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**Rochester Institute of Technology
Official Bulletin**



**1971-72
Graduate Catalog**

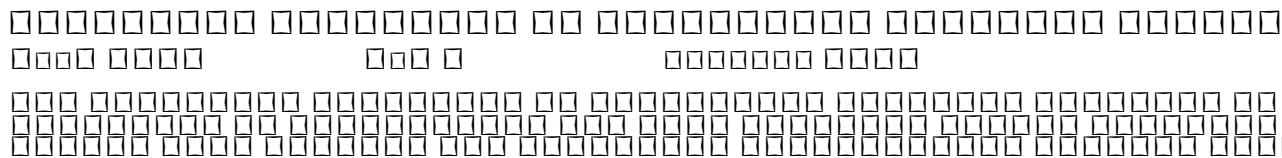




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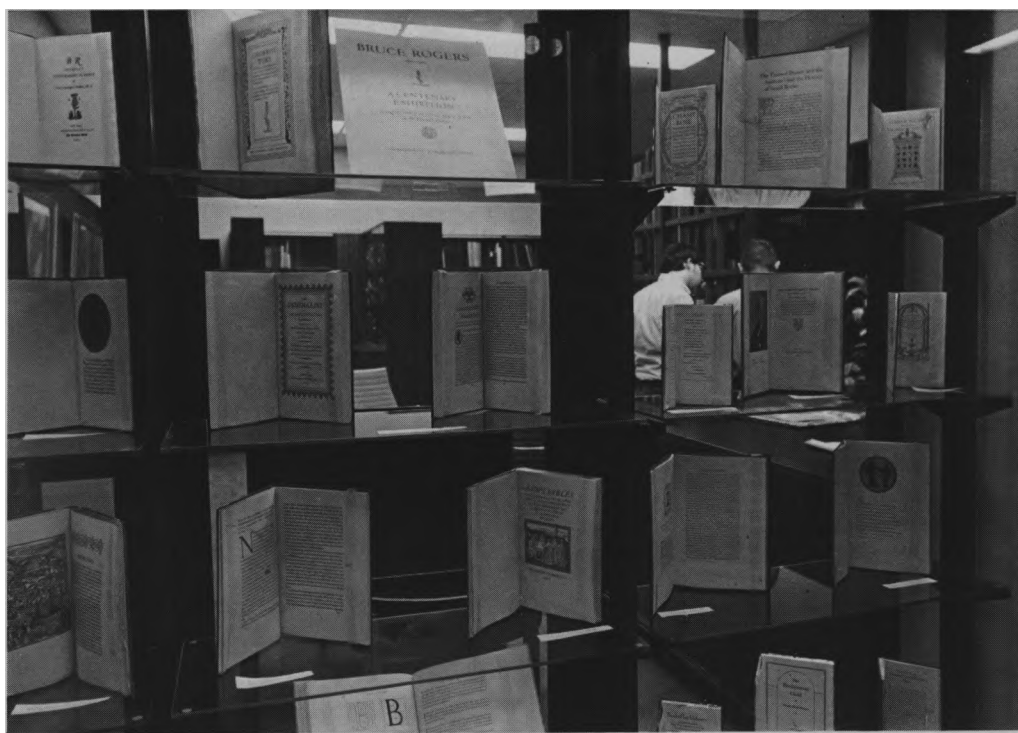
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Graduate Education at R.I.T.

HISTORY AND OBJECTIVES

Approximately a decade 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, R.I.T. 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 R.I.T. 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 Applied Science (now 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, while broad in scope, 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 R.I.T.'s long experience in technical education, a new area of graduate study for Community and Technical College Faculty was also inaugurated. Accordingly, a 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 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.

One of R.I.T.'s newer graduate programs has emanated from its School of Printing. The need for additional people with training in the graphic arts plus teachers who could apply new instructional methods and concepts to encourage students to enter the printing profession became apparent from the numerous requests R.I.T. received for a graduate program in Printing. As a result, the School of Printing introduced a graduate program with two majors, a curriculum which became operational in January of 1969, leading to the M.S. degree.

A recent addition to the list of graduate degree programs now available is the M.F.A. in photography, meeting the demand for higher level professional offerings by the School of Photographic Arts and Sciences. In 1971-72 a new program leading to an M.S. degree in accountancy is to be undertaken, subject to certification.

Additional graduate programs are under consideration as part of the Institute's continuous concern for the needs of the business, industrial, and scholarly communities.

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 of a student 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

CREDIT HOUR REQUIREMENTS

The minimum credit requirements for 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. 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 are in terms of *quarter credit hours*. Course numbers in parentheses after a description are the *prerequisites*.

THESIS REQUIREMENTS

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.

CANDIDACY FOR AN ADVANCED DEGREE

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-A1). 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 residency 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.

SUMMARY EXPERIENCE OF DEGREE CANDIDATES

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 full-time graduate students (12 or more credit hours) in the day colleges is \$750 per quarter. Part-time tuition is \$65 per quarter credit hour.

Tuition for the Master of Science program of the College of Continuing Education in Applied and Mathematical Statistics is \$50 per quarter credit hour.

FELLOWSHIPS

These are available through the respective departments offering graduate degrees. Interested applicants should write to the appropriate department chairman or dean.

ACCREDITATION

Rochester Institute of Technology is chartered by the Regents of the University of the State of New York and registered by the State Education Department. It is accredited by the Middle States Association of Colleges and Secondary Schools. It is a member of the American Council on Education and the Association of Colleges and Universities of the State of New York. The undergraduate programs in Electrical Engineering and Mechanical Engineering are accredited by the Engineering Council for Professional Development (ECPD).

The Wallace Memorial Library

The Wallace Memorial Library contains more than 120,000 volumes, selected to serve the technical and general studies objectives, and currently receives more than 1,700 serials in the different fields represented in the Institute's curricula. The library is the permanent custodian of the library of the Photographic Society of America. In addition, it contains a growing collection on the problems and teaching of the deaf.

Student Affairs Division

COUNSELING CENTER

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 R.I.T. students, the Counseling Center offers career counseling for individuals and personnel selection services for industrial firms. Brochures describing the several types of service and fees may be obtained by telephoning or writing the Director, 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.

VEHICLES ON R.I.T. CAMPUS

All vehicles which are operated by R.I.T. students, faculty, or staff on the R.I.T. campus must be registered at the Institute and bear a current R.I.T. parking decal. The decal is reissued for each academic year beginning September 1 and ending the following August 31.

There is no charge for parking at R.I.T., but all students, faculty and staff are required to park in clearly designated areas intended for general parking. There are a limited number of spaces intended for disabled motorists using parking facilities here. Disabled motorists wishing to park in these spaces must apply to Director, Protective Services, to obtain a special permit enabling them to park in these areas. The permit is issued after evidence of the disability is shown. These and other restricted spaces intended for use by certain service vehicles and official visitors may be used only for the purpose shown on signs designating these spaces as restricted ones.

All motorists using R.I.T. roadways and parking facilities must comply with New York State Motor Vehicle laws as well as R.I.T. Traffic/Parking Rules and Regulations.

Vehicles are to be registered at the time of formal academic registration, at which time a decal and regulations pamphlet may be obtained. At other times, these may be obtained from Protective Services Office, College Union Mezzanine.

Enforcement of above applicable laws and regulations is effected by a fine system and, when necessary, towing at operator's expense. Nonpayment of fines will result in withheld transcripts and privilege to register for a subsequent academic period.

EMERGENCIES

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.

EMPLOYMENT AND PLACEMENT

Placement of all graduates in business and industry is handled by the Director of Central Placement and his staff, with the cooperation of the individual colleges. Interviews are scheduled and contacts arranged by the Central Placement Office with prospective employees.

In cooperative programs, the coordinator of employment for the college makes arrangements for Placement interview. Information concerning part-time work can be found in the Central Placement Office in the College-Alumni Union.

All students would be well advised to contact the Central Placement Office early in their first year on campus. Familiarity with the services offered to the student can pay off in many ways.

GRADUATE STUDENT ID CARDS

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

ENROLLMENT OF VETERANS

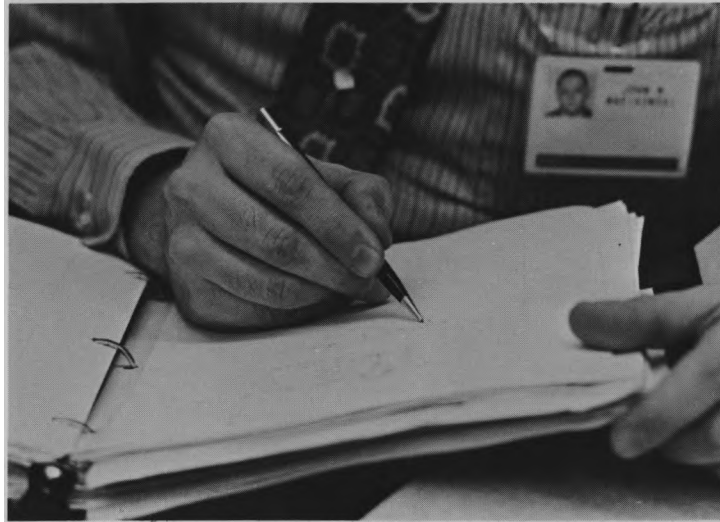
Courses and programs at the Institute are approved for the education of veterans under P.L. 89-358 (Veterans Readjustment Benefits Act of 1966), P.L. 815 or P.L. 894 (Rehabilitation Acts), and P.L. 634 (War Orphans Act).

