>
<th>EDUCATION MAJOR: Undergraduate Degree in Education</th>
<th>PPRE-713</th>
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<tbody>
<tr>
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<td>PPRE-714</td>
<td>Photographic Reproduction Technology</td>
</tr>
<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>PPRE-715</td>
<td>Printing Plate Technology</td>
</tr>
<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>PPRE-716</td>
<td>Printing Press Technology</td>
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<table>
<thead>
<tr>
<th>EDUCATION MAJOR: Undergraduate Degree in Education</th>
<th>PPRE-702</th>
<th>Teaching Methods in Graphic Arts Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>PPRE-860</td>
<td>Practice Teaching in the Graphic Arts (Secondary Level)</td>
</tr>
<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>PPRT-709</td>
<td>History of Printing Technology</td>
</tr>
<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>GSHH-701</td>
<td>History of American Educational Thought and Practice</td>
</tr>
<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>GSSP-702</td>
<td>Educational Psychology</td>
</tr>
<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>GSSS-701</td>
<td>Educational Sociology</td>
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<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>GSSP-702</td>
<td>Educational Psychology</td>
</tr>
<tr>
<td>EDUCATION MAJOR: Undergraduate Degree in Education</td>
<td>GSSS-701</td>
<td>Educational Sociology</td>
</tr>
</tbody>
</table>
Courses with initial prefix letter "G" are offered by the College of General Studies; those with initial prefix "A" by the School of Applied Science (Center for Community College Faculty Development). All others are offered by the School of Printing.

Students who do not have a background in printing and who elect the technology major, normally should complete their printing electives prior to taking the core courses. Education courses should also be completed prior to student teaching, and candidates in the two-year college education program should be similarly prepared prior to serving their teaching internships. Selection of electives is subject to the approval of a faculty advisor.

All candidates are expected to maintain at least a "B" average in order to complete the program. Students dropped for academic reasons may petition the Graduate Admissions Committee for reinstatement. A student, however, may not be reinstated for more than one quarter.

A student may transfer a maximum of nine approved graduate credits. Normally, a student may carry a maximum of 18 quarter credits of course work per quarter.

Prerequisite courses must normally be completed prior to undertaking any graduate courses. In special cases, a graduate course may be taken simultaneously with a prerequisite course.

Additional information on courses and majors may be obtained by contacting the graduate program coordinator.

The student should select a thesis advisor and make a proposal by the time he completes his second quarter of work. This proposal is to be made to the Graduate Thesis Committee. This committee will, upon completion of the thesis, conduct an oral examination.

A rough draft of the thesis must be submitted at least three weeks prior to the convocation in which the student expects to graduate. The finished thesis must be submitted one week prior to that convocation.
College of Science
THOMAS P. WALLACE, Dean
ROBERT E. GILMAN, Department Head, Chemistry

MASTER OF SCIENCE DEGREE IN CHEMISTRY
The College of Science offers graduate programs leading to the Master of Science degree in Chemistry on either a part-time or full-time basis with a variety of program options designed to fill the needs of both the practicing chemist in the greater Rochester industrial community and the full-time graduate student.

OBJECTIVES
The objective of the program is, through course work and research experience, to increase both the breadth and depth of the graduate student's background and to provide an opportunity for the student to attack scientific problems on his own initiative with a minimum of supervision.

Four program options are available to cover the differing needs of graduate chemists.

FULL-TIME GRADUATE WORK
A limited number of teaching assistantships are available to qualified students to undertake full-time graduate work that would include research experience. The Chemistry Department has a vigorous, research oriented faculty and excellent equipment and facilities to enable the full-time graduate student to carry on a program of independent study which will develop his ability to attack scientific problems at the research level.

Students enrolled in the full-time program are expected to complete 45 hours of course work and submit an independent research thesis. A full-time student is permitted to take a maximum of 16 credits per quarter.

TWO-YEAR COLLEGE TEACHER OPTION
To better prepare the graduate student for a career as a chemistry instructor in a two-year college, the Department of Chemistry provides an opportunity, through course work and actual teaching experience at two-year colleges, to obtain experience in the development of course material and instructional ability at the Community College level.

This instructional development is provided in addition to the requirements of the full-time Master of Science in Chemistry program which includes both independent research experience and a thesis.

PART-TIME STUDY
The College of Science encourages practicing chemists in the greater Rochester industrial community to pursue a program toward the Master of Science degree in Chemistry without interrupting their work at their place of employment. Consequently, most of the courses in the graduate programs in Chemistry are scheduled in the late afternoons or early evenings.

Students employed full-time in industry are normally limited to a maximum of two courses or eight credits each quarter.
The part-time M.S. program does not require a research thesis, and it is possible for a student to obtain the M.S. degree in two academic years (or six quarters) by taking courses in late afternoons or early evenings only.

**INTERNSHIP OPTION**

The College of Science, Department of Chemistry, recognizes that the in-plant experience of a number of chemists employed in local industry includes independent, creative research. This experience may be applied to a maximum of 16 hours of research credit, towards the completion of the Master of Science degree in Chemistry in either the full or part-time program.

The industrial research submitted for research credit must be originated by the graduate student and be presented to the scientific community as either a published paper, presentation at a professional meeting, or a report to the RIT Chemistry Department.

**ADMISSION**

Admission to the program will be granted to qualified graduates who are holders of a bachelor's degree from an accredited college or university. Before a student is admitted to candidacy for the M.S. degree, he must have experience equivalent to a full year's course in each of the following: Analytical Chemistry, Organic Chemistry, Physical Chemistry, Physics, and Calculus.

He must further demonstrate his mastery of the first three of these in qualifying examinations administered by the RIT Chemistry Department.

**PROGRAM**

Each student, with his advisor, will arrange a program best suited to his interests and needs. This program will be subject to the approval of the Department Head and the Chairman of the Graduate Committee.

A deliberate effort will be made to strengthen any areas of weakness indicated by the student's undergraduate record and/or the qualifying examinations.

In order to qualify for the M.S. degree, a candidate must satisfy the following requirements.

1. A minimum of 45 quarter credits beyond the bachelor's degree. Courses in chemistry will be chosen from those with SCH-500 and SCH-600 numbers and should include one or more representing each of the four fields (analytical, inorganic, organic, and physical). Each student must take or have demonstrated proficiency in the areas represented by the following courses: SCHI-551, SCHA-511, SCHO-522, and SCHP-531. As part of the required credits, each student must have one or two quarter hours in seminar, SCHC-640, and six quarter hours in upper division courses from related departments.

2. A minimum of nine quarter hours in research and submission of a satisfactory thesis. This may be waived for part-time students.

3. A foreign or computer language requirement.

4. The passing of an oral thesis defense or comprehensive examination.

More information may be obtained by contacting the Graduate Advisor, Department of Chemistry, or by phoning (716) 464-2497.
School of Applied Science

ROY I. SATRE, Dean

Center for Community / Junior College Relations

RICHARD L. RINEHART, Director

Office of Faculty Development

GENERAL The Center was established in 1969 for the purpose of serving the specialized training needs of both potential and currently employed two-year college faculty. The Center's objectives are accomplished through several unique Master's degree programs in addition to seminars, workshops, and conferences.

1. To achieve mastery through graduate study in the selected discipline sufficient to be able to teach the discipline in Associate degree and Certificate programs, and to function as a professional faculty member in two-year colleges.

2. To develop the ability to define and believe in the philosophy, goals, and spirit of community junior colleges and technical institutes; analyze and understand the implications of the various organizational patterns of such colleges within different states and differing collegial organizations; comprehend the financing aspects of such colleges including the preparation of budgets, and the implications of various revenue patterns, and to understand the governance and decision making systems including the faculty role in such systems.

3. To become an effective and proficient faculty advisor, and know what to expect and require from counselors; to diagnose the different learning styles of individuals, stimulate appropriate motivations and enthusiasm.
for learning, and understand the real implications of open door policies for faculty and for students; to understand the appropriate use of developmental education activities both in formal classes and special arrangements, and to prescribe the use of such specialists.

4. To demonstrate the ability to apply full systems of curriculum planning which include appropriate and effective rationale, objectives, cognitive styles, learning techniques, evaluation, and provisions for revision.

5. To be able to devise and use a wide variety of basic instructional techniques, have had some experience in other more specialized instructional techniques, and to become a recognized artist-specialist in some combination of teaching-learning techniques that match one's personality.

At the present time, graduate work may be completed leading to the M.S. degree (Engineering Technology) and M.S. degree (Business Technology) through the CCJCR on a full-time or part-time basis. The External degree, M.S. (Engineering Technology) is constructed to meet individual situations. A new program, leading to the M.S. degree (Instructional Technology), is now being offered. Certain courses will be available in September, 1973, with full implementation of the program in the Winter Quarter (January 1974).

Related Degrees in Other Colleges:
Special options in the following additional fields are available for those planning to teach such disciplines in community colleges:

- CHEMISTRY, Master of Science
  See: College of Science
- FINE ARTS, Master of Science in Teaching
  See: College of Fine and Applied Arts
- PRINTING, Master of Science, Printing Education
  See: College of Graphic Arts and Photography

Degree candidates in these fields include community college core courses in their programs, and have other special experiences in common with the student in other fields of community college teaching.

Graduates of accredited baccalaureate degree programs may be admitted to study at the graduate level only after completion of the application for admission and submittal of (1) transcripts for previous undergraduate and graduate study, (2) recommendations, (3) a statement of the candidate's objectives and goals, including his evaluation of how the program for community college faculty will aid in obtaining them; and (4) other evidence that can be considered to determine the probability of success of the individual applicant. Initial acceptance will be granted on either a regular or provisional status. Candidates for the M.S. in Business Technology program will normally be required to take the admissions test for graduate study in Business.
COMMON REQUIREMENTS:
M.S. degree for Community College Faculty
A minimum of 48 quarter credits beyond the baccalaureate degree, distributed as follows:
1. A minimum of 24 quarter credits in the field of specialization.
2. A minimum of 12 quarter credits in an allied field.
4. An internship for those not having sufficient experience, or an occupational internship for those not having sufficient related work experience. When an internship is required, it will carry 3 to 6 quarter credits which may be applied to the field of specialization requirements.

INTERNSHIP An individual arrangement with an appropriate community or junior college will be made for those persons not having sufficient experience. This will provide definite teaching assignments and responsibilities, together with participation in other faculty functions including advising, committee work, planning, and student evaluation on a full semester or term basis at a two-year college. Supervision, assistance, and evaluation will be provided by an advisor in the participating college and by the CCJCR.
The M.S. (Engineering Technology) program is specifically structured for candidates wishing to teach in the Electrical, Mechanical, or Electromechanical Technology area.