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.



College of Business



College of Business

JERRY D. YOUNG, *Dean*

MASTER OF BUSINESS ADMINISTRATION

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 new Eastman Building. 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 area of accounting, marketing, finance, management, production, and personnel; 2) provide the basic tools needed by management in decision making; 3) provide opportunities to analyze busi-

ness 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 M.B.A. PROGRAM (Full-time)

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 (21-670), 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.

THE M.B.A. PROGRAM (Part-time)

In addition to full-time study, the M.B.A. program is available on a part-time basis, with courses offered in the evening 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.

**FULL-TIME CURRICULUM:
MASTER OF BUSINESS ADMINISTRATION**

	<i>Required Courses</i>	<i>Hours</i>
1st Qtr.	21-661 Marketing Concepts 21-681 Managerial Decision Making I 21-644 Behavioral Science in Management 21-613 Basic Financial and Managerial Accounting	4 4 4 4 16
2nd Qtr.	21-682 Managerial Decision Making II 21-642 Legal & Social Environment of Am. Bus. 21-622 Financial Management 21-641 Administrative Theory	4 4 4 4 16
3rd Qtr.	Administrative Internship	
4th Qtr.	21-645 Economic Environment of American Business 21-670 Business Research Methods 21-000 Approved Elective 21-683 Managerial Decision Making III	4 4 4 4 16
5th Qtr.	Administrative Internship and 21-671 Research Option	4 4
6th Qtr.	Administrative Internship and 21-672 Research Option	4 4
7th Qtr.	21-659 Integrated Business Analysis 21-000 Approved Elective 21-000 Approved Elective 21-643 Production Management	4 4 4 4 16

Total Hours Required — 72 qtr. hrs. maximum
48 qtr. hrs. minimum (for students graduating from Schools of Business)

**PART-TIME CURRICULUM:
MASTER OF BUSINESS ADMINISTRATION**

	<i>Required Courses</i>	<i>Hours</i>
1st Qtr.	21-613 Basic Financial and Managerial Accounting	4
	21-681 Managerial Decision Making I	4
		8
2nd Qtr.	21-644 Behavioral Science in Management	4
	21-682 Managerial Decision Making II	4
		8
3rd Qtr.	21-661 Marketing Concepts	4
	21-683 Managerial Decision Making III	4
		8
4th Qtr.	21-622 Financial Management	4
	21-641 Administrative Theory	4
		8
5th Qtr.	21-645 Economic Environment of American Business	4
	21-643 Production Management	4
		8
6th Qtr.	21-670 Business Research Methods	4
	21-642 Legal and Social Environment of American Business	4
		8
7th Qtr.	21-000 Approved Elective	4
	21-659 Integrated Business Analysis	4
		8

(continued)

8th Qtr.	21-000	Approved Elective	4
	21-000	Approved Elective or	
	21-671	Research Option	4
			8
9th Qtr.	21-000	Approved Elective	4
	21-000	Approved Elective or	
	21-672	Research Option	4
			8

Total Hours Required — 72 qtr. hrs. maximum
48 qtr. hrs. minimum (for students graduating from Schools of Business)

**MASTER OF BUSINESS ADMINISTRATION:
ACCOUNTING OPTION**

For those students wishing to qualify for the C.P.A. examination with little or no background in accounting or business, the following sequence of additional accounting courses are recommended:

<i>Courses</i>	<i>Hours</i>
21-614 Basic Accounting Theory	4
21-615 Accounting Controls	4
21-616 Advanced Public Accounting	4
21-617 Seminar in Taxation	4
21-618 Seminar in Advanced Accounting and Theory	4

The above sequence can be integrated into the regular M.B.A. program for a total of 72 maximum quarter credit hours by using these as the approved electives.

MASTER OF SCIENCE IN ACCOUNTANCY

The increasing demands on the professional accountant have produced a need for broader educational preparation. In recognition of this need a master's degree program has been developed to prepare students for managerial responsibilities in professional accounting.

Specifically, the M.S. in Accountancy is 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 applicable to the M.B.A. program.

The M.S. in Accountancy is now in the process of being reviewed for certification by the New York State Education Department.

CURRICULUM

MASTER OF SCIENCE IN ACCOUNTANCY

<i>Required Courses</i>	<i>Hours</i>
21-616 Advanced Public Accounting	4
21-617 Seminar in Taxation	4
21-618 Seminar in Advanced Accounting and Theory	4
21-644 Behavioral Science in Management	4
21-641 Administrative Theory	4
21-681, 682, 683 Managerial Decision Making	12
21-645 Economic Environment of American Business	
OR	
21-000 Approved Advanced Economic Elective	4
21-622 Financial Management	
OR	
21-000 Approved Finance Elective	4
21-000 Approved Electives	8
	48

Course Descriptions

GRADUATE BUSINESS ADMINISTRATION DEPARTMENT

Basic Financial and Managerial Accounting

21-613

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.

Cr. 4

Financial Management

21-622

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. (21-613)*

Cr. 4

Administrative Theory

21-641

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. (21-644)

Cr. 4

Legal and Social Environment of American Business

21-642

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.

Cr. 4

Production Management

21-643

Techniques of problem analysis and decision making as applied to the production function of a business. Procedures from mathematics and the behavioral sciences and other business courses are utilized. (21-683)

Cr. 4

Behavioral Science in Management

21-644

The implications of studies from the fields of psychology, sociology and anthropology to man-

agement 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.

Cr. 4

Economic Environment of American Business

21-645

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.

Cr. 4

Integrated Business Analysis

21-659

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. (21-613, 622, 641, 643, 661)

Cr. 4

Marketing Concepts

21-661

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.

Cr. 4

Business Research Methods

21-670

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.

Cr. 4

*Parenthesis indicates number of course that is a prerequisite.

Research Option 21-671, 672

A thesis course requiring the student to confront a real business problem. Requirements include steps from design to completed management report.

Cr. 8

Managerial Decision Making I 21-681

The development of a conceptual framework for managerial decision making. Emphasis is placed on the logical analysis of decisions under uncertainty arising in the practice of business administration. Topics include: decision diagrams, subjective probability assessments, probability functions, preference curves, mathematical expectation, sampling, and prior and posterior distributions. In addition, various topics in modern algebra such as set theory, functions and their graphs, matrix notation and operations, and interest functions will be reviewed.

Cr. 4

Managerial Decision Making II 21-682

A continuation and development of the topics introduced in MDM I. In addition, some elementary topics in calculus including differentiation of simple functions, max-min problems, and integration for continuous probability functions and expectation will be studied. (21-681)

Cr. 4

Managerial Decision Making III 21-683

A study of probability and classical statistics including discrete and continuous probability functions and their characteristics, point and interval estimation, and tests of hypotheses. Applications are made to the business situation. (21-682)

Cr. 4

APPROVED ELECTIVES***Basic Accounting Theory 21-614**

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. (21-613)

Cr. 4

Accounting Controls 21-615

Emphasizes the uses of cost data and reports for managerial decision making. Includes problems and procedures relating to job order, process, and stan-

dard cost systems with special attention to problems of overhead distribution. The planning process, the control process, and analytical processes are considered in detail. (21-613)

Cr. 4

Seminar in Advanced Accounting and Theory 21-616

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 statements, partnerships, consignments and installment sales. (21-614, 615 or admission to M.S.A. program)

Cr. 4

Seminar in Taxation 21-617

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. (21-614, 615 or admission to M.S.A. program)

Cr. 4

Advanced Public Accounting 21-618

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. (21-614, 615 or admission to M.S.A. program)

Cr. 4

Theory of Finance 21-623

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. (21-622)

Cr. 4

Problems in Financial Management 21-624

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, secur-

*Students may also select graduate electives from other colleges of the Institute subject to the approval of Graduate Faculty of the College of Business.

ity valuation, methods of financing and dividend policy, among others. (21-622)
Cr. 4

Securities and Investment Analysis 21-625
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. (21-622)
Cr. 4

Supervisory and Executive Development 21-646
Concepts of individual development. Overview of present individual and group procedures. Implications of current technological development for training, replacement, and advancement. (21-641)
Cr. 4

Systems Administration 21-647
Analysis of basic character of industrial operations, their measurement, and criteria for their efficiency. Design and administrative problems in management of processes and systems. (21-641)
Cr. 4

Labor/Management Problems 21-648
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. (21-641)
Cr. 4

Advanced Marketing Management 21-662
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. (21-661)
Cr. 4

Seminar in Consumer Behavior 21-663
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. (21-661)
Cr. 4

Marketing Logistics 21-664
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. (21-661, 21-683)
Cr. 4

Decision Theory I and II 21-684, 685
The decision theory approach to decisions under uncertainty is examined. The modelling 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. Both quarters are required in order to get credit. (21-683)
Cr. 8

Introduction to Operations Research I and II 21-686, 687
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. (21-683)
Cr. 8

Multivariate Analysis 21-688
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. (21-683)
Cr. 4

Simulation 21-689
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. (21-683,21-641)
Cr. 4

Information Systems I and II 21-690, 691
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. (21-683, 21-641)
Cr. 8



Photo by Peter Fine - School of Photography

College of Continuing Education

College of Continuing Education

MASON E. WESCOTT, *Chairman, Department of Statistics*

MASTER OF SCIENCE DEGREE IN APPLIED AND MATHEMATICAL STATISTICS

PROGRAM OF STUDY

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 R.I.T. 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

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 the 701 and one other course in the 700 series with the grade of at least "B" in each course.

REQUIRED COURSES

The following courses (or equivalent) normally shall be required in partial fulfillment of the requirements for the Master of Science degree:

CASM-711, 712 Fundamentals of Statistics

CASM-811, 812 Probability Theory and Applications

CASM-821-22-23 Theory of Statistics (two or all three courses)

All other courses in Applied and Mathematical Statistics are elective. 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.

GRADUATION REQUIREMENTS

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

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 nine 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 work toward. 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.

Course Descriptions

Note: Course numbers here follow the new designations of the Evening Session. Conversion Charts are available for referencing to former course numbers.

GRADUATE COURSES IN APPLIED AND MATHEMATICAL STATISTICS

Basic Statistical Mathematics CASM-701

Refresher training in the mathematical tools needed for work in statistics courses. Review of key topics in algebra, analytic geometry, and calculus, including background theory. Selected topics in advanced calculus, matrix algebra, and use of computers. (Required of all candidates accepted on condition. May be taken as an elective by any student in the program)
Cr. 3

Fundamentals of Statistics CASM-711, 712

A full and first sequence of courses in statistics. Designed to cover the most important methods needed for work in industry, and research in any field. Emphasis will be on applications.

CASM-711: Variability; the normal, student-t, chi-square and F distributions; inferences about means and variances; sample size for variables; chi-square applications. (Admission to graduate study or consent of the department)
Cr. 3

CASM-712: Analysis of variance; planning experiments; basic experimental designs; factorial experiments; nested designs; individual effects; fractional factorials; confounding; regression analysis; determination of optimum conditions; non-parametric statistics; probability. (CASM-711 or equivalent)
Cr. 3

Quality Control: Control Charts CASM-721

A graduate level course in the application of statistical methods to the management of production operations. Designed to give depth to practicing quality control personnel. Topics studied: statistical measures; theory, construction, and application of control charts for variables and for attributes including acceptance control charts and cumulative sum charts; computerization procedures for control charts; statistical aspects of tolerances, specifications, and process capability studies; basic concepts of acceptance sampling, total quality control, and

management of the quality control function. (Consent of the department)
Cr. 3

Quality Control: Acceptance Sampling CASM-731

This course investigates modern acceptance sampling techniques with emphasis on industrial application. Single, double, multiple, and sequential techniques are discussed for attributes sampling, variables sampling, and techniques for sampling continuous production. The course highlights the Dodge-Romig plans, Military Standards plans, and recent contributions from the literature. (Consent of the department)
Cr. 3

Techniques for Investigational Analysis CASM-741

This course studies a variety of special techniques related to courses 711, 712 and 721, 731. Topics covered: narrow limit gauging; analysis of small sample data; techniques for identifying assignable causes; graphical experimental designs using analysis of means strategies; elements of evolutionary operation.
(Statistics 712, 721)
Cr. 3

Introduction to Decision Processes

CASM 751, 752

Study of decision making under uncertainty. Statistical decision theory as it is used today.

CASM-751: The language of uncertainty; model making; strategies; classical and Bayesian approaches; applications. (Consent of the department)
Cr. 3

CASM-752: Continuation of CASM-751. Additional statistical decision theory and applications. Nature of statistical inference; structure of decision theory; value of information; procedures; sequential decisions; stopping rules; extensions; numerous applications. (CASM-751)
Cr. 3

Reliability**C ASM-761**

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; reliability growth models; evaluations of tolerances; Bayesian test programs.

(711, 712 or consent of the department)
Cr. 3

Design of Experiments**CASM-801**

This is a methods course in the planning, execution, and interpretation of comparative experiments involving qualitative factors. Fundamental principles of designs; analysis of variance; fixed effects, random effects, and mixed model designs, incomplete block designs; estimation of components of variance and missing values; transformation of variables and analysis of residues. (CASM-712 or equivalent)

Cr. 3

Design of Experiments**CASM-802**

A continuation of CASM-801. Fundamental principles, analysis and interpretation of designs involving quantitative factors; two-level factorials; fractional factorials; multilevel factorials; central composite designs; exploration of response surfaces and evolutionary operation. (CASM-801)

Cr. 3

Probability Theory and Applications CASM-811

This is an introductory course in mathematical probability at a graduate level. Topics covered include basic definitions and concepts; elements of combinatorial analysis; conditional probability; stochastic independence; random phenomena; distribution functions; elements of renewal theory and Markov chains.

(CASM-712, and Mathematics CASM-253 or equivalent)
Cr. 3

Probability Theory and Applications CASM-812

A continuation of CASM-811. Additional topics covered include moments and moment-generating functions; laws of large numbers; central limit theorem; binomial, Poisson, normal, and related distributions; random variables and simple time-

dependent stochastic processes. (CASM-811 or equivalent)

Cr. 3

Theory of Statistics**CASM-821, 822, 823**

These three theory courses present an analytical study of the mathematical structure supporting applied statistics.

CASM-821: Discrete and continuous distribution functions for a single variable and for the multivariate case; expected value and moment generating functions; sampling and sampling distributions. (CASM-811 and Mathematics CASM-253 or equivalent)

Cr. 3

CASM-822: The multivariate normal distribution and its properties; point estimation theory and applications; interval estimation theory and applications.

(CASM-812 or 821 or equivalent)

Cr. 3

CASM-823: Hypothesis testing; regression and linear hypothesis; models in experimental design. (CASM-822 or equivalent)

Cr. 3

Regression Analysis**CASM-841**

A methods course at a graduate level dealing with the general relationship problem. Topics include the matrix approach to simple and multiple linear regression; analysis of residuals; dummy variables; orthogonal models; computational techniques.

(CASM-712, and Mathematics CASM-253 or equivalent)

Cr. 3

Regression Analysis**CASM-842**

A continuation of CASM-841. Topics include selection of best linear models; regression applied to analysis of variance problems; nonlinear estimation and model building.

(CASM-841 or equivalent)

Cr. 3

Nonparametric Statistics**CASM-851**

Distribution-free testing and estimation techniques with emphasis on applications. Topics covered include sign tests; Kolmogorov-Smirnov statistics; run tests; Wilcoxon-Mann-Whitney test; Chi-Square tests; rank correlation; rank order tests; normal scores; asymptotic efficiency; distributions.

(CASM-811 or equivalent)

Cr. 3

Sampling Theory and Applications CASM-871
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.
(CASM-811 or 812 or 821)
Cr. 3

Special Topics in Applied Statistics CASM-891
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.
(Consent of the department)
Cr. 3

Statistics Seminar CASM-895
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 R.I.T. (or other colleges) to provide special training in statistics for students who desire an independent study program in partial fulfillment of graduate degree requirements.
(Consent of all departments involved)
Cr. 3

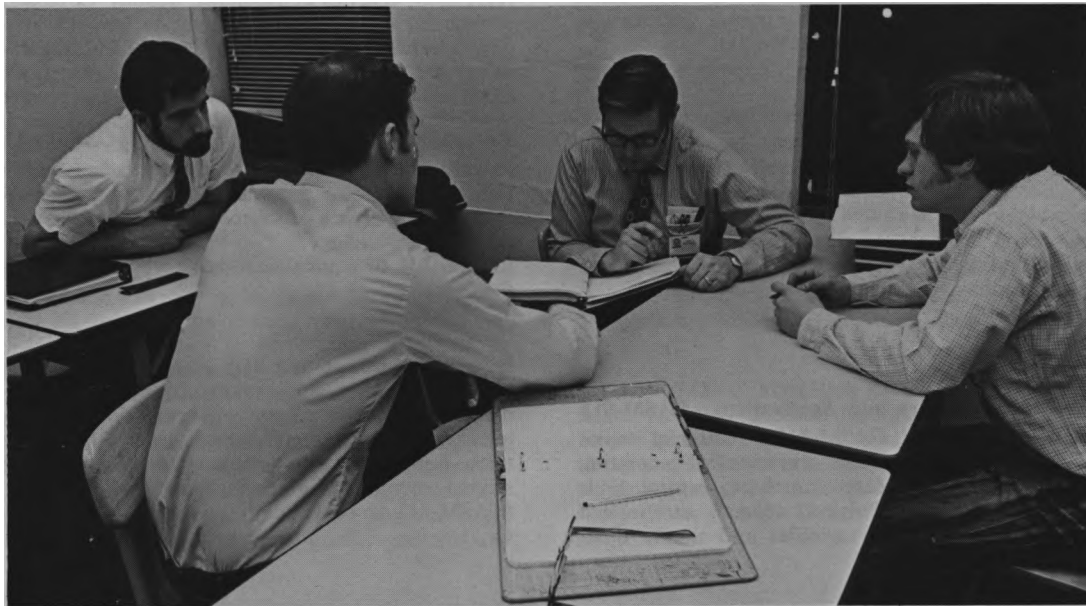
Thesis CASM-896, 897, 898
For students working for the M.S. degree under Plan A.
(Consent of the department)
Cr. 9

Individual Achievement Program CASM-899
For students accepted under the Plan C Option (Independent Study). 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.