The objectives of developing professional teaching competence, flexible teaching abilities, and knowledge in the specialization and allied fields may be met by fulfilling the requirements of the Community College Course Series and the Internship, and by selected courses from the graduate offerings of the College of Engineering as well as the following:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Quarter Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFDE-711</td>
<td>Microelectronics</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-718</td>
<td>Applications of Linear Integrated Circuits</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-719</td>
<td>Communication Theory</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-721</td>
<td>Digital Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-722</td>
<td>Digital Integrated Circuits</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-728</td>
<td>Active Filter Design</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-730</td>
<td>Electric Power Transmission</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-705</td>
<td>Mechanical Engineering Concepts</td>
<td>4</td>
</tr>
<tr>
<td>AFDE-707</td>
<td>Engineering Concepts (Solid Body Mechanics)</td>
<td>4</td>
</tr>
<tr>
<td>AFDE-710</td>
<td>Science and Technology of Materials</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-717</td>
<td>Electrical Measurements</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-725</td>
<td>Numerically Controlled Machines</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-731</td>
<td>Mechanical Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-708</td>
<td>Engineering Technology Analysis</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-713</td>
<td>Computers in Engineering Technology I</td>
<td>4</td>
</tr>
<tr>
<td>AFDE-714</td>
<td>Computers in Engineering Technology II</td>
<td>4</td>
</tr>
<tr>
<td>AFDE-715</td>
<td>Electromechanical Systems I</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-716</td>
<td>Electromechanical Systems II</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-720</td>
<td>Integrated Physics</td>
<td>4</td>
</tr>
<tr>
<td>AFDE-727</td>
<td>Advanced Electrical Measurements</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-732</td>
<td>Manufacturing Organization and Management</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-750</td>
<td>Seminar</td>
<td>2</td>
</tr>
<tr>
<td>AFDE-751</td>
<td>Advanced Engineering Technology Seminar</td>
<td>1</td>
</tr>
<tr>
<td>AFDG-840</td>
<td>Teaching Internship</td>
<td>3 to 6</td>
</tr>
<tr>
<td>AFDE-850</td>
<td>Special Projects</td>
<td>1 to 6</td>
</tr>
</tbody>
</table>
MASTER OF SCIENCE (BUSINESS TECHNOLOGY) PROGRAM

This program of graduate study encompasses the functional areas of business and provides the candidate with advanced proficiency in a technical specialty of his choosing and is supplemented with a closely allied field.

In addition to the general objectives of the Center for Community/Junior College Relations, the M.S. (Business Technology) program will provide the candidates with:

1. A knowledge of the functional areas of Business—Accounting, Marketing, Finance, Personnel, and Production.
2. The basic tools needed to understand the changing environment of Business. Courses in Business Statistics, Legal and Social Environment, and Economics are offered to fulfill this objective.
3. An opportunity to study in depth in the technical area which the candidate intends to teach, and to supplement this with appropriate study in an allied field.
4. Selective workshops to relate technical specialities to the unique problems associated with two-year college business programs.
5. Completion of a teaching internship for prospective faculty lacking classroom experience.

From the maximum requirement of 65 quarter credits, students who have completed previous graduate or undergraduate work in Business can waive from 12 to 16 quarter credits from the program. Business courses in this program are offered by the College of Business.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Quarter Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Functional Areas of Business</td>
<td>BBUA-713 Basic Financial and Managerial Accounting</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BBUF-722 Financial Management</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BBUB-744 Behavioral Science in Management</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BBUM-761 Marketing Concepts</td>
<td>4</td>
</tr>
<tr>
<td>2. Basic Core Courses in Business</td>
<td>BBUB-742 Legal &amp; Social Environment of American Business</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BBUF-745 Economic Environment of American Business</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BBUQ-781, 782 Managerial Decision Making I, II</td>
<td>4 and 4</td>
</tr>
<tr>
<td>3. Courses in Technical Area of Specialization</td>
<td>12 quarter credits from one of the following areas: Accounting, Management, Marketing.</td>
<td></td>
</tr>
<tr>
<td>4. Allied Field in Business Technology</td>
<td>8 quarter credits from the fields listed in 3 above.</td>
<td></td>
</tr>
<tr>
<td>5. Common Requirements of the Internship and the Community College Course Series.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MASTER OF SCIENCE (INSTRUCTIONAL TECHNOLOGY) PROGRAM

This is a generalist Master of Science program for those holding a baccalaureate degree related to the field (such as Photography, Audio Visual Communications, Graphic Arts), or in other fields where individual aptitudes and experiences would qualify the person for required courses.

The general goals are:
1. To prepare such individuals for professional positions as instructional technologists in Associate Degree granting institutions.
2. To further qualify the graduates of the program to be able to teach in some individually appropriate area such as Audio Visual Technology, Photography, etc.
3. To qualify individuals as managers in instructional technology.
4. To provide the graduate with a sufficient perspective on various media and learning processes research in order to assist the college faculty in choosing appropriate instructional techniques for the most effective and efficient learning without bias.

The Basic M.S. Program

On the assumption that entering students will hold an appropriate baccalaureate degree, there will be 48 quarter credit hours of graduate instruction as below:

The four courses of the Community College Course Series and the following specialized courses—

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Quarter Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFDG-715</td>
<td>Instructional Television</td>
<td>5</td>
</tr>
<tr>
<td>AFDG-760</td>
<td>Management and Personnel in I.T.</td>
<td>3</td>
</tr>
<tr>
<td>AFDG-761</td>
<td>Fiscal Analysis and Accounting in I.T.</td>
<td>3</td>
</tr>
<tr>
<td>AFDG-763</td>
<td>Library-Media Organization</td>
<td>2</td>
</tr>
<tr>
<td>AFDG-765</td>
<td>Individual Learning Style Analysis</td>
<td>3</td>
</tr>
<tr>
<td>AFDG-766</td>
<td>Behavioral Science Applications to I.T.</td>
<td>3</td>
</tr>
<tr>
<td>AFDG-767</td>
<td>Instructional Technique Comparisons</td>
<td>2</td>
</tr>
<tr>
<td>AFDG-768</td>
<td>Learning Systems and Planning</td>
<td>2</td>
</tr>
<tr>
<td>AFDG-840</td>
<td>Internship</td>
<td>6</td>
</tr>
<tr>
<td>AFDE-745</td>
<td>Electro-Mechanical-Optical Systems</td>
<td>3</td>
</tr>
<tr>
<td>AFDE-750</td>
<td>Seminar</td>
<td>2</td>
</tr>
</tbody>
</table>

Total Basic Program 48 cr.
EXTERNAL DEGREE-MASTER OF SCIENCE
(ENGINEERING TECHNOLOGY)

The purpose of the new external degree is to make available to those persons teaching, or industrially employed in technical areas, a unique graduate level program that will make use of their various job-related experiences and post-baccalaureate education.

Salient features of the program include:

1. Cooperation with other selected institutions of higher education.
2. Degree candidacy while remaining fully employed.
3. Credit given by proficiency examinations.
4. Internship in a community college as a part of the teaching faculty.

Credit may be given for such things as attendance at summer institutes (NSF, VEA, etc.), workshops and seminars, other post-baccalaureate courses taken, and measurable knowledge gained through work-related experience (by examination). Some specific courses may be taken at institutions other than RIT. In the case of an out-of-state student, or one far distant from Rochester, up to thirty (30) quarter credit hours may be gained from other institutions.

ADMISSION

1. Possession of a baccalaureate degree in the areas of electrical or mechanical engineering or engineering technology, or in a field of physical science or mathematics that relates to technical employment.
2. Experience teaching in recognized technology programs and/or industrial experience directly related to the undergraduate preparation.
3. Establishment of a "curriculum contract" between the student and the Evaluation Committee.

Inherent, also, is the willingness and desire of the external degree candidate to either continue teaching in technical programs or to seek such a position at the end of the program.

DURATION OF PROGRAM

The external degree candidate has from three to five years (or less) to complete his Master of Science program. This determination is made on the basis of the entering credit allowed.

<table>
<thead>
<tr>
<th>Previous credits earned</th>
<th>Completion time limited to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 12 quarter credits</td>
<td>5 years</td>
</tr>
<tr>
<td>13 to 24 credits</td>
<td>4 years</td>
</tr>
<tr>
<td>25 to 30 credits</td>
<td>3 years</td>
</tr>
</tbody>
</table>
1. Completion of at least 48 quarter credit hours of work with a grade point average of "B" or better and also technical proficiency proven through evaluation by a faculty committee or through proficiency examinations.

2. At least 12 quarter credit hours (25 percent of program) will be taken in technical subject areas in the School of Applied Science.

3. At least six quarter credit hours will be taken in the field of community college education.

4. The remaining 30 quarter credit hours may be gained through whatever means the student and his evaluation committee deem admissible and proper for the program. These may include, but are not limited to, summer institutes, post-graduate courses, and partial programs planned with other institutions. A minimum of three semester credit hours will be taken at another approved institution (or substantially more if the student desires).

All courses in the technical area are currently offered in the resident Master of Science (Engineering Technology) degree program.

Courses in community college education are offered by Rochester Institute of Technology and at some other institutions. For the most part, all courses are offered periodically throughout the total academic year and summers, and in both day and evening (depending on student demand).

The Center for Community College Faculty Development cooperates with other Colleges of RIT in providing additional degree programs teaching other specialized areas in community colleges. These include the following degrees that are described within the appropriate sections of this Bulletin:

- Master of Science in Printing Education in Graphic Arts;
- Master of Fine Arts in Fine and Applied Arts

A variety of special services are organized each year in conjunction with community and junior colleges. These workshops, seminars, demonstrations, and in-service activities are initiated and sponsored by consortia as well as individual colleges.

A brief statement of topics to be studied is provided in the section on course descriptions for the Center for Community College Faculty Development (call letters AFDE and AFDG). A more detailed summary of the general and specific objectives and prerequisite knowledge may be obtained by writing the Center for Community College Faculty Development Graduate Office.
RIT Universal Course Numbering System

In addition to its title, each academic course offered by RIT is identified by a specific four letter and three digit number. This new system has been adopted to:

1. Make it easier to find a given course, directory style, in whatever college, school or department it is offered;
2. Make it easier, especially in choosing electives, to develop individualized programs through the several colleges of RIT;
3. Make record keeping and retrieval more efficient.

As shown in the example below, each letter and digit has significance:

- **First letter:** College offering the course
- **Second and Third letters:** School or Department of that college
- **Fourth letter:** Major field of interest
- **First number:** Course level (0 = Non-credit, 1=Diploma; 2 or 3 = Lower Level Degree Courses; 4 and 5 = Upper Level Undergraduate Degree Courses; 6, 7, or 8=Courses for Graduate Credit)
- **Second and Third numbers:** Course differentiation and sequencing

![Example: BBUF-722 Financial Management](image)

Course Descriptions

All Course Descriptions will be found in this section of the catalog. They are arranged for convenient use, directory style by colleges, schools and major departments. Any course shown in the Program Outlines of the several colleges can be found by its alphabetical sequence (and within this alphabetical order, by its numerical sequence) in the Course Description section.
Center for Community / Junior College Relations

Course Descriptions

Note: Graduate courses applicable to the M.S. in Business Technology are listed under College of Business. A more detailed statement of course objectives, assumed prior knowledge, and topics to be covered are available through the CCJCR office.