(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.

Independent Study Credit Adjustment Course CASM-900
This course will require successful completion of assigned independent study. It will be needed by some candidates to complete the full 45 quarter hour degree requirement during the transition period from the semester to the quarter system. A candidate needing this credit adjustment course may instead elect to take a full 3 quarter hour credit course and thus complete degree requirements with a total of 46.5 quarter hours of credit. The CASM-900 course may not be elected by a candidate who does not need it for credit adjustment.
(Consent of the department)
Cr. 1.5





College of Engineering

College of Engineering

RICHARD A. KENYON, *Dean*

MASTER OF SCIENCE DEGREES IN ELECTRICAL ENGINEERING AND MECHANICAL ENGINEERING

The College of Engineering offers programs leading to the Master of Science degree in Electrical or Mechanical Engineering.*

The purpose of the graduate programs in Engineering is to equip the graduate student with the insight, understanding and competence commensurate with the demands of current and future positions in engineering.

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 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.

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 is permitted to take a maximum of 16 credits per quarter. 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.

ADMISSION TO THE GRADUATE PROGRAM

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.

♦Several new graduate programs in Engineering are under active consideration at the time of preparation of the Bulletin. These include a full-time internship graduate program leading to the Master of Engineering degree, and a joint program in Engineering and Management Science. Detailed information about these new programs can be obtained from the Dean of the College of Engineering.

FACULTY ADVISOR

A member of the Graduate Committee 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 of Science 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 will 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 must consult the brochure "Thesis Format" available at the departmental office.

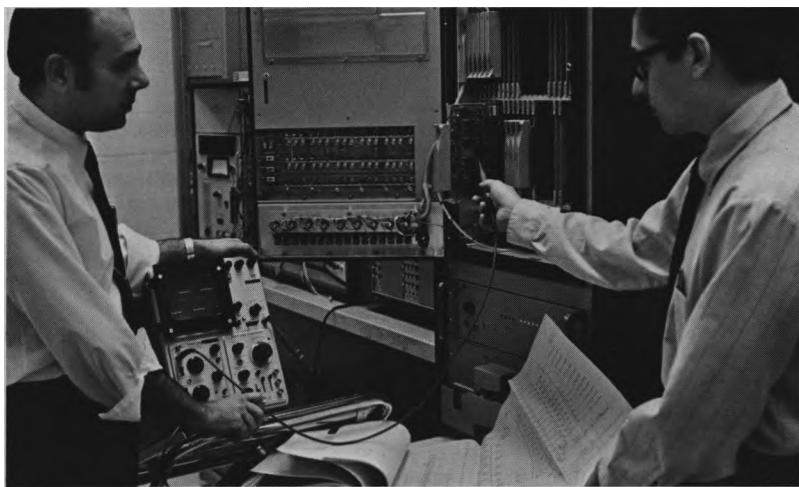
MAXIMUM LIMIT ON TIME TO EARN THE DEGREE

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 or a provisional or a special student.

PROGRAM AND COURSES OF INSTRUCTION

The programs of instruction and graduate courses offered by the Electrical Engineering and Mechanical Engineering Departments are described in the pages that follow.

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 and when necessary.



Electrical Engineering Department

WATSON F. WALKER, *Department Head*

MASTER OF SCIENCE DEGREE PROGRAM

The Master of Science degree in Electrical Engineering is awarded to a student upon the successful completion of 45 credits. This number represents the *minimum* required for the degree; under certain circumstances, a student may be expected to complete more than the minimum number of credits specified above.

Thesis — The inclusion of a thesis as a formal part of the Master of Science degree program in Electrical Engineering is *optional with the Student*.

Students who decide *not* to write a thesis should obtain the details of the non-thesis program from the Electrical Engineering Department.

Students who decide to write a thesis can earn between a minimum of 6 credits and a maximum of 12 credits towards the degree from the thesis.

Core Courses — Certain courses in Electrical Engineering and Mathematics are prescribed as core courses in the program. All graduate students are ordinarily required to take the core courses. However, exceptions will be made in the case of students who have adequate background in the subject areas covered by the core courses. The list of core courses can be obtained from the Electrical Engineering Department.

Elective Courses — A maximum of 12 credits can be chosen from graduate or advanced undergraduate courses offered by any department of the Institute with the prior permission of the faculty advisor. The remaining credits must be earned from graduate courses in Electrical Engineering.

Course Descriptions

GRADUATE COURSES IN ELECTRICAL ENGINEERING

Wherever a prerequisite is stated in the form of a specific course number, the words “or equivalent” are always implied. Prerequisites appear in parentheses following the description.

Probability Theory 13-602

Introduction to sets and set operations, finite sample spaces, probability and statistical independence. One dimensional and multidimensional discrete and continuous random variables and their related distributions. Central limit theorem and moment generating functions. (Graduate standing or departmental approval)
Cr. 4

Electromagnetic Fields I, II, III 13-604, 605, 606

Vector analysis. Static fields in electric and magnetic materials. Boundary conditions. Theorems of Stokes, Gauss, and Green. General curvilinear coordinate systems. Polarization. Method of images. Maxwell's equations. Harmonic propagating fields in unbounded media. Reflection and refraction of time varying fields. Guided waves. Radiation. Diffraction. Reflection and absorption in the troposphere and ionosphere. (75-611, 612)
Cr. 4

Linear Systems 13-607

The methods of Fourier Series, Fourier transform and Laplace transform are applied to the analysis of linear systems. Topics include Fourier Series, Fourier transforms, Laplace transforms, complex variables, convolution, and application of linear systems theory to the solution of linear networks. Throughout the course, linear networks are considered as specific examples of linear systems.
Cr. 4

Active Network Synthesis I, II 13-608, 609

Study of the synthesis of passive and active networks. Topics include network functions, p.r. functions, synthesis of two element kind networks, approximations, active network elements, and synthesis of active RC networks. (13-607)
Cr. 4

Integrated Circuit Operational Amplifiers 13-611

The course treats the analysis and application of integrated circuit operational amplifiers. Analysis topics include differential amplifiers, current sources, level shifting stages, and feedback. Application topics

include compensation, stability (Bode plot), amplifiers, integrators, gyrators, and filters. (Graduate Standing or Departmental approval.)
Cr. 4

Modern Control Theory 13-613

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. (13-607, or 13-511, 512)
Cr. 4

Nonlinear Control Systems I, II 13-614, 615

An introduction to the physical nature and mathematical theory of non-linear control systems behavior covering piecewise linear analysis, numerical techniques, describing function methods, and phase plane techniques including singular point analysis and Poincare's method.

Further analytical methods of Kryloff, Vanderpol, perturbation and variational procedures. The study of asymptotic, orbital, local and global stability. The development of Liapunov theory of stability with application to non-linear systems and the design of intentional non-linear control systems. (13-613)
Cr. 4

Digital Signal Processing 13-616

[Formerly “Introduction to Sampled Data Methods”]

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. (13-607)
Cr. 4

Statistical Design of Control Systems 13-618

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. (13-602 and 13-613)
Cr. 4

Sampled Data Control Systems 13-619

Brief review of the theory of sampling and quantizing. Modified Z transform properties and application. Design and compensation techniques for sampled data control systems. Stability criteria. Synthesis of digital controllers. Multirate sampled data control systems. Computer control theory. (13-613 and 13-616)
Cr. 4

Optimum Control Systems 13-620

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. (13-613)
Cr. 4

Communication Theory I 13-634

An introductory course describing the communication process in statistical terms. Topics include correlation and spectral properties of random signals, signal spaces and signal vectors, the joint Gaussian process, linear operation on Gaussian signals, sampling theorems and elementary non-linear effects. (13-602 and 13-607)
Cr. 4