AFDB-705 Design and Development of Computer Mediated Instruction
A course to increase competence in the utilization and development of CMI materials, to develop such knowledge relating to the selection or upgrading of computing systems to support CMI, and to provide greater orientation and awareness to the potential and recent developments in instructional technology.
Credit 6

AFDB-706 CMI for Business Subject Instruction
CMI: Computer as a Medium of Instruction
To make participant aware of wide use of computers as applied in their instructional area, to present the various tools available to the faculty member for his classroom utilization and to give the participant sufficient background for defining, designing and implementing various computer oriented problems in his subject area.
Prerequisite: AFDB-705.
Credit 6

AFDE-705 Mechanical Engineering Concepts
The first and second laws of thermodynamics are applied to fundamental problems in mechanical engineering technology.
Credit 4

AFDE-707 Engineering Concepts
(Solid Body Mechanics)
A special graduate level course to update knowledge in solid body mechanics. Statics of rigid bodies, statics of deformable bodies, dynamics of rigid bodies, and dynamics of deformable bodies are reviewed and extended, using modern mathematical techniques; i.e., vectors, matrices, and Cartesian tensors in three dimensions. Mathematical models are constructed and integrated with laboratory exercises and/or projects using analog and digital computers as aids in obtaining effects on systems by varying the parameters.
Credit 3

AFDE-708 Engineering Technology Analysis
The fusion of three significant elements: 1) the historical base, 2) which led to the development of certain areas of mathematics, 3) and how this mathematics is used in engineering design. This course also develops the knowledge in selected mathematics topics necessary for teaching engineering technology. Instructional topics are selected on the basis of pre-assessment of the understandings of the course participants.
Credit 3

AFDE-710 Science and Technology of Materials
The intent of the course is to develop in the student an understanding of the properties of crystalline and non-crystalline materials (metals, alloys, polymers, ceramics, and glass) based on their micro and macro structures.
Credit 3

AFDE-711 Microelectronics
Principles of physical basis of solid state active and passive devices. Manufacturing processes of assembly of passive circuit elements and active solid state devices into unified circuit package. Discussion of thick, thin film circuit techniques, hybrid circuit assembly, and integrated circuit techniques. Design concepts of solid state design.
Credit 3
AFDE-713  Computers in Engineering Technology I
Introduction to digital computers and application to solution of technical problems. FORTRAN programming methods, solution of equations, and numerical methods. Simultaneous linear equations, finite differences, method of least squares, numerical integration, solution of ordinary differential equations.
Prerequisite: College Mathematics through Calculus or equivalent.
Credit 4

AFDE-714  Computers in Engineering Technology II
Continuation of study of use of digital computers, computer applications, and numerical methods of solution to equations. Additional programming languages and programming techniques, finite difference, methods of solution to ordinary and partial differential equations, iterative methods for linear systems, numerical analysis and application of computers to engineering problems.
Credit 4

AFDE-715  Electromechanical Systems I
Principles and concepts of electromechanical systems and controls. Electromechanical, electricity-electronics, mechanisms, interface problems with applications to computers and control systems. Concentration on the specifications, characteristics, and proper usage of commonly used electromechanical systems. Electromagnetic devices, electromechanical amplifiers, sensors, feeders, actuators, controls (open and closed loop), counters, switches, timers, digital logic, simulation, transducers, and electromechanical analogies.
Credit 3

AFDE-716  Electromechanical Systems II
To study the major components and subsystems required for the operation of numerically controlled machines, and other current industrial applications involving the synthesis, as opposed to the addition, of electromechanical technology. The course leads to the development of a curriculum plan for electromechanical engineering technology.
Credit 3

AFDE-717  Electrical Measurements
To present the various electrical measuring devices, instruments, and transducers which the mechanical engineer is likely to encounter. Basic principles and applications are stressed.
Credit 3

AFDE-718  Applications of Linear Integrated Circuits
1) Review of the advantages and disadvantages of integrated circuits. 2) Familiarity with integrated circuits specs and circuits for obtaining these specs. 3) Ability to design circuits using integrated circuits. 4) Familiarity with the many types of circuits using op-amps.
Credit 3

AFDE-719  Communication Theory
To provide the student with the basic principles of communication theory and applications in system design.
Credit 3

AFDE-720  Integrated Physics
The course objectives include the synthesis and integration of a wide variety of physics topics that are the basis of electrical, mechanical, and optical technology, and the understanding of their common concepts, structures, and terminology.
Credit 4

AFDE-721  Digital Fundamentals
Boolean Algebra with extensive applications to digital systems.
Credit 3

AFDE-722  Digital Integrated Circuits
A comprehensive review of the design, manufacture, application, and evaluations of integrated digital circuits, with the major emphasis put on the uses of the circuits, and related laboratory work.
Credit 3

AFDE-725  Numerically Controlled Machines
Basic principles and capabilities of N/C; N/C machine and its controls; increment and absolute
systems, point to point and continuous path sys-
tems, manual programming; use of computers and
programs for N/C; N/C turning; design criteria
and managing of N/C; nonmachining applications.
Credit 3

AFDE-727 Advanced Electrical Measurements
A continuation of Electrical Measurements (717)
stressing current industrial applications, elec­
tronic instrumentation, and trouble shooting.
Bio-medical applications will be included.
Credit 3

AFDE-728 Active Filter Design
This course deals with modern approaches to the
design of frequency selective filters. Concepts
of transfer functions, poles and zeros, and graphi­
cal evaluation of frequency response are discussed.
Following this, the classical filter approximations
(e.g., Butterworth, Chebychev, and Elliptic) are
developed for low pass, band pass, and high pass
passive designs. The final portion of the course
includes the design of active R-C filters using
operational amplifiers.
Credit 3

AFDE-730 Electric Power Transmission
A survey of modern power systems including
symmetric components, transmission line con­
stants, relaying and control techniques, system
stability and economic operation. The impact of
large power solid state electronics and ecological
studies will be discussed.
Credit 3

AFDE-731 Mechanical Systems Design
To provide a comprehensive introduction to the
analytical and graphical techniques required for
the design of mechanism and machine parts.
Credit 3

AFDE-732 Manufacturing Organization
and Management
To study the principles of manufacturing orga­
ization and management as they would be related
to teaching the material in the two-year college.
Credit 3

AFDE-745 Electro-Mechanical-Optical
Systems
The course purpose is to prepare individuals to
design, install, and maintain instructional tech­
ology systems. This would include the technical
aspects of circuits, controls and devices involved
in multiple projector uses, multi-media arrange­
ments, television systems, and related technical
theories.
Credit 3

AFDE-750 Seminar
This is a series of interdisciplinary discussions led
by course participants (from different teaching
disciplines), and outside resource persons. The
topics concern the challenges involved in teaching,
and in educational planning, leading to a better
understanding of the total learning by the two
year college students.
(All degree candidates should enroll once in
Seminar).
Credit 2

AFDE-751 Advanced Engineering
Technology Seminar
A seminar for advanced students and faculty in
appropriate engineering technology programs.
The particular topics will be selected, by the
participants, prior to the Seminar. Examples of
proposed topics could include: Large Scale In­
tegration, Compatible Metal Oxide Semi Con­
ductors, Electromechanical Systems, Applications
in Industry, and current developments in Com­
puting.
Credit 1

AFDG-701 The Two-Year Colleges
The complex of philosophies, organizations, de­
velopments, finance, goals, curricula, and spirit
of the colleges.
Credit 3

AFDG-702 The Students
Advising-counseling relationships, learning styles,
student activities, motivations, developmental
education, and the implications of the "open door"
policies.
Credit 3
AFDG-703 Management of Learning
Systems of curriculum planning, and cognitive styles, goals, objectives, evaluation, measurement, and productivity, as they relate to the accountability of faculty, students, and administration.
Credit 4

AFDG-704 Instructional Techniques
To develop professional competence in direct applications and uses of various learning styles, including television, special audio-visuals, prepared lectures, seminars, computer-assisted instruction, programmed learning.
Credit 4

AFDG-715 Instructional Television
The capabilities and limitations of television as an instructional medium will be studied and experienced. Included will be an overview of television in the communication process and the components necessary to the television product: pre-production planning; script writing; perceptual principles; television graphics; producing and directing; lighting; techniques for performing; methods for evaluating the instructional effectiveness of programs and cataloging and storing of video tapes.
Production equipment and existing video tape formats, including video cassettes, will be utilized in providing hands-on experience for the student. Faculty for the course will be drawn from several disciplines.
Credit 5

AFDG-760 Management and Personnel in Instructional Technology
The participant will learn the necessary abilities for supervision and management of instructional technology efforts including the capabilities for the supervision of technicians and staff, personnel relationships, management by objectives, planning and scheduling activities.
Credit 3

AFDG-761 Fiscal Analysis & Accounting in Instructional Technology
Basic accounting as used by a department within a college, budget preparation and use as a management tool, cost estimating for instructional techniques, and the ability to make cost-benefit analyses are to be learned by the participant.
Credit 3

AFDG-763 Library-Media College Organization
This course leads to the understanding of learning and media center organizations and operations well enough for the participant to be an effective manager in the related activities, insuring the efficiency necessary for maximum learning in differing organizational patterns. Special topics include: information storage and retrieval, dissemination systems, micro forms, copyright laws, and the functions of library staff members.
Prerequisite: AFDG-701
Credit 3

AFDG-765 Individual Learning Style Analyses
The student will learn how to map or measure individual cognitive styles, and to make recommendations to teaching faculty and college administrators regarding these learning styles.
Prerequisites: AFDG-702 and AFDG-703 or equivalent studies.
Credit 3

AFDG-766 Behavioral Science Applications to Instructional Technology
A review and clear understanding of appropriate research and developmental activities for behavioral science knowledge, and the capability to follow such research throughout a career are the principal objectives for this course. Closely related is the objective of knowing the history and current status of promising experiments in education and the administration of learning as being conducted in related industry, universities, and in professional organizations.
Prerequisites: AFDG-704 or Educational Psychology, or the approval of the department.
Credit 3

AFDG-767 Instructional Techniques Comparisons
Presuming the accomplishment of competence in several instructional technology specializations, the course provides the opportunity to develop
AFDG-840 Internship
An individual arrangement with an appropriate community or junior college will be made for those persons not having teaching experience. This will provide definite teaching assignments and responsibilities, together with participation in other faculty functions, including advising, committee work, planning, and student evaluation on a full semester or term basis at a two-year college. Supervision, assistance, and evaluation will be provided by a mentor in the participating college and by the CCJCR.
Credits 3 to 6

AFDG-850 Special Projects
This course provides for independent study, investigation, or research activity in subject matter areas not formalized by the Center's program, but having specialized value to the field of community college teaching. Projects may be directed at teaching, curriculum development, or instructional technology. Proposals require approval by the Director of CCJCR.
Credits 1 to 6

College of Business

Course Descriptions

GRADUATE BUSINESS ADMINISTRATION DEPARTMENT

ACCOUNTING GROUP

BBUA-713 Basic Financial and Managerial Accounting
Managerial Accounting considers accounting as part of a total company information system emphasizing responsibility accounting. Accounting information is shown to be source material for decision making. The use and limitations of this information for managerial control and performance evaluation are discussed.
Credit 4

BBUA-714 Basic Accounting Theory
A treatment of basic accounting theory and concepts and an analysis of the special problems that arise in applying these underlying concepts to financial accounting. Valuation of assets, liabilities and capital. Adjustments for price level changes. Analysis of financial statements for credit, investment, and managerial purposes. Pronouncements of the American Institute of Certified Public Accountants.
Prerequisite: BBUA-713
Credit 4
BBUA-715  **Accounting Controls**  
Emphasizes the uses of cost data and reports for managerial decision making. Includes problems and procedures relating to job order, process, and standard cost systems with special attention to problems of overhead distribution. The planning process, the control process, and analytical processes are considered in detail.  
Prerequisite: BBUA-713  
Credit 4

BBUA-716  **Advanced Public Accounting**  
The theory and practice of Advanced Public Accounting are examined. Critical study of auditing procedures and standards in the light of current practice. Measurement and reliance of internal control covered by case studies. Modern day auditing techniques by statistical sampling and electronic data processing applications.  
Prerequisite: BBUA-714 or admission to M.S. in Accountancy program.  
Credit 4

BBUA-717  **Seminar in Taxation**  
A study of federal income taxes with special emphasis on corporate tax problems affecting business decisions and policies; including corporate reorganizations, personal holding companies, dividends, liquidations, capital gains transactions; federal gifts and estate taxes; tax planning and management.  
Prerequisite: BBUA-713 or admission to M.S. in Accountancy program.  
Credit 4

BBUA-718  **Seminar in Advanced Accounting and Theory**  
Analysis and evaluation of current accounting thought relating to the nature, measurement and reporting of business income and financial position. Concepts of income. Attention to special areas relating to consolidated statement, partnerships, consignments and installment sales.  
Prerequisite: BBUA-714 or admission to M.S. in Accountancy program.  
Credit 4

BUSINESS GROUP

BBUB-714  **Administrative Theory**  
This course stresses the development of effective skills in interpersonal relations in organizations, with emphasis on decision making. Use of the behavioral sciences in problem solving is stressed. Problem areas include communication, influence, control, and managing for innovation and change.  
Prerequisite: BBUB-744  
Credit 4

BBUB-715  **Legal and Social Environment of American Business**  
A study of the legal and social influences which govern business conduct and their impact on business decisions and policy. Social and legal aspects of competition, pricing, advertising, and employment will be discussed.  
Credit 4

BBUB-716  **Operations Management**  
An analytical approach to the theory and application of operations management. Combines quantitative models and qualitative considerations relating to forecasting, inventory management, quality control, and queuing analysis. Statistical reasoning and computer utilization are the basic tools used in problem solution.  
Prerequisite: BBUB-783  
Credit 4

BBUB-717  **Behavioral Science in Management**  
The implications of studies from the fields of psychology, sociology and anthropology to management are discussed; problems in perception, motivation, social interaction, group dynamics, attitudes and values are stressed. Lecture, discussion, case studies and emphasis on critical analysis and interpretation of original research readings.  
Credit 4

BBUB-718  **Seminar in Management Development**  
Concepts of individual development. Overview of present individual and group procedures. Implica-
tions of current technological development for training, replacement, and advancement.
Prerequisite: BBUB-741
Credit 4

BBUB-747 Systems Administration
Analysis of basic character of industrial operations, their measurement, and criteria for their efficiency.
Design and administrative problems in management of processes and systems.
Prerequisite: BBUB-741
Credit 4

BBUB-748 Labor/Management Problems
Economic problems in labor/management relations at the plant and industry level as they influence managerial decision making. Though the focus of the approach is economic, the analysis is developed within the relevant institutional context. Topics include composition of the labor force participation; relative importance of market forces and unionism in shaping wage levels, and wage structure; consideration of the role of wages on costs, prices, and profits, the relationship between labor cost and technology; conflicts and agreements between labor and management; and the impact of unemployment, and inflation on labor-management disputes.
Prerequisite: BBUB-741

BBUB-749 Organizational Simulation
This course attempts to increase the learner's familiarity and understanding of several organizational concepts including formal organization, supervision, personnel management, decision-making, interviewing techniques, and contract negotiations. It utilizes the use of role play in simulated business problems under gaming conditions.
Prerequisites: BBUB-741, BBUB-742, and BBUB-744.
Credit 4

BBUB-759 Integrated Business Analysis
A course intended to give experience in combining theory and practice gained in other course work. This integrative exposure is achieved by solving complex and interrelated business policy problems that cut across the several functional areas of marketing, production, finance and personnel. This course is aimed at the formulating and implementation of business policy as viewed by top management. The case method is used extensively.
Prerequisites: BBUA-713, BBUB-741, BBUB-745, BBUF-722, BBUM-761.
Credit 4

BBUB-770 Business Research Methods
Research as a basis for policy building, planning, control and operation of the business enterprise. Concepts, tools, sources, methods, and applications are covered. Procurement and evaluation of data for business use from government and private sources.
Credit 4

BBUB-771, 772 Research Option
A thesis course requiring the student to confront a real business problem. Requirements include steps from design to completed management report.
Credit 8

BBUB-790 Information Systems
The concepts and techniques for the design and implementation of a computer-based management information system are studied. Topics include systems theory, the generation and collection of data, the transformation and dissemination of information, and the economics of information.
Prerequisites: BBUB-741, BBUQ-783.
Credit 4

FINANCE GROUP

BBUF-722 Financial Management
A broad coverage of business finance with emphasis on the analytical techniques of resource allocation and asset management. Covers securities and securities markets, capital structure, analysis of financial statements, financing business operations, cost of capital and capital budgeting.
Prerequisite: BBUA-713
Credit 4
BBUF-723  Theory of Finance
This course involves a study of the current literature and most recent developments relating to the theories of investment and valuation, cost of capital, risk and dividend policy. Also considered are specific areas of application and the policy implications of the theories studied.
Prerequisite: BBUF-722
Credit 4

BBUF-724  Problems in Financial Management
This course is designed to give the student greater depth in the basic concepts of financial management and greater facility in using the analytical techniques. Extensive use will be made of case material. Problem types to be considered include liquid asset management, capital budgeting, security valuation, methods of financing and dividend policy, among others.
Prerequisite: BBUF-722
Credit 4

BBUF-725  Securities and Investment Analysis
Study of securities and various investment media and their markets. Analysis of investment values based on financial and other data. Considers factors such as return, growth, and risk.
Prerequisite: BBUF-722
Credit 4

BBUF-745  Economic Environment of American Business
Nature of business firm. Theory of demand, costs, and prices. Competition and monopoly. Production function and the marginal productivity theory of distribution. Saving and investment; the determination of the level of income. Federal Reserve operations; fiscal and monetary policies.
Credit 4

BBUF-765  Business Economics and Applied Econometrics
The course stresses model building, with emphasis on the economic foundations of the models. Econometric techniques are employed in the development and testing of aggregate, industry, and company models, with attention given to the feedback relationship from the aggregate (macro) model to the industry and company models. Forecasting and analysis of the industry and company models are employed. Simulation of the models under alternative policy assumptions is performed. Bank data, model-tools, and computer programs are supplied.
Prerequisites: BBUF-745, BBUQ-781, 782.
Credit 4

MARKETING GROUP

BBUM-761  Marketing Concepts
Critical examination of the marketing system as a whole; functional relationships performed by various institutions such as manufacturers, brokers, wholesalers, retailers, etc. Analysis of costs, strategies and techniques related to the marketing system. Both behavioral and quantitative aspects of marketing considered.
Credit 4

BBUM-762  Advanced Marketing Management
A depth study of selected problems which face marketing managers concerned with promotion, place, price, and product. Material centers on staff marketing functions. Research topics are covered and are those unique to the field of marketing.
Prerequisite: BBUF-761
Credit 4

BBUM-763  Seminar in Consumer Behavior
A study of the market in terms of the psychological and socio-economic determinants of the buyer’s behavior, including current trends in purchasing power and population movements.
Prerequisite: BBUF-761
Credit 4

BBUM-764  Marketing Logistics
The study of an integrated system for the distribution of products from producer to consumer. The emphasis is on the physical flow of goods both between marketing institutions as well as within marketing institutions. Specific topics covered are unit geographic location, internal product flow, inter-unit transportation, and warehousing.
Prerequisites: BBUQ-783, BBUF-761.
Credit 4
QUANTITATIVE GROUP

BBUQ-781 Managerial Decision Making I
A study of probability and classical statistics including set theory, discrete and continuous probability distributions, sampling distributions, point estimation, and hypothesis testing. Applications are made to the managerial decision-making situation.
Credit 4

BBUQ-782 Managerial Decision Making II
A continuation of topics from classical statistics including interval estimation, nonparametric tests, analysis of variance, regression and correlation analysis, time series, and index numbers.
Prerequisite: BBUQ-781
Credit 4

BBUQ-783 Managerial Decision Making III
An introduction to decision theory for managerial decision situations with a strong emphasis on Bayesian decision analysis. Topics include modeling, principles of choice, the expected opportunity loss, the expected value of information, revision of discrete and continuous prior distributions, the expected value of sample information, optimal sampling, utility functions, and decision diagramming.
Prerequisite: BBUQ-782
Credit 4

BBUQ-784 Decision Theory
The decision theory approach to decisions under uncertainty is examined. The modeling of business decision situations, the utilization of utility theory, and the application of various principles of choice are considered. The Bayesian approach to decision theory is primarily emphasized.
Prerequisite: BBUQ-783
Credit 4

BBUQ-785, 787 Introduction to Operations Research I and II
An introduction to the application of operations research techniques to business decision making. Specific topics covered are linear programming, inventory models, dynamic programming, queuing theory, network analysis, and game theory.
Prerequisite: BBUQ-783
Credit 8

BBUQ-788 Multivariate Analysis
An introduction to the primary multivariate statistical techniques available for business and economic research. Chi-square contingency table tests, the analysis of variance, and multiple regression and correlation analysis are examined.
Prerequisite: BBUQ-783
Credit 4

BBUQ-789 Simulation
An introduction to the various uses of simulation as a management tool for decision making. Models of varying levels of sophistication employing simulation programming languages are constructed.
Prerequisites: BBUQ-783, BBUQ-741.
Credit 4

BBUQ-792 Concepts in Computer Utilization
An introduction to the use of computers in problem solving. Students will be exposed to Fortran IV and basic programming languages. Application programs will also be introduced for a wide variety of business problems.
Credit 4
College of Continuing Education

Course Descriptions

GRADUATE COURSES IN APPLIED AND MATHEMATICAL STATISTICS

CASM-701 Basic Statistical Mathematics
Refresher training in the mathematical tools needed for work in statistics courses.
Topics: Algebra, calculus, and matrices.
(Required of all candidates accepted on condition. May be taken as an elective by any student in the program.)
Credit 3

CASM-71X Fundamentals of Statistics I
For those taking statistics for the first time. Covers the statistical methods used most in industry, business and research. Essential to all scientists, engineers, and administrators. Emphasis will be on applications.
Topics: Probability; random variables; distributions; statistical investigations and sampling; hypothesis testing and control of error. (All standard statistical tests.)
Prerequisite: Consent of the department.
Credit 3

CASM-712 Fundamentals of Statistics II
Continuation of CASM-711.
How to estimate, analyze data, and predict with statistics.
Topics: Review and extension of statistical inference; estimation; goodness-of-fit tests and tests of independence; introduction to analysis of variance with applications; regression and correlation analysis; nonparametric tests.
Prerequisite: CASM-711 or equivalent.
Credit 3

CASM-721 Quality Control: Control Charts
A course designed to give depth to practicing quality control personnel.
Topics: Statistical measures; theory, construction, and application of control charts for variables and for attributes; computerization procedures for control charts; tolerance, specification and process capability studies; basic concepts of total quality control; management of the quality control function.
Prerequisite: Consent of the department.
Credit 3

CASM-731 Quality Control: Acceptance Sampling
Investigation of modern acceptance sampling techniques with emphasis on industrial application.
Topics: Single, double, multiple, and sequential techniques for attributes sampling; variables sampling; techniques for sampling continuous production. The course highlights Dodge-Romig plans, Military Standard plans, and recent contributions from the literature.
Prerequisite: Consent of the department.
Credit 3