Communication Theory II 13-635

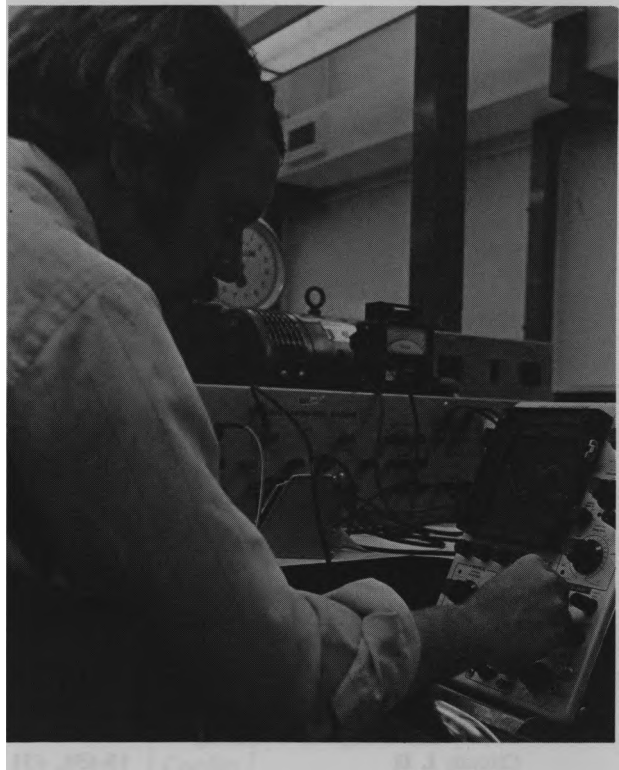
A continuation of 13-634 with emphasis on optimum methods. Topics include mean square optimization, elementary decision theory, maximum likelihood methods, diversity principles, the elements of randomly varying channel description. (13-634)
Cr. 4

Information Theory 13-636
[Formerly "Communication Theory III"]

An introduction to the fundamental concepts of information theory: entropy, equivocation, transmission, and redundancy. Coding for binary channels: comma-free codes, block codes, cyclic codes, convolutional and sequential decoding. (13-602)
Cr. 4

Adaptive Signal Detection 13-637

Application of statistical decision theory to the detection of signals in radar and digital communication systems. Adaptive communication systems. (13-635 and 13-636)
Cr. 4



Physical Electronics I 13-638

Introduction to the basic principles of solid state electronics, as they apply to diodes and transistors. The fundamentals of semiconductor device behavior are introduced from a physical viewpoint, with emphasis upon the generation, transport, and recombination of electrons and holes in solids. Energy diagrams will be extensively utilized to achieve this understanding. (Graduate standing or departmental approval)
Cr. 4

Physical Electronics II 13-639

The behavior of devices is studied in terms of the operational physical mechanisms, tunneling, dielectric breakdown, etc. Analysis and design of digital and linear integrated circuits are studied. (13-638)
Cr. 4

Computer Methods in Electrical Engineering 13-642

A study of numerical methods for the solution of problems in Electrical Engineering with special emphasis on approximation techniques. The method of moments and the computer solution of problems in antennas and microwave networks are studied. (75-611)
Cr. 4

Theory and Design of Switching Circuits I, II 13-650, 651

Synthesis of combinational and sequential switching circuits: Boolean algebra, simplification of switching functions, synthesis of single and multiple output networks, synthesis of sequential circuits and related problems. Other topics include hazards in switching circuits, threshold logic circuits, and fault

detection. (Graduate standing or departmental approval)
Cr. 4

Sequential Machines and Automata 13-652

An introduction to the study of automata with specific emphasis on finite state machines: state tables and diagrams, combination of sequential machines, state identification experiments, machine identification, equivalence, regular expressions and regular sets. Kleene's theorem. (13-650, 651 or 13-550)
Cr. 4

Diagnosis of Logical Faults in Digital Systems 13-653

Generation, selection and verification of tests for the detection of logical faults in combinational and sequential circuits, and iterative logic arrays. Fault simulation and fault dictionaries. Design techniques. (13-650, 651 or 13-550)
Cr. 4

Special Topics in Electrical Engineering 13-672, 673, 674

This is a variable credit, variable topic course which can be in the form of regular courses or independent study under faculty supervision. Variable credits. Maximum of 4 credits/quarter.

Research and Thesis Guidance 13-691

An independent engineering project to demonstrate professional maturity and preferably involving reduction of theory to practice. An oral examination on the project and related topics as well as a written thesis is required. Variable credits. Maximum of 12 credits *total*.

Mechanical Engineering Department

RICHARD A. KENYON, *Department Head*

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 6 credits and a maximum of 12 credits. Under unusual circumstances the thesis requirement may be waived if, in the judgement of the Departmental Graduate Committee, the goals of a particular Graduate Program of study may be better served by alternative activity.

Core Courses — All Graduate students in the Mechanical Engineering Department are expected to have a mathematics background equivalent to 75-207, Engineering Mathematics. Students not meeting this prerequisite will be expected to take 75-207 as soon as possible after enrolling. Graduate credit is not given for 75-207.

All Graduate students are required to complete 17-631, Introduction to Continuum Mechanics, and an 8 credit mathematics sequence to be selected from the following courses.

<i>Course Number</i>	<i>Course Title</i>	<i>Credits</i>
17-601	Applied Engineering Analysis I	4
17-602	Applied Engineering Analysis II	4
17-603	Applied Engineering Analysis III	4
17-605	Numerical Analysis	4

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, may anticipate additional core requirements.

Elective Courses — It is anticipated that the majority of a student's program will be developed from the Mechanical Engineering Graduate courses listed on the following pages. 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.

Full Time Study — Although the Graduate program in Mechanical Engineering serves the needs of a large population of locally employed engineers on a part time basis, the Department also regularly enrolls full time Graduate students. 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 \$2,500 per academic year. Applicants for financial aid should write directly to the Department Head for details.

Examinations — Students completing a Thesis will be required to pass, as a minimum, an oral examination on the Thesis subject. Students in a non-Thesis Program will be required to pass a comprehensive examination in their 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.

Course Descriptions

GRADUATE COURSES IN MECHANICAL ENGINEERING

Applied Engineering Analysis I 17-601
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. (75-207)
Cr. 4

Applied Engineering Analysis II 17-602
Classification of second order partial differential equations related to fluid mechanics, vibrations and theory of elasticity. Green's method for solving Laplace's equation and its application to fluid mechanics and electrostatics. Theory of characteristics and its applications to supersonic flow. Riemann's method for solving hyperbolic equations and its application to fluid mechanics. (17-601)
Cr. 4

Applied Engineering Analysis III 17-603
Topics chosen from Conformal Mappings, Complex Inversion of Transform Integrals, Calculus of Variations and Integral Equations with applications to mechanical engineering problems. (17-411)
Cr. 4

Numerical Analysis 17-605
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)
Cr. 4

Heat Transfer I 17-611

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)
Cr. 4

Heat Transfer II 17-612

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)
Cr. 4

Heat Transfer III 17-613

Principles of natural and forced convection. Fluid stresses and flux laws. The differential and integral equations of hydrodynamic and thermal boundary layers, heat transfer in flow inside smooth surfaces, heat transfer for flow over external surfaces. (Graduate standing or departmental approval)
Cr. 4

Fluid Dynamics 17-615

Selected topics from compressible flows, viscous flow, hydrodynamic instability and turbulence, depending on the interests of the students. (17-315)
Cr. 4

Thermodynamics 17-617

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. (17-313)
Cr. 4

Statistical Thermodynamics 17-618

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.
Cr. 4

Nature and Properties of Materials 17-630

A study of the nature of solids including metals, ceramics, polymers, glasses and composites. Also considered are thermal, electrical, magnetic, and optical properties. (17-244)
Cr. 4

Introduction to Continuum Mechanics 17-631

Stress, deformation and flow in a continuous medium. Applications in the area of linear elasticity and fluid mechanics. (75-207)
Cr. 4

Advanced Mechanics of Materials 17-632

Theory of failure. Stress analysis of thick cylinders, plates, curved beams, and beams on elastic foundations. (Graduate standing or departmental approval)
Cr. 4

Analytical Mechanics I 17-633

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)
Cr. 4

Analytical Mechanics II 17-634

Transmission of waves, variational calculus, variational dynamics, and some relativity. (17-633)
Cr. 4

Theory of Elasticity I 17-635

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, etc. (17-631)
Cr. 4

Theory of Elasticity II 17-636

Solution of three-dimensional problems in elasticity, contact stresses. Variational methods. Introduction to wave propagation in elastic bodies. (17-635)
Cr. 4

Vibration Theory and Applications I 17-637

Vibrations of a particle, theory of damped free and forced vibrations of systems with several degrees of freedom. (17-602)
Cr. 4

Vibration Theory and Applications II 17-638

Vibration of elastic bodies, structures and approximation methods using matrix methods. (17-637)
Cr. 4

Experimental Stress Analysis 17-639
Mechanical methods of analysis of structural and machine members, including photoelastic method, strain gages, the membrane; hydrodynamical and electrical analogs. Laboratory tests of models. (17-632)
Cr. 4

Advanced Mechanical Systems Design 17-641
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. (17-651 and 17-605)
Cr. 4

Automatic Control Engineering I 17-651
Development of the transfer functions and block diagrams to describe components and systems; root-locus, Bode, and polar plots are used. The analog computer is used throughout the course to simulate systems. (17-602)
Cr. 4

Automatic Control Engineering II 17-652
An advanced study of feedback systems covering the areas of compensation, complex control systems, and non-linear systems. (17-651)
Cr. 4

Special Topics in Mechanical Engineering 17-672, 673, 674
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.
Variable credits. Maximum of 4 credits/quarter

Research and Thesis Guidance 17-691
In conference with a thesis advisor, a topic is decided on, and either a theoretical or laboratory type research program is carried out for a total of 6 to 9 credit hours. Periodic progress reports and final written thesis with oral examination.
Variable credits. Maximum 12 credits *total*.





College of Fine and Applied Arts

College of Fine and Applied Arts

ROBERT H. JOHNSTON, *Dean*

MASTER OF SCIENCE IN TEACHING AND MASTER OF FINE ARTS DEGREE

The College of Fine and Applied Arts, in its School for American Craftsmen, in its Industrial-Environmental Design, Communication Design and Fine Arts programs, 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 decorative 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. Under certain circumstances some of the credit hours required may be waived for those holding the B.F.A.

degree and whose undergraduate studies include specified content and a substantial amount of experience and credits in the area of the proposed graduate concentration.*

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 working 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 1 quarter (or 1 Summer Session) of the M.S.T. course of study.

OBJECTIVES

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.

REQUIREMENTS FOR ADMISSION TO GRADUATE PROGRAMS

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. The undergraduate studies should include a minimum of 36 quarter credit hours (24 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.

*See Admission to M.F.A. programs.

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. For applicants holding the Bachelor of Fine Arts Degree and whose undergraduate studies included a minimum of 75 quarter credit hours (50 semester hours) in studio courses, up to 33 credit hours of the graduate degree requirement may be waived. The undergraduate experience, in such cases, should include at least 27 quarter hours (18 semester hours) in the area in which the applicant proposes to carry his graduate concentration. In certain cases a demonstration of competence, or professional experience, may be accepted in lieu of the academic credit required for admission.

ACCEPTANCE FOR GRADUATE STUDY

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 TO THE PROGRAM 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.

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 R.I.T., 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 5 years preceding. The student, upon achieving Candidacy for the Master's Degree, will be notified by the Dean of the College as to the status of his transfer credit.

Admission as Candidate for the Master's Degree — After one term of graduate work a student (regular or Summer Session) who has achieved admission to the program, an application for candidacy for the Master of Fine Arts or Master of Science in Teaching must be submitted. The application material should include the following:

1. A statement covering undergraduate and graduate work in other institutions.
2. A recommendation from the major advisor indicating the student's capacity to do work in the intended major area.
3. A new statement of purpose if the student has changed his major from the original selection submitted upon application to the program.
4. A Program Planning Form which tentatively indicates the time and sequence of future course work in the program. This form should be planned with the student's advisor.

Applicants for Candidate for the Master's degree will be classified by the Graduate Selection Committee as Rejected or Accepted. Applicants who are rejected may continue their graduate study in course work for which they are qualified, and may apply again for candidacy after completing an additional quarter (or one Summer Session) of work. However, only one quarter (or Summer Session) of work may be counted toward the requirements for the degree prior to achieving candidacy, with the exception of credit earned in the Humanities requirement, or general-liberal electives. When a student has applied as a Candidate for the Master's Degree, he must consult with his advisor as to his status, the applicability of transfer credit, and any suggested Program Planning Form changes.

*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 Art.

POLICY REGARDING STUDENT WORK

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:

	Quarter Credit
1. Major Concentration	30
Designed to give depth of experience in the area of the student's major interest and chosen from one of the following:	
(a) Ceramics and Ceramic Sculpture	
(b) Metalcrafts and Jewelry	
(c) Woodworking and Furniture Design	
(d) Weaving and Textile Design	
(e) Design Applications	
(f) Communication Design	
(g) Fine Art (Painting, Printmaking)	
2. Minor Concentration *	15
From the above, to consist of studio and related electives, or internship.	
3. Electives	18
4. Humanities, Art History	10
5. Thesis	12
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 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 BA. (Art Major) Degrees and seeking the Graduate Degree and Permanent Certification.]

	Quarter Credit Hours
The degree offers a concentration consisting of background courses in Education:	20
(a) Developmental 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.

	Quarter Credit Hours
Major Concentration	24-30
(a) Studio Art, or Crafts	
(b) Art History and Humanities	
Minor Concentration	6-9
(c) From a or b above	
Liberal or General Studies, and Seminar: Teaching the Arts and Humanities	10-15
Total	48

Course Descriptions

ART AND DESIGN

Design Applications

32-711D (MFA) 32-651D (MST)

The reasoned application of theoretical three-dimensional design, to 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.

L. 9-27, Cr. 3-9

COMMUNICATION DESIGN

Communication Design Studio

32-711G (MFA) 32-651G (MST)

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.

L. 9-27, Cr. 3-9

FINE ARTS

Printmaking 32-711R (MFA) 32-651R (MST)

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 collography. 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.

L. 9-27, Cr. 3-9

Painting

32-711P (MFA) 32-651P (MST)

The pursuit of the pertinent, the ecstatic, the beautiful, by a small group of those dedicated to the art.

L. 9-27, Cr. 3-9

Research and Thesis Guidance

32-791

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.

Cr. 12

ART EDUCATION

Methods and Materials in Art Education

32-660, 661

Intensive study of curriculum in terms of teaching materials for both studio and appreciation aspects of elementary, early secondary and high school art education. Includes studio and elementary school teaching experience.

C. 2, L. 9, Cr. 5.

Seminar in Art Education

32-672

Evaluation and study of the practice teaching experience. Discussion of the professional role of the art teacher in terms of professional associations, supervision, teacher training, and research. A final project on some intensively studied aspect of art education is required.

L. 25, Cr. 3.

Practice Teaching in Art

32-671

A seven-week full-time practice teaching experience in secondary school, including professional duties of the art teacher in humanities courses, publication advising, audio-visual work, and supervision. Supplements the studio-theoretical education. Meets the state education requirements.

Cr. 9.

Seminar in the Teaching of the Arts and Humanities

32-674

Study of the content, method, and teaching materials for the teaching of studio and humanities oriented courses in the visual arts at the high school and college level. Includes lecture, discussion sessions, presentation of research reports, observations, and practicum work. Seminar attendance is required of those planning to teach. A non-credit, required course.

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. L. 9-27, Cr. 3-9

Ceramics 36-711C (MFA) 36-651C (MST)

Metalcrafts and Jewelry
36-711M (MFA) 36-651M (MST)

Woodworking and Furniture Design

36-711W (MFA) 36-6S1W (MST)

Weaving and Textile Design

36-71 IT (MFA) 36-6S1T (MST)

Research and Thesis Guidance 36-791

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.

L. 27, Cr. 12

COURSES GIVEN THROUGH THE COLLEGE OF GENERAL STUDIES

Developmental Psychology 89-601

A study of psychological research as it applies to physiological development throughout the various stages of life. Developmental tasks relative to different age groups will be surveyed and discussed. Emphasis will be placed on the periods of childhood and adolescence. Lectures, readings and seminar-type projects will be utilized.

C. 3, Cr. 5

Educational Psychology 89-602

A study of psychological research as it applies to the problems of learning and teaching. Consideration will be given to Pavlovian and operant conditioning, perceptual learning, motivation, individual differences, and other factors related to efficiency 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.

C. 3, Cr. 5.

Educational Sociology 89-603

The development of sociological and socio-psychological 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.

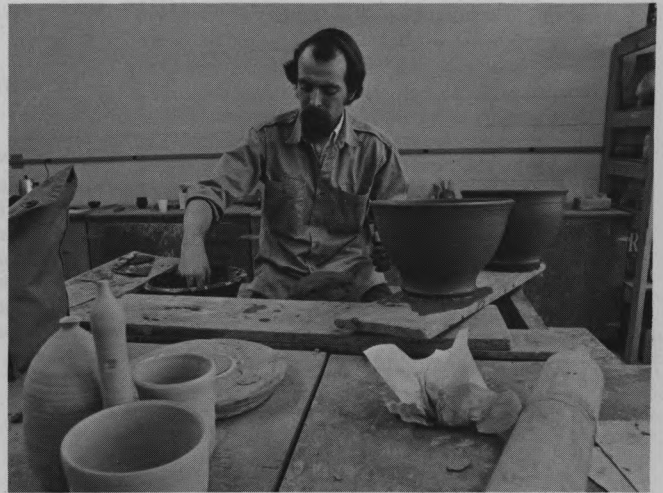
C. 3, Cr. 5.

History of American Educational Thought and Practice 89-611, 612

A study of the intellectual ideas and social forces that have shaped American education from the colonial period to the present.

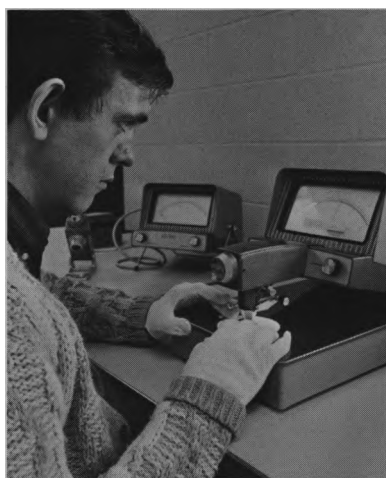
C. 3, Cr. 5.