CASM-741 Techniques for Investigational Analysis
Studies of special statistical techniques applicable to industrial, educational, accounting, medical, and business type problems. Helpful to those doing research in these fields.
Topics: Use of special probability papers, probit analysis; sensitivity testing; order statistics with applications; analysis of means; special plotting techniques; applications of statistics to real problems.
Prerequisite: CASM-712 or equivalent.
Credit 3
CASM-751 Introduction to Decision Processes
A first course in statistical decision theory featuring concrete situations and realistic problems. (When to use statistics, what size sample, and how to evaluate risks.)
Topics: The structure of the decision making problem; criteria of choice; decision diagrams; decision making using prior and sample information; devising optimal strategies; sequential decision making procedures; comparing older methods.
Prerequisite: Consent of the department.
Credit 3

CASM-761 Reliability
A methods course in reliability practices. What a reliability engineer must know about reliability prediction, estimation, analysis, demonstration, and other reliability activities. Covers most methods presently being used in industry.
Topics: Applications of normal, binomial, exponential, and Weibull graphs to reliability problems; hazard plotting; reliability confidence limits and risks; strength and stress models; reliability safety margins; truncated and censored life tests, sequential test plans; Bayesian test programs.
Prerequisite: CASM-712 or equivalent.
Credit 3

CASM-801 Design of Experiments I
A methods course in the planning, execution, and interpretation of comparative experiments.
Topics: Linear statistical models; fundamental principles of designs; inference making; analysis of variance.
Prerequisite: CASM-712 or equivalent.
Credit 3

CASM-802 Design of Experiments II
Continuation of CASM-801.
Topics: Seeking a maximum or minimum response (method of steepest ascent, EVOP); fractional factorial experiments and incomplete block designs; random models; nested sampling experiments; estimation of and tests on variance components; mixed models; randomized blocks; split-plot designs.
Prerequisite: CASM-801 or equivalent.
Credit 3

CASM-811 Probability Theory and Applications I
How to handle processes that have some chance element in their structure.
Topics: Review of basic concepts of mathematical theory; Markov sequences; Poisson processes; discrete parameter random processes; applications.
Prerequisite: CASM-822 or equivalent.
Credit 3

CASM-812 Probability Theory and Applications II
Continuation of CASM-811. More on stochastic processes.
Topics: Algebraic methods useful for solving Markov chains; nonfinite and continuous Markov chains; limiting distributions; an introduction to queuing theory.
Prerequisite: CASM-811 or equivalent.
Credit 3

CASM-821-822-823 Theory of Statistics I-II-III
This sequence of courses seeks to develop an understanding of the analytic structure of statistics and its applications. Covered here is what the practicing statistician needs to know to work at his best in his profession and keep up with new developments.

CASM-821 Theory of Statistics I
Topics: Probability distributions; mathematical expectation; sums of random variables; using theory in applications.
Prerequisite: Consent of the department.
Credit 3

CASM-822 Theory of Statistics II
Continuation of 821.
Topics: Theory and applications of sampling distributions; estimation; hypothesis testing.
Prerequisite: CASM-821
Credit 3

CASM-823 Theory of Statistics III
CASM-823 Theory of Statistics III
Continuation of 822.
Topics: Multivariate models and linear hypotheses with reference to applications in analysis of variance and regression analysis.
Prerequisite: CASM-822
Credit 3

CASM-841 Regression Analysis I
A methods course dealing with the general relationship problem.
Topics: The matrix approach to simple and multiple linear regression; analysis of residuals; dummy variables; orthogonal models; computational techniques.
Prerequisite: CASM-802 or equivalent.
Credit 3

CASM-842 Regression Analysis II
A continuation of CASM-841.
Topics: Selection of best linear models; regression applied to analysis of variance problems; non-linear estimation and model building.
Prerequisite: CASM-841 or equivalent.
Credit 3

CASM-851 Nonparametric Statistics
Distribution-free testing and estimation techniques with emphasis on applications. For applied research workers.
Topics: Sign tests; goodness-of-fit tests; run tests; rank tests; contingency tests; rank correlation; tests of two or more samples.
Prerequisite: CASM-712 or equivalent.

CASM-853 Managerial Decision Making
Statistical decision analysis for management.
Topics: Review of principles of decision making; decisions prior to sampling; many action problems; revisions of probability distributions; optimal sample size; utility and decision diagrams; replacement policies.
Prerequisite: CASM-712 or equivalent.
Credit 3

CASM-871 Sampling Theory, Applications
A study of the strategies and supporting theory applicable to survey sampling, inventory control, sampling for auditing and accounting, and bulk sampling of raw materials.
Prerequisite: CASM 712 or equivalent.
Credit 3

CASM-891 Special Topics in Applied Statistics
This course provides for the presentation of subject matter of important specialized value in the field of applied and mathematical statistics not offered as a regular part of the statistics program.
Prerequisite: Consent of the department.
Credit 3

CASM-895 Independent Study
This course or sequence of courses, provides for one or more quarters of independent study and research activity by students other than those in the Plan C option. This course may be used by other departments at RIT (or other colleges) to provide special training in statistics for students who desire an independent study program in partial fulfillment of graduate degree requirements.
Prerequisite: Consent of all departments involved.
Credit 3

CASM-896, 897, 898 Thesis
For students working for the M.S. degree in Math Statistics under Plan A.
Prerequisite: Consent of the department.
Credit 3/Qtr.

CASM-899 Individual Achievement Program
For students accepted under the Plan C Option. The program to be followed will permit either:
(a) satisfactory achievement in the same subject matter the student would select under Plan A or Plan B; or
(b) satisfactory achievement through independent studies in the student's particular field of professional interest in statistics, such as mathematics, engineering, quality control, or business.
Prerequisite: Consent of the department.
Credit: 45 quarter hours to be earned and recorded in quarter hour segments as the candidate progresses in the plan of independent study set up with him.
College of Engineering

Course Descriptions

Wherever a prerequisite is stated in the form of a specific course number, the words 'or equivalent' are always implied. Prerequisites, if any, are shown following the description of the course.

EENG-790 Engineering Internship
This course number is used by the students in the Master of Engineering degree program for earning internship credits. The actual number of credits is to be determined by the student's faculty advisor and subject to approval of the Graduate Committee of the College of Engineering.
Credit Variable

GRADUATE COURSES IN ELECTRICAL ENGINEERING

EEEE-702 Introduction to Random Variables and Signals
(Graduate standing or departmental approval)
Credit 4

EEEE-704 Electromagnetic Fields
Prerequisites: EEEE-571, 572
Credit 4

EEEE-705 Electromagnetic Waves
Prerequisites: EEEE-571, 572
Credit 4

EEEE-706 Special Topics in Electromagnetics
Prerequisites: EEEE-704, 705
Credit 4

EEEE-707 Linear Systems
Credit 4

EEEE-708 Active Filter Design
Credit 4
IEEE-709 Active Network Synthesis
(Instructor's approval)
Credit 4

IEEE-711 Integrated Circuit Operational Amplifiers
(Graduate standing or departmental approval)
Credit 4

IEEE-712 Control System Fundamentals
A study of linear control systems, their physical behavior, dynamical analysis and stability using mathematical models. This involves the use of Root Locus, Bode, and Nyquist techniques for the analysis and compensation of single and multiple-loop systems.
Prerequisite: Elementary knowledge of Laplace Transforms. (This course is intended for graduate students who have not had a formal course in control systems in their undergraduate program. This course is not open to those who have already had an introductory control systems course.)
Credit 4

IEEE-713 Modern Control Theory
The development of the analytical techniques of modern theory as applied to linear control systems. Topics include vector spaces, state space, and state variables, matrices and matrix functions, controllability, observability and stability theory.
Prerequisite: EEEE-611
Credit 4

IEEE-714 Introduction to Nonlinear Control Systems
An introduction to the physical nature and mathematical theory of nonlinear control systems' behavior using Phase Plane techniques, Liapounov Theory, Describing Function techniques and Popov's criterion. These are applied to both piecewise-linear and analytical nonlinear systems.
Prerequisite EEEE 713
Credit 4

IEEE-715 Analysis of Nonlinear Control Systems
Prerequisite EEEE 714
Credit 4

IEEE-716 Digital Signal Processing
A course in sampled data methods aimed at the development and study of discrete signal processing techniques. Elementary sampling theory and the one-sided Z transform are the principal tools used. Emphasis is placed on the design of digital filters and the use of Fast Fourier transform methods.
Prerequisite: EEEE-707
Credit 4

IEEE-718 Statistical Design of Control Systems
Brief review of probability. Statistical description of random processes. Mean square error analysis. Design of optimum linear control system for minimizing the mean square error with stationary random inputs with or without additive noise. Design with constraints.
Credit 4
EEEE-719  Sampled Data Control Systems
Prerequisites: EEEE-713
Credit 4

EEEE-720  Optimum Control Systems
Introduction to Calculus of variations. Conditions of optimality. Optimizing transient performance by statistical and variational procedures, dynamic programming and by Pontryagin's maximum principle. Design of optimal linear systems with quadratic criteria.
Prerequisite: EEEE-713
Credit 4

EEEE-734  Communication Techniques
Prerequisite: EEEE-707
Credit 4

EEEE-735  Digital Data Transmission
Pulse code modulation and pulse amplitude modulation. Carrier systems, FSK and PSK systems. DCPSK system. Signal space representation of data signals and discussion of signal space.
Prerequisites: EEEE 702, 734
Credit 4

EEEE-736  Information Theory
Prerequisite: EEEE-702
Credit 4

EEEE-737  Random Signals and Noise
Prerequisite: EEEE-702
Credit 4

EEEE-738  Physical Basis of Integrated Circuits
(Formerly "Physical Electronics I")
A study of semiconductor physics to develop an understanding of the operation of various devices such as bipolar transistors and MOS transistors. The emphasis will be on the development of models useful in circuit analysis and design. Fabrication and characteristics of integrated circuits will be discussed.
(Departmental approval)
Credit 4

EEEE-740  Digital Integrated Circuits
Monolithic IC fabrication process. Components, properties, models and equations. Different types of digital IC's. Applications of digital IC's to circuits as well as systems. Emphasis will be on the TTL family and problems most often faced by the practicing designer.
Prerequisites: EEEE-650 or EEEE-750, 751. (751 may be taken concurrently)
Credit 4

EEEE-742  Computer Methods in Electrical Engineering
A study of numerical methods for the solution of problems in Electrical Engineering with special emphasis on approximation techniques. The method of moments and computer solutions of problems in antennas and microwave networks are studied.
Prerequisite: SMAM-611
Credit 4

EEEE-743  Minicomputer Fundamentals
A course designed to provide engineers with a practical knowledge of minicomputers. Stress will be placed on basic architecture, software fundamentals, interfacing characteristics, and interrupt structures and control of I/O devices.
Credit 4
EEE-750  Switching Circuits I
Credit 4

EEE-751  Switching Circuits II
A study of sequential logic circuits and applications. Iterative networks. Analysis and synthesis of synchronous and asynchronous, fundamental and pulse mode, sequential circuits. Application of sequential circuits to shift registers, and counters.
Prerequisite: EEEE-750
Credit 4

EEE-752  Sequential Machines and Automata
Prerequisite: EEEE-650 or 751
Credit 4

EEE-753  Logic Fault Diagnosis
Generation, selection and verification of tests for the detection and diagnosis of logical faults in combinational and sequential circuits and iterative logic arrays. Fault simulation and fault dictionaries. Design techniques.
Prerequisite: EEEE-650 or 751
Credit 4