Students may elect, as requirements of their programs permit, from a substantial offering of upper level courses given by the College of General Studies. A few course titles may serve as examples: Modern Applications of Language Theory; Selected Writers of the 20th Century; The Hero in Literature; The American Spirit in Literature; The Social Consequences of Technology; Music; Survey of American Architecture; Baroque Art and Architecture; Religion and History; Problems in Ethical Theory; Problems of Knowledge; Contemporary Religious Thought; Aesthetics; Contemporary Social Problems; Contemporary Economic Systems; The Planned Society; and American Foreign Policy.





College of Graphic Arts
and Photography



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 Chairman 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. Since education in photographic science is available at so few institutions, knowledge of photography is not required for admission to the course of instruction. However, 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. In special cases, applicants with sufficient education or experience may be admitted to candidacy by examination, but it will normally be necessary for applicants to take the full-time summer course 41-060, Principles of Photographic Science. This full-time course begins in June and runs for ten weeks. Full-time students should plan on four quarters 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. Persons without sufficient experience or education in photographic science must take 41-061, 062, 063, Principles of Photographic Science, which is equivalent to 41-060 in content. The 41-061, 062, 063 sequence is offered during the evening, with Saturday laboratory sessions. It is divided into quarters 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.

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 chairman.

ADMISSION

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.

REQUIREMENTS FOR THE DEGREE

For graduation, 45 credits in graduate-level courses are required. These must include 41-611, 612, 613; 41-621, 622;** 41-631, 632, 633; 41-641, 642, 643; 41-691; and an oral examination.

PROGRAM

<i>Course Number</i>	<i>Course Title</i>	<i>Quarter Credit Hours</i>		
		F	W	S
41-060 <i>or</i> 41-061, 062, 063*	Principles of Photographic Science	No G	raduate	Credit
41-611, 612, 613	Theory of the Photographic Process	3	3	3
41-621, 622**	Mathematics for Photographic Systems	4	4	
41-631, 632, 633	Principles of Instrumental and Photographic Optics	3	3	3
41-641, 642, 643	Photographic and Optical System Analysis and Evaluation	4	3	3
41-691	Research and Thesis Guidance	arranged, total of 9 min.		

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

*One of these courses, 41-060 or 41-061, 062, 063, is required unless the student is able to furnish proof of equivalent education or experience, normally by examination.

Course Descriptions

MASTER OF SCIENCE IN PHOTOGRAPHIC SCIENCE

Principles of Photographic Science 41-060

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 mathematics, physics, and chemistry, and includes: radiation theory and radiometry, properties of radiation-sensitive materials, chemistry and kinetics of photographic processing, sensitometry, tone reproduction, principles of color measurement, and color photographic systems.

Summer only. Cr. 15. Not applicable to 45 required graduate credits.

Principles of Photographic Science 41-061, 062, 063

Equivalent to 41-060, but offered in the evening and Saturdays during the regular Fall, Winter, and Spring quarters.

Cr. 15. Not applicable to the 45 required graduate credits.

Theory of the Photographic Process 41-611, 612, 613

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.

C. 3, Cr. 3

Mathematics for Photographic Systems 41-621, 622

A special graduate course in mathematics involving those areas of direct concern in design, analysis, and evaluation of photographic systems.

Cr. 5

Principles of Instrumental and Photographic Optics 41-631, 632, 633

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.

C. 3, Cr. 3

Photographic and Optical System Analysis and Evaluation 41-641, 642, 643

Complex variables and Fourier analysis with application to the evaluation of imaging systems. Properties of optical images, structure of photographic images. Methods of photo-optical system evaluation.

Fall: C. 2, L. 6, Cr. 4

Winter, Spring: C. 3, Cr. 3

Research and Thesis Guidance 41-691

Thesis based on experimental evidence obtained by the candidate in an appropriate field as arranged between the candidate and his advisor.

Arranged. Cr. 9 minimum for M.S.

Special Topics in Photographic Science 41-651, 652, 653

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.)

Cr. 3



MASTER OF FINE ARTS DEGREE IN PHOTOGRAPHY

PHILOSOPHY AND OBJECTIVES

1. To provide a student who has some undergraduate photographic background with an opportunity to increase the breadth and depth of his experience in the field.
2. To provide an opportunity for the mature student to engage in directed independent study which will develop his ability to solve visual communication problems on his own initiative with a minimum of supervision.
3. To provide an opportunity for the student to strengthen his understanding of the related arts and humanities, especially if his undergraduate work has been in a professional curriculum.
4. To provide an opportunity for the student to prepare himself for the professional practice of photography within a broad range of options which relate to photographic visual communication.

Typically, the graduate of such a program may find career employment in these areas: still photography, film-making, museum practice, and the teaching of photography and related visual communication disciplines.

ADMISSION STANDARDS

Admission may be granted to graduates of accredited degree-granting institutions as well as those with appropriate equivalent experience. Applicants must demonstrate to the Graduate Committee (M.F.A.) of the School of Photographic Arts and Sciences that they have the capability to pursue graduate work successfully. Normally, this will include a minimum of 21 quarter credits of undergraduate work in the area in which the applicant proposes to major; relevant work in the field may also be acceptable at the discretion of the Graduate Committee. An interview is required, as well as the presentation of a portfolio of recent work and

a statement of purpose. Transcripts of all academic work undertaken are required, together with recommendations from previous teachers and employers.

Applicants are admitted to the program only by recommendation of the Graduate Committee (M.F.A.) of the School of Photographic Arts and Sciences, after all credentials have been examined. Admission to candidacy for the degree may be made to the Graduate Committee by the student's advisor after one quarter of full-time graduate study, which is considered a probationary period.

DEGREE REQUIREMENTS

The M.F.A. in Photography is normally earned in two years of residence and the completion of 72 quarter credit hours of study, which includes 9 hours of credit for the Thesis. The student will, with his faculty advisor, arrange a plan of study which will most effectively meet his needs and strengthen areas of weakness in his previous educational experience. A typical distribution of credits might be:

Major concentration.....	30 Quarter Credit Hours
Minor concentration.....	18 Quarter Credit Hours
Electives (Humanities).....	15 Quarter Credit Hours
Thesis.....	9 Quarter Credit Hours

The above plan serves as a guide, and is subject to variations which depend equally upon the student's objectives and upon his undergraduate or professional experience. The final plan of study will be determined by the student and his advisor, subject to approval by the Graduate Committee, prior to his first registration at the Institute. A copy of the study plan is to be entered in the student's record. An applicant without sufficient undergraduate preparation may be required to fulfill certain prerequisites for undergraduate credit in order to gain maximum benefit from his graduate studies; for some applicants the summer course, 40-060, will provide adequate preparation. Some of these prerequisites must be fulfilled before admission to the graduate program and others may be fulfilled concurrently with graduate study. The letter of acceptance will specify these requirements in detail.

For students who have exceptional undergraduate preparation, such as an undergraduate degree in photography or other outstanding qualifications, portions of the 72 hour requirement may be waived by decision of the Graduate Committee.

MAJOR AND MINOR OPTIONS

The School of Photographic Arts and Sciences offers major concentrations for the M.F.A. degree in the areas of still photography, film-making, and photographic museum practice. The student requesting a major in film-making must have 21 undergraduate quarter credits in film-making or its

equivalent, in addition to the photographic prerequisite. The student requesting a museum practice major should have an undergraduate degree in photography or its equivalent in practical work. This major is contingent upon the availability of a suitable museum internship. Contact the M.F.A. Coordinator for details.

Minor concentrations are offered by the School in still photography and in film-making, but not in museum practice. Minor concentrations may also be undertaken at other schools of the Institute by permission of the Graduate Committee (M.F.A.) of the School of Photographic Arts and Sciences, and by permission of the Director of the appropriate school. Minors may be requested from the School of Printing, and (with appropriate prerequisites) from the School of Art and Design, the School for American Craftsmen, the College of General Studies and the Center for Community College Faculty Development. These are expected to be in one discipline, but the student may propose an interdisciplinary minor, subject to the approval of the Graduate Committee (M.F.A.). A list of minor options will accompany the acceptance letter.

THE THESIS

The Institute believes that a professional degree should be granted only upon the attainment of an advanced level of competence in the student's field of study, to be evaluated by the Graduate Committee in charge of the program.

The Thesis is, therefore, the culminating experience in the Master of Fine Arts Program in Photography, and is to be considered as a demonstration that a satisfactory level of competence has been attained by the applicant. Among the abilities which are to be displayed by the Thesis are:

1. The ability to propose a creative project with full recognition of both its limits and its possibilities. Its content must be within the scope of the program.
2. Technical competence to achieve the objectives of the proposal, in keeping with the contemporary state of the art, and ability to use the medium as a vehicle of visual communication.
3. Linguistic skills sufficient to make a lucid, literate proposal and to submit a scholarly report and summary of the project in the required format.

HUMANITIES ELECTIVES

Students may elect, as their objectives and schedules dictate, from extensive offerings of fourth and fifth year courses given by the College of General Studies. In some cases, the student's advisor will recommend and the Graduate Committee (M.F.A.) will require that specific courses be taken to enrich the overall educational experience. Among the offerings are courses which will help to meet certification requirements to teach in the high schools or junior colleges.