EEE-800, 801  Graduate Paper
This course number is used to fulfill the Graduate Paper requirement under the non-thesis option for the Master of Science degree in Electrical Engineering. The graduate paper is an extensive term paper on a topic of professional interest. The student must obtain the consent of a faculty member to supervise the paper before registering for these course numbers.
Credit 4 for EEEE 800; Variable (Maximum 4) for EEEE 801

EEE-890  Research and Thesis Guidance
An independent engineering project or research problem to demonstrate professional maturity, preferably involving the reduction of theory to practice. An oral examination and a written thesis are required.
Credit Variable (Maximum of 12 credits total)

GRADUATE COURSES IN INDUSTRIAL ENGINEERING
EIEI-601  Value Analysis
This course examines the nature and measurement of value. The concept and construction of a value index representing average value is related. Numerical estimation methods such as ranking, pair comparison, magnitude estimation, and criteria analysis are explained and used to measure the value of diverse items. The methods used are applicable to the study of a wide variety of problems and have special utility in engineering design studies.
Credit 4

EIEI-701  Principles of Operations Research I
Applied linear programming. Computational techniques for solving constrained optimization problems. Linear programming, the Simplex method and variations, duality and sensitivity testing.
Credit 4
EIEI-702 Mathematical Programming
Application of non-linear programming techniques. Classical optimization techniques; quadratic, stochastic, integer programming and dynamic programming. Applications to industry.
Prerequisite: EIEI-701
Credit 4

EIEI-705 Survey of Operations Research
A survey course designed to introduce the student to such topics as waiting line analysis, inventory, scheduling, replacement, and simulation. This course is intended to present an integrated view of the field of Operations Research to students who will take more specialized courses as well as those in other disciplines desiring only a limited exposure to the field.
Credit 4

EIEI-710 Systems Simulation
Methods of modeling and simulating man-machine systems with emphasis on model validation, design of simulation experiments, variance reduction techniques, random number generation, distribution generation.
Credit 4

EIEI-715, 716 Statistical Analysis for Engineers I and II
A basic two-quarter course in probability and statistics designed to give the student a foundation for further study in areas such as Design of Experiments, Stochastic Systems, Simulation, etc.
Credit 4

EIEI-720 Production Control
A systems approach to the design of production control operations. Investigation of forecasting, operations planning, inventory control, and scheduling. Case studies and the design of actual production systems is encouraged.
Credit 4

EIEI-730 Biotechnology and Human Factors I
Credit 4

EIEI-731 Biotechnology and Human Factors II
Effect of mechanical and physical environment on: physiology, behavior, performance of man. Design considerations to protect man against such environmental effects (e.g. thermal environment, noise, vibration, acceleration, light, altitude).
Credit 4

EIEI-732 Biotechnology and Human Factors III
Theoretical fundamentals of human body mechanics. Development and applications of biomechanics and biomechanical models. Kinematics of the link system of the body and extremity joints.
Credit 4

EIEI-733 Biotechnology and Human Factors IV
Measurements of human performance. Functions that man performs in man-machine systems. Techniques to quantify man’s behavior at work.
Credit 4

EIEI-734 Systems Safety Engineering
Credit 4

EENG-707 Engineering Hydrology
A study of the dynamics of the physical processes involving the waters of the earth. Included in the course will be: the meaning of hydrology, the hydrological cycle, transport processes, physical composition of the atmosphere, physical composition of oceans and lakes, planetary fluid mechanics, circulation of the atmosphere, and precipitation.
Credit 4
EENG-742  Solid Wastes Engineering
A study of the collection, processing, disposal and re-use of solid wastes of municipal, industrial and agricultural origin. A discussion of the basic design parameters of landfilling, burning and processing solid wastes. A presentation of considerations of importance to the development of workable regional and municipal management systems.
Credit 4

EMEM-652 Fluid Mechanics of Turbomachinery
A fundamental course in turbomachinery presuming background in elementary fluid mechanics and thermodynamics. The course begins with a comprehensive review of those portions of fluid mechanics appropriate to the study of turbomachinery. Topics covered include: dimensional analysis, energy transfer between rotor and fluid, radial flow pumps and compressors, axial flow pumps and compressors, radial flow turbines, and axial flow turbines.
Credit 4

EMEM-692 Analysis for Engineers
Credit 4

EMEM-693 Theory of Thermo Fluid Systems
Credit 4

EMEM-694 Stress Analysis
Topics to be covered include: two and three dimensional stress-strain relations, Mohr's circle, elasticity theory, experimental techniques, yield theories, introduction to plasticity, fracture mechanics, design approaches, vibrational principles, and extensive coverage of Castigliano's Theorem. Prerequisite for EMEM-795.

EMEM-701 Applied Engineering Analysis I
Solutions to boundary value problems related to the theory of elasticity, heat transfer, vibrations and fluid flow by methods of separation of variables, LaPlace transforms and Fourier transforms. Prerequisite: SMAM-308
Credit 4

EMEM-702 Applied Engineering Analysis II
Credit 4

EMEM-703 Applied Engineering Analysis III
Topics chosen from Conformal Mappings, Complex Inversion of Transform Integrals, Calculus of Variations and Integral Equations with applications to mechanical engineering problems. Prerequisite: EMEM-702
Credit 4

EMEM-705 Numerical Analysis
Roots of algebraic and transcendental equations. Finite difference solutions of ordinary and partial differential equations, solutions of simultaneous linear equations. Error and Convergence Analysis. Extensive use of computer is anticipated. (Graduate standing)
Credit 4

EMEM-711 Heat Transfer I
The formulation of conduction heat transfer problems. Solutions to steady state and unsteady state problems by separation of variables. LaPlace transforms and numerical methods. (Graduate standing or departmental approval)
Credit 4
EMEM-712 Heat Transfer II
Thermal radiation, radiation properties of surfaces, radiant interchange among surfaces separated by radiatively nonparticipating media, radiant energy transfer through absorbing, emitting and scattering media.
(Graduate standing or departmental approval)
Credit 4

EMEM-713 Heat Transfer III
(Graduate standing or departmental approval)
Credit 4

EMEM-715 Fluid Dynamics
Selected topics from compressible flows, viscous flow, hydrodynamic instability and turbulence, depending on the interests of the students.
Prerequisite: EMEM-415
Credit 4

EMEM-717 Thermodynamics
This course provides a general, postulative approach to classical macroscopic thermodynamics through a mathematical formalism developed from basic postulates concerning equilibrium and stability. Applications of the formalism to chemical, electric and magnetic, and stressed solid systems are considered. The course concludes with an introduction to the theory of fluctuations, and the concepts of irreversible thermodynamics.
Prerequisite: EMEM-413
Credit 4

EMEM-718 Statistical Thermodynamics
This course develops the fundamentals of thermodynamics from the standpoint of a statistical model of a system of discrete particles. Topics covered include kinetic theory, elementary transport parameters, classical Maxwell-Boltzmann statistics, Fermi-Dirac and Bose-Einstein quantum statistics with applications to gases, vapors, compressed gases and liquids.
Credit 4

EMEM-730 Nature and Properties of Materials
A study of the nature of solids including metals, ceramics, polymers, glasses and composites. Also considered are thermal, electrical, magnetic, and optical properties.
Prerequisite: EMEM-344
Credit 4

EMEM-731 Introduction to Continuum Mechanics
Stress, deformation and flow in a continuous medium. Applications in the area of linear elasticity and fluid mechanics.
Prerequisite: SMAM-308
Credit 4

EMEM-732 Advanced Mechanics of Materials
Theory of failure. Stress analysis of thick cylinders, plates, curved beams, and beams on elastic foundations.
(Graduate standing or departmental approval)
Credit 4

EMEM-733 Analytical Mechanics I
Brief review of vectorial mechanics with emphasis on the dynamics of rigid bodies and applications to systems of degrees. Introduction to continuum using the limiting case of a system with an infinite degree of freedom.
(Graduate standing or departmental approval)
Credit 4

EMEM-734 Analytical Mechanics II
Transmission of waves, variational calculus, variational dynamics, and some relativity.
Prerequisite: EMEM-733
Credit 4

EMEM-735 Theory of Elasticity I
Formulation of problems in elasticity; bending and torsion of beams, plain strain and plain stress problems. Different methods of solutions such as stress functions, complex variables.
Prerequisite: EMEM-731
Credit 4
EMEM-736  Theory of Elasticity II
Solution of three-dimensional problems in elasticity, contact stresses. Variational methods. Introduction to wave propagation in elastic bodies.
Prerequisite: EMEM-735
Credit 4

EMEM-737  Vibration Theory and Applications I
Vibrations of a particle, theory of damped free and forced vibrations of systems with several degrees of freedom.
Prerequisite: EMEM-702
Credit 4

EMEM-738  Vibration Theory and Applications II
Vibration of elastic bodies, structures and approximation methods using matrix methods.
Prerequisite: EMEM-737
Credit 4

EMEM-739  Experimental Stress Analysis
Mechanical methods of analysis of structural and machine members, including photoelastic method, strain gages, the membrane; hydrodynamical and electrical analogs. Laboratory tests of models.
Prerequisite: EMEM-732
Credit 4

EMEM-741  Advanced Mechanical Systems Design
Optimization of system response to deterministic inputs. Various mechanical systems in use will be analyzed and studies will be made to improve them. Both the analog and the digital computer are used.
Prerequisites: EMEM-705 and 751
Credit 4

EMEM-743  Applied Vibrations
Nature of various types of vibration problems, and procedures for assessing their significance. Diagnosis of selected practical problems, including experimental techniques such as strain gages, displacement sensors, and an introduction to holography. The development of meaningful analytical models, based on either test data for problem diagnosis, or on layout drawings for design analysis. Prediction of natural frequencies, mode shapes, and vibration response amplitudes for discrete mass systems using Newton's Law of Motion, and introduction to problems associated with continuum systems of bars, plates and shells. Practical problem-solving workshop sessions will consolidate the above topics.
Credit 4

EMEM-751  Automatic Control Engineering I
Development of the transfer functions and block diagrams to describe components and systems; rootlocus, Bode, and polar plots are used. The analog computer is used throughout the course to simulate systems.
Prerequisite: EMEM-702
Credit 4

EMEM-752  Automatic Control Engineering II
An advanced study of feedback systems covering the areas of compensation, complex control systems, and non-linear systems.
Prerequisite: EMEM-751
Credit 4

EMEM-772, 773, 774  Special Topics in Mechanical Engineering
An opportunity for the advanced student to undertake an independent investigation in a mechanical engineering field of his own choice. Assistance will be given only when the student requests it. The project may be a comprehensive literature investigation, a theoretical study, or an investigation involving laboratory experiment.
Credit Variable. (Maximum of 4 credits/quarter)

EMEM-795  Finite Elements I
Development of theory from variational principles. Two-dimensional applications to elastic continua, considering plain stress, plain strain, and axisymmetric loading examples. Problem-solving sessions using RIT computer. Applications in structural mechanics, considering beam elements, plate elements, and shell elements. Utilization of these elements in solving specific structural problems. Introduction to three-dimensional stress analysis. Features of large general-purpose computer programs.
Credit 4
EMEM-796 Applied Vibrations II
Analysis of vibrations of linear continuous systems, involving beams, frames, plates, and shells. Solution by classical methods or by approximate methods, as expedient. Finite-element analysis of vibration and stability problems. System analysis techniques such as mobility and receptance methods. Applications of methods discussed to important practical problems. Problem-solving workshop.
Credit 4

EMEM-797 Finite Elements II
Variational principles for linear and nonlinear elements. Three dimensional element derivations using natural coordinate systems. Solid elements, tetrahedron and hexahedron. Various thin shell elements. Computer workshops with use of various programs demonstrating the above theory.

EMEM-890 Research and Thesis Guidance
In conference with a thesis advisor, a topic is decided on, and either a theoretical or laboratory type research program is carried out. Periodic progress reports and final written thesis with oral examination.
Credit Variable. (Maximum 12 credits total)
COMMUNICATION DESIGN
FADC-780 (MFA) FADC-750 (MST)
Communication Design Studio
Advanced creative problem-solving experiences in communication design imagery. Professional problems in graphic design and related visual techniques for communication media such as print, television, film. Media Center facility available for extension of studio problems.
Lab. 9-27
Credit 3-9

INDUSTRIAL/ENVIRONMENTAL DESIGN
FADE-780 (MFA) FADE-750 (MST)
Design Applications
The reasoned application of theoretical three-dimensional design, responsible practical solutions that are valid in our complex and dynamic world environment, by considering the importance of the decision-making role of the individual designer, in a mass industrialized society.
Lab. 9-27
Credit 3-9

PAINTING
FADP-780 (MFA) FADP-750 (MST)
Painting
The pursuit of the pertinent, the ecstatic, the beautiful, by a small group of those dedicated to the art.
Lab. 9-27
Credit 3-9

PRINTMAKING
FADR-780 (MFA) FADR-750 (MST)
Printmaking
Advanced techniques in etching, lithography and woodcutting, as well as in many experimental areas including color processes, photo-etching, photo-lithography, vacuum-forming, combination printing and calligraphy. Students are expected to develop along independent lines and direction is offered in contemporary thought and concept. The emphasis is toward developing a complete respect for the printmaking craft and profession.
Lab. 9-27
Credit 3-9

THESIS
FAD(C, E, P, or R)-890
Research and Thesis Guidance
The development of a thesis project instigated by the student and approved by a faculty committee and the Graduate Faculty Chairman. Primarily creative production, the thesis must also include a written report.
Credit 12

SCHOOL FOR AMERICAN CRAFTSMEN
Design, Techniques and Research Problems
A program structured on the basis of individual needs, interests, and background as they may be determined through faculty counseling. This sequence of courses will lead to the production of a thesis project, suggested by the student and approved by the faculty. This applies to all craft areas.
Lab. 9-27
Credit 3-9

FSCC-780 (MFA) FSCC-750 (MST) Ceramics
FSCM-780 (MFA) FSCM-750 (MST) Metalcrafts and Jewelry
FSCT-780 (MFA) FSCT-750(MST) Weaving and Textile Design
FSCW-780 (MFA) FSCW-750 (MST) Woodworking and Furniture Design
FSC(C, M, T or W)-890 Research and Thesis Guidance
Research and presentation of an acceptable thesis with a focus on technique, design, production, or a combination of these approved by the faculty. The thesis subject will be chosen by the candidates with the approval of the faculty advisor. The thesis will include a written summation or report of the research and presentation program.
Lab. 27
Credit 12
College of General Studies

Course Descriptions

EDUCATION SERVICE COURSES
FOR GRADUATE PROGRAMS OF
OTHER RIT COLLEGES

GSHH-701 History of American Educational
Thought and Practice
A study of the intellectual ideas and social forces
that have shaped American education from the
colonial period to the present.
Credit 5

GSSP-702 Educational Psychology
A study of psychological research as it applies to
the problems of learning and teaching. Considera-
tion will be given to Pavlovian and operant condi-
tioning, perceptual learning, motivation, individ-
ual differences, and other factors related to effi-
ciency in learning. Evaluation will be studied to
the degree that it is useful in teaching. Lectures,
readings, and seminar-type projects will be used
to develop the various phases of the course.
Credit 5

GSSS-701 Educational Sociology
The development of sociological and socio-psycho-
logical types of knowledge that have relevancy for,
or logical connections to, educational practices.
This course will be based on substantive material
about social phenomena making up the social order
in which the educational systems are operating
and by which they are influenced.
Credit 5

College of Graphic Arts and Photography

Course Descriptions

SCHOOL OF PHOTOGRAPHIC ARTS
AND SCIENCES

MASTER OF SCIENCE IN
PHOTOGRAPHIC SCIENCE

PPHS-700 Principles of Photographic Science
A course intended for students who have completed
their undergraduate programs in engineering or the
sciences and now wish to prepare themselves for
entry into the graduate program in Photographic
Science and Instrumentation. It is an intensive
course, assuming working knowledge of mathe-
matics, physics, and chemistry, and includes: radia-
tion theory and radiometry, properties of radiation-
sensitive materials, chemistry and kinetics of photo-
graphic processing, sensitometry, tone reproduc-
tion, principles of color measurement, and color
photographic systems.
Summer only. Credit 15. Not applicable to 45
required graduate credits.

PPHS-701,702,703 Principles of Photographic
Science
Equivalent to PPHS-700, but offered in the even-
ing and Saturdays during the regular Fall, Winter,
and Spring quarters.
Credit 15. Not applicable to the 45 required gradu-
ate credits.
PPHS-711,712,713  Theory of the Photographic Process
Chemical and physical properties of silver halides and gelatin, physical structure and optical properties of the silver halide emulsion and their relations to the characteristic curve; chemistry and preparation of emulsions; extensive treatment of theory of sensitivity and latent image formation; chemistry and kinetics of processing, including color processing; theory of color reproduction; chemistry and physics of selected non-silver processes.
Credit 3/Qtr.

PPHS-721,722  Mathematics and Statistics for Photographic Systems
A special graduate course in mathematics and applied statistics involving those areas of direct concern in design, analysis, and evaluation of photographic systems.
Credit 5/Qtr.

PPHS-731,732,733  Principles of Instrumental and Photographic Optics
The principles of geometrical and physical optics with application to photographic instrumentation systems. Geometrical optics—general laws, first order imaging, aberrations and geometrical image evaluation, mirror and prism systems, the eye and vision characteristics, radiometry of optical images, basic instrument systems. Physical optics—Maxwell’s equations, electromagnetic waves, polarization, interference and interferometers, coherence, Kirchhoff integral and Huygen’s principle, Fraunhofer and Fresnel diffraction, Fourier-transform formulation of diffraction, transfer-function description of imaging system performance.
Credit 3/Qtr.

PPHS-741,742,743  Photographic and Optical System Analysis and Evaluation
Complex variables and Fourier analysis with application to the evaluation of imaging systems. Properties of optical images, structure of photographic images. Photo-optical system evaluation.
Fall: Class 2, Lab 6, Credit 4
Winter, Spring: Class 3, Credit 3

PPHS-751,752,753  Special Topics in Photographic Science
Advanced topics of current or special interest, varying from quarter to quarter, selected from the field of photographic science. Specific topics announced in advance.
(Not offered every quarter. Consult Chairman of the Photographic Science Graduate Program.)

PPHS-890  Research and Thesis Guidance
Thesis based on experimental evidence obtained by the candidate in an appropriate field as arranged between the candidate and his advisor.
Hours arranged. Credit 9, minimum for M.S.

PPHG-700  Fundamentals of Photographic Communication
A summer course for students entering the graduate program with insufficient undergraduate credits in photography. An intensive survey of photographic materials, processes, equipment and practice; workshop in the application of photography to the solution of problems in visual communication and design.
Undergraduate credit (15 hours) will be granted upon completion. Credits not applicable to M.F.A. requirements.

PPHG-701,702,703  History and Aesthetics of Photography
Covering the "History and Aesthetics of Photography" from 1839 to the present, with special emphasis on the development of photographic seeing, and its related effect on other media. A survey of the numerous processes and how their development affected the image-making of their particular period, i.e. daguerreotypes, calotypes, ambrotypes, etc. Student projects designed to illuminate phases of photographic history best understood by personal visual exploration.
Credit 3/Qtr.
PPHG-720  Photography (Still)
Photographic communications workshop. Individually planned studies in photographic visual communication as determined by faculty-student consultation based on the student's personal objectives. Research, group critiques, seminars, studio and laboratory practice, field trips.
Credit 1-9

PPHG-730  Cinematography
Film making workshop. Individually planned studies in cinematography, as determined by faculty-student consultation, group critiques, seminars, studio and laboratory practice, field trips.
Credit 3-9

PPHG-740  Photographic Museum Practice
Museum internship workshop. Research, assigned projects, seminars in history, function and administration of museums, with emphasis on photographic curatorial duties. Practice in exhibition planning and development. Field trips. This cannot be selected as a minor concentration.
Credit 6-14

PPHG-753  Photographic Workshop for Teachers
A course especially designed for the High School or Junior College teacher, counselor, or advisor involved in instruction or career guidance in photography.
The theory and principles of practical black and white and color photography are presented and applied in actual picture making experiences. Both the aesthetic and technical aspects of photography are stressed. Teaching methods concepts and development of visual-aids are discussed, and ideas in visual communications are examined. Career opportunities in professional photography will be explored.

This course is being jointly sponsored by RIT and the Winona School of Professional Photography, which is the educational division of the Professional Photographers of America, Inc. Practicing professional photographers from the staff at Winona will join the RIT faculty one day each week. The Photographic Arts and Science Foundation is encouraging participation by granting $200 toward the tuition of the twenty students accepted. Summer only.
Credit 9

PPHG-799  Independent Project
The student proposes an advanced project to an individual instructor. The student and the instructor are jointly responsible that the material to be covered is appropriate to the student's program and that the number of credits proposed are justified. Both will sign the proposal which must also be approved by the Coordinator and the Director of the School.
Credit 1-9

PPHG-890  Research and Thesis Guidance
Research, execution of a creative project and presentation of an acceptable exhibition with emphasis on technique, design, and communication. The candidate will select his thesis subject with the approval of the graduate committee and will deposit a suitable report and record of the thesis with the Institute. Museum majors will plan, assemble and take full responsibility for mounting a major photographic exhibit under the sponsorship of Rochester Institute of Technology, or a major museum or educational institution. The announcement, catalog, reviews and a satisfactory illustrated report of the project must be deposited with the Institute. Credit to be arranged.