GRADE REQUIREMENTS AND TIME LIMIT

The average of all grades for graduate courses taken at the Institute must be at least a "B". The Graduate Committee may deny graduate credit for a major course which receives a grade lower than "B" and for any other course which receives a grade lower than "C", regardless of the overall average grade.

An end-of-term grade of "R" will be given for each quarter of registration for *Thesis Research and Guidance*, with the completed Thesis and its report being evaluated by the Committee as "Satisfactory" or "Unsatisfactory." The Committee may specify a time limit for the completion of the Thesis after consideration of the scope and problems involved in the project.

In the case of some Thesis projects, the Committee may require registration for more than 9 credits in order to permit the student to achieve a satisfactory Thesis experience.

Course Descriptions

MASTER OF FINE ARTS DEGREE IN PHOTOGRAPHY

Fundamentals of Photographic Communication

43-060

A summer course for students entering the graduate program. 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* granted upon completion.
Cr. 15

Photography

43-7 IIP

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.
Cr. 3-9

Cinematography

43-711C

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

Photographic Museum Practice

43-711M

Museum internship workshop. Research, assigned projects, seminars in history, function and administration of museums, with emphasis on photo-

graphic curatorial duties. Practice in exhibition planning and development. Field trips. This cannot be selected as a minor concentration.
Cr. 6-14

Independent Project

43-772

Student proposes an advanced project to the graduate committee. If the committee concurs, an advisor will be appointed. The committee may require modifications, will determine the hours of credit to be granted upon completion and will set the date for completion of the project.
All variable credit courses are subject to approval of advisor and the director of the school
Credit to be arranged.

Research and Thesis Guidance

43-791

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; minimum 9

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, 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.

THE MAJORS

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. 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.

The printing education major emphasizing teacher preparation for the two-year college has a program for students with varying undergraduate backgrounds. 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.

ADMISSION

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.

CREDIT AND RESIDENCE REQUIREMENTS

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

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.

All candidates are expected to maintain at least a “B” average in order to complete the program. Those who do not will normally be dropped from 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.

THESIS

The student should select a thesis adviser 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.

Course Descriptions

CORE COURSES TO ALL MAJORS AND PROGRAMS IN PRINTING

Research Methods in the Graphic Arts 51-601

Methods common to most types of experimental and survey research and how they may be applied to research in the graphic arts.
Cr. 4

Graphic Reproduction Theory 51-603

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.
Cr. 4

Statistical Inference 51-605

Hypothesis testing, confidence intervals, and sample size for variables. Introduction to analysis of variance and regression analysis.
Cr. 5

Design of Experiments 51-606

Basic designs for experiments, objectives, conclusions, error estimation, data analysis. Continuation of analysis of variance and regression analysis. Response surfaces and factorials. (51-605)
Cr. 5

Computers in the Graphic Arts 51-608

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.
Cr. 4

CORE COURSES IN THE TECHNOLOGY MAJOR PROGRAM FOR THE STUDENT WITH AN UNDERGRADUATE DEGREE IN PRINTING

Application for Mechanics and Electronics to Materials, Machine Design, and Processes in Printing 51-611,12,13

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.
Cr. 12

Introduction to Systems Analysis 51-615

Problems of systems analysis in printing operations for the highest quality product at the minimal cost including optimal floor designs and methods study. (51-608)
Q. 4

**CORE COURSES IN THE TECHNOLOGY
MAJOR PROGRAM FOR THE STUDENT
WITH AN UNDERGRADUATE DEGREE
IN AN AREA OTHER THAN PRINTING**

History of Printing Technology 51-621

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.
Cr. 4

Ink and Substrates 51-623

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, polyethylenes, polypropylenes, foils, and plastics.
Cr. 4

Tone and Color Analysis 51-625

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.
Cr. 4

**CORE COURSES IN THE PRINTING
EDUCATION MAJOR: UNDERGRADUATE
DEGREE IN EDUCATION**

Introduction to Graphic Arts Education 54-060

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.
Cr. 4

Typographical Procedures 54-631

Theory and practice of type composition by hand and machine. Monotype, Linotype, and Intertype. Phototypesetting. Use of perforated tape in automated typesetting.
Cr. 4

Photographic Reproduction Technology 54-634

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.
Cr. 6

Printing Press Technology 54-635

Theory and practice of the methods of relief, planographic, flexographic, and intaglio processes. Experiments in printing on different surfaces.
Cr. 6

Printing Plate Technology 54-637

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.
Cr. 6

**CORE COURSES IN THE PRINTING
EDUCATION MAJOR: UNDERGRADUATE
DEGREE IN PRINTING**

Introduction to Graphic Arts Education 54-060

History of Printing Technology 51-621
(Courses above are previously described)

Educational Psychology 89-602

A study of psychological research as it applies to the problems of learning and teaching. Consideration will be given to Pavlovian and operant conditioning, perceptual learning, motivation, individual differences, and other factors related to efficiency 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.
Cr. 5

Educational Sociology 89-603

The development of sociological and sociopsychological 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.
Cr. 5

History of American Educational Thought and Practice 89-611

A study of the intellectual ideas and social forces that have shaped American education from the colonial period to the present.
Cr. 5

Practice Teaching in the Graphic Arts 54-671

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.
Cr. 12

Teaching Methods in Graphic Arts Education 54-601

The study of the criteria necessary for selecting the methods, procedures, and materials relevant to planning and executing an effective lecture or demonstration lesson.
Cr. 4

CORE COURSES IN THE PRINTING EDUCATION MAJOR: UNDERGRADUATE DEGREE OTHER THAN PRINTING AND EDUCATION

Introduction to Graphic Arts Education 54-060

History of Printing Technology 51-621

Typographical Procedures 54-631

Photographic Reproduction Technology 54-634

Printing Press Technology 54-635

Printing Plate Technology 54-637

Educational Psychology 89-602

Educational Sociology 89-603

History of American Educational Thought and Practice 89-611

Practice Teaching in the Graphic Arts 54-671

Teaching Methods in Graphic Arts Education 54-601

(All of the above courses are previously described)

CORE COURSES IN THE TWO-YEAR COLLEGE PRINTING EDUCATION MAJOR: UNDERGRADUATE DEGREE IN PRINTING

Introduction to Graphic Arts Education 54-060
(Described previously)

The Two-Year College 90-601

This course is designed to acquaint the student with the nature, purpose, and philosophy of the two-year college in American higher education. Attention is directed to the variety of institutions classified as two-year colleges. Specifically, the course includes an examination of the organization, finance, administration, curriculum, personnel, and student services of the various types of two-year colleges.
Cr. 3

The Student in the Two-Year College 90-602

An examination of the characteristics of the two-year college student. The unique needs of the student and effective student-faculty relationships, including counseling, factors of motivation, development of effective instructional approaches with cognizance of student needs, abilities, and objectives. Attention is directed towards the purpose and importance of student personnel services in the two-year college; intellectual and non-intellectual characteristics of the college students of today; the similarities and differences between two- and four-year students. Simulation of learning process will provide the opportunity to experience some of the problems and feelings of the two-year college student.
Cr. 3

Instructional Techniques in the Two-Year College 90-603

Selected topics of instructional techniques appropriate to the two-year college. Testing and measurement, instructional methods and techniques of effective teachers, measuring teaching effectiveness, and methods of instructional evaluation, instructional technology and course curriculum development.
Cr. 4

Teaching Internship 90-606

A structured teaching internship at a co-operating two-year college or other appropriate internship experience to provide classroom experience for

candidates. Plans for the internship require approval by the Director of the Center for Community College Faculty Development.
Cr. 3-12

**CORE COURSES IN THE TWO-YEAR
COLLEGE PRINTING EDUCATION
MAJOR: UNDERGRADUATE DEGREE
OTHER THAN PRINTING**

Introduction to Graphic Arts Education	54-060
The Two-Year College	90-601
The Student in the Two-Year College	90-602
Instructional Techniques in the Two-Year College	90-603
Teaching Internship	90-606
Typographical Procedures	54-631
Photographic Reproduction Technology	54-634
Printing Press Technology	54-635
Printing Plate Technology	54-637
(All of the above courses are previously described)	



PROFESSIONAL ELECTIVES

Layout and Printing Design 51-640
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.
Cr. 4

Copy Preparation 51-642
Preparation of copy for camera. Working from layouts, making analysis of requirements. Paste-up techniques, methods of pre-separation mechanicals, use of photographic and typographic copy, relation to production steps in follow-up for offset platemaking and photoengraving. Proper instructional specification writing. An independent graduate research project is required.
Cr. 4

Imposition and Finishing Procedures 51-646
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.
Cr. 4

Machine Composition Technology 51-644
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.
Cr. 4

Printing Plate Methodology 51-646
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.
Cr. 4

Lithographic Press Methodology 51-648
A study of the principles, materials, and equipment used in lithographic presswork, set-up and operation of sheet-fed presses. An independent graduate