Note: Some courses listed above are presently under review.
SCHOOL OF PRINTING

MASTER OF SCIENCE IN PRINTING

PRINTING EDUCATION COURSES

PPRE-701 Introduction to Graphic Arts Education
A prerequisite course required of all students working in the printing education major. A study of historical trends along with the development and overview of philosophy and methodology. Also includes a survey of current industrial education teaching problems.
Credit 4

PPRE-702 Teaching Methods in Graphic Arts Education
The study of the criteria necessary for selecting the methods, procedures, and materials relevant to planning and executing an effective lecture or demonstration lesson.
Credit 4

PPRE-713 Typographical Procedures
Credit 4

PPRE-714 Photographic Reproduction Technology
Study and production of negatives or film positives for the major printing processes. Student gains an understanding of photography and the various printing processes so as to be able to introduce this area into an existing graphic arts program at the high school or college level.
Credit 6

PPRE-715 Printing Plate Technology
The theory and practice of the methods of relief, planographic, and intaglio platemaking processes and procedures. Imposition and stripping operations. Lockup. Register problems. The study of electronics in present-day platemaking techniques.
Credit 6

PPRE-716 Printing Press Technology
Theory and practice of the methods of relief, planographic, flexographic, and intaglio processes. Experiments in printing on different surfaces.
Credit 6

PPRE-720 Photographic Reproduction Technology
The fundamental principles, procedures, techniques, and applications of the photographic process as it is related to the production of negatives for the major printing processes. An independent graduate research project is required.
Credit 4

PPRE-860 Practice Teaching in the Graphic Arts
A 10-week teaching experience in a school offering an appropriate exposure for the student teacher in the areas of student relationships and understanding; development of teaching methods and procedures; and a supervised involvement in the duties of the cooperating teacher. A one-hour, weekly seminar is provided for the discussion of overall student teacher progress.
Credit 12

PRINTING MANAGEMENT COURSES

PPRM-701 Computers in the Graphic Arts
Introduction to basic computer characteristics. Function of hardware components in relation to software requirements. Discussion of computer languages as they relate to applications in printing. An independent graduate research project is required.
Credit 4

PPRM-702 Computers in Management
Discussion of printing requirements in relation to computer system configurations. Applications of computers to management and production control problems. Investigation of computer-oriented production control techniques.
Prerequisite: PPRM-701
Credit 4
PRINTING TECHNOLOGY COURSES

PPRT-701 Research Methods in Graphic Arts
Methods common to most types of experimental and survey research and how they may be applied to research in the graphic arts.
Credit 4

PPRT-702 Graphic Reproduction Theory
Orientation in the interpersonal, man-machine, and machine relationships inherent in the management role. Areas of investigation include aspects of behavioral and mechanistic theory as it pertains to various aspects of the graphic arts industry. Distinguished speakers contribute to breadth.
Credit 4

PPRT-703 Statistical Inference
Hypothesis testing, confidence intervals, and sample size for variables. Introduction to analysis of variance and regression analysis.
Credit 5

PPRT-704 Design of Experiments
Basic designs for experiments, objectives, conclusions, error estimation, data analysis. Continuation of analysis of variance and regression analysis. Response surfaces and factorials.
Prerequisite: PPRT-703
Credit 5

Force systems, elementary dynamics. Work, power, and energy. Relation to stress and strain, particularly as applicable to printing equipment and processes; torsion stresses of printing materials. Design of machine elements; bearings, gears, shafts, fasteners, and frames. Application of basic circuits to electronic devices and systems.
Credit 4/Qtr.

PPRT-708 Introduction to Systems Analysis
Problems of systems analysis in printing operations for the highest quality product at the minimal cost including optimal floor designs and methods study.
Prerequisite: PPRM-701
Credit 4

PPRT-710 History of Printing Technology
A study of the forces which have influenced the development of printing, with emphasis upon the technological factors involved. Examinations of the relationships of esthetics and craft concepts to modern industrial techniques.
Credit 4

PPRT-711 Ink and Substrates
The study of ink components by process and their relationship to "printability" on various substrates. Ink receptivity. Ink and substrate compatibility to meet process requirements. Printing demands for various substrates; paper, polyethylene, polypropylene, foils, and plastics.
Credit 4

PPRT-712 Tone and Color Analysis
Methods and instrumentation necessary for the evaluation of printed tone and color and the photographic intermediate images required for their production by the photomechanical process.
Credit 4

PPRT-713 Lithographic Press Methodology
Elements of platemaking procedures for letterpress, flexographic, and lithographic plates; gravure cylinders, and electronically engraved plates. Theoretical study plus practical involvement in making of various plates. An independent graduate research project is required.
Credit 4

PPRT-714 Relief Press Methodology
Theory and practice of letterpress presswork using platen and cylinder presses. Techniques, mechanics of equipment, care of equipment and materials used. Application of special techniques on letterpresses, die cutting, scoring, numbering, perforating, embossing. Makeready methods for line and halftone printing. Pre-press preparation of various
plates for printing. Introduction to flexographic printing. An independent graduate research project is required.
Credit 4

PPRT-715 Gravure and Screen Printing Methodology
Survey of gravure and screen printing incorporating lectures and laboratory sessions. The study of techniques, equipment, materials, and supplies necessary to arrive at a finished product by either process. An independent graduate research project is required.
Credit 4

PPRT-716 Layout and Printing Design
Historical analysis of letter forms. Essential requirements and principles of layout and printing design as applied to commercial printing and advertising. Practical application of theory in solving printing design problems. An independent graduate research project is required.
Credit 4

PPRT-717 Copy Preparation
Preparation of copy for camera. Working from layouts, making analysis of requirements. Paste-up techniques, methods of preseparation mechanicals, use of photographic and typographic copy, relation to production steps in follow-up for offset plate-making and photoengraving. Proper instructional specification writing. An independent graduate research project is required.
Credit 4

PPRT-718 Imposition and Finishing Procedures
Theory and practice of imposition of various kinds of forms. Imposition planning as related to and governed by folding and other finishing operations. Imposition and lockup principles and procedures for letterpress forms. An independent graduate research project is required.
Credit 4

PPRT-719 Machine Composition Technology
Emphasis on use of perforated tape in automated operation of composing machines. Introduction to use of computers in printing. Operation and application of photocomposition and cold type processes. Practice on specialized equipment. Participation in field trips required. An independent graduate research project is required.
Credit 4

PPRT-850 Research Projects
Individual research projects in which independent data are collected by the student, followed by analysis and evaluation. A comprehensive written report is required. Consent of adviser required.
Credit variable.

PPRT-890 Research and Thesis Guidance
An experimental or survey study of a problem area in the graphic arts.
Credit variable.
MASTER OF SCIENCE IN CHEMISTRY

SCHA-511,512 Instrumental Analysis
Theory, applications and limitations of instrumental methods for qualitative and quantitative analysis; Spectroscopic and electrochemical techniques studied in detail. Laboratory experience in spectrophotometry, NMR, atomic absorption, fluorometry, potentiometry, coulometry, polarography, and radio-chemical methods.
Prerequisite: SCHA-313
Class 3, Lab 3, Credit 4/Qtr.

SCHA-611 Advanced Analytical Chemistry
Theories behind analytical methods; compleximetry with applications to separations and masking; Theory of electrode processes, specific ion electrodes; non-aqueous methodology; new analytical techniques.
Prerequisite: SCHA-511
Class 3, Credit 3

SCHC-555,556 Biochemistry
Introduction to modern biological chemistry, physiological and physical-chemical aspects of energy metabolism, intermediary metabolism, biosynthesis of biopolymers, and metabolic regulation. Structure and function of proteins and nucleic acids as an introduction to enzymology, molecular biology, and molecular genetics.
Prerequisites: SCHO-433 and SCHP-443
Class 3, Credit 3/Qtr.

SCHC-639 Topics in Chemistry
Current chemical topics which are not among the regular courses will be presented periodically or on a one-time basis. Course offerings will be in response to student and faculty interest in the topics to be presented.
Class 3, Credit 3

SCHC-640 Chemistry Seminar
Credit 1

SCHC-691 Research and Thesis Guidance
Hours and credits to be arranged. Chemical research in a field chosen by the candidate, subject to approval of the Department Head and advisor. Credit Variable

SCHI-551, 552 Inorganic Chemistry
The properties and structures of the elements and their compounds in relation to electronic and stereochemical principles; inorganic laboratory techniques.
Prerequisites: SCHO-433 and SCHP-443
Class 3, Lab (Optional) 3, Credit 3 or 4/Qtr.

SCHI-601 Advanced Inorganic Chemistry
Theories of molecular geometry; Hard-soft, Acid-Base Theory; transition metal chemistry, crystal and ligand field theories, spectroscopic interpretation; reaction mechanisms.
Prerequisite: SCHI-551
Class 3, Credit 3

SCHO-521 Advanced Organic Chemistry
Several of the following advanced topics in organic chemistry are covered; polyfunctional compounds, modern synthetic methods, stereochemistry, conformational analysis, free radical reactions; natural and synthetic polymers.
Prerequisite: SCHO-433
Class 3, Credit 3

SCHO-522 Advanced Organic Chemistry
Topics include activation parameters, kinetic and non-kinetic treatment of mechanism elucidation, linear free energy concepts, quantitative analysis of conformational and electronic effects, simple Hückel Molecular Orbital Theory, electrocyclic reactions, acidity functions and primary and secondary isotope effects.
Prerequisites: SCHO-433 and SCHP-443. (Note: SCHO-521 is recommended but not required)
Class 3, Credit 3

SCHO-525 Qualitative Organic Chemistry
A combination of chemical and spectroscopic techniques is used to identify the structure of “unknown” organic compounds.
Prerequisite: SCHO-433
Class 2, Lab 6, Credit 4
SCHO-621  Physical Organic Chemistry  
A theoretical treatment of the basic tools used in mechanism elucidation. Interpretation of kinetic, stereochemical, and spectral data emphasized. 
Prerequisite: SCHO-433 and SCHP-443  
(Note: SCHO-521 recommended but not required)  
Class 3, Credit 3

SCHO-622  Stereochemistry  
Advanced treatment of steric relationships and stereoisomerism in organic compounds. 
Prerequisite: SCHO-522  
Class 3, Credit 3

SCHO-623  Heterocyclic Chemistry  
The preparation, properties, and reactions of heterocyclic systems, especially for small rings. 
Prerequisite: SCHO-433  
Class 3, Credit 3

SCHO-624  Natural Products  
Introduction to the major classes of natural products. Emphasis is on recent total synthesis of representative natural products of current interest. 
Prerequisite: SCHO-521  
Class 3, Credit 3

SCHO-625  Organic Chemistry of Polymers  
Introduction to the chemistry of synthetic, high molecular weight polymers and a survey of their diverse structures and properties. Mechanisms of condensation, free radical and ionic polymerization. 
Prerequisite: SCHO-433  
Class 3, Credit 3

SCHP-531  Chemical Thermodynamics  
A study of the basic fundamentals of thermodynamics and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases will be calculated based on spectroscopic data. 
Prerequisites: SCHP-443 and SMAM-307  
Class 3, Credit 3

SCHP-533  Principles of Magnetic Resonance  
A development of the principal ideas of magnetic resonance including the theory of resonance line shapes, magnetic interactions, experimental considerations, and spectral analysis. These concepts are discussed in terms of nuclear magnetic, nuclear quadrupole, and electron spin resonance spectroscopy. 
Prerequisite: SCHP-443  
Class 3, Credit 3

SCHP-536  Radiochemistry  
Prerequisite: SCHP-443  
Class 3, Lab (Optional) 3, Credit 3 or 4

SCHP-626  Physical Chemistry of Polymers  
Study of the theoretical and experimental aspects of polymer characterization. In addition, theoretical considerations of the configuration of polymer chains and statistical thermodynamics of polymer solutions will be related to experimental results. 
Prerequisite: SCHP-443  
Class 3, Credit 3

SCHP-634  Quantum Mechanics  
The Schrodinger equation, variational and perturbation methods, the Heisenberg uncertainty relations, free particles, particles in boxes and in wells, tunneling, the rigid rotator, the harmonic oscillator, the hydrogen atom, the helium atom, electron spin, Pauli exclusion principles. 
Prerequisite: SCHP-443  
Class 3, Credit 3

SCHP-635  Quantum Chemistry  
The application of quantum mechanics to the covalent bond, diatomic molecules, resonance and complex molecules. Molecular spectroscopy. Elements of quantum statistical mechanics. 
Prerequisite: SCHP-634  
Class 3, Credit 3

SCHP-637  Chemical Kinetics  
Methods of investigating the kinetics of chemical reactions and the theories used to interpret their results. Focus on homogeneous reactions in gas and liquid phases. Discussions of references from recent chemical literature. 
Prerequisite: SCHP-443  
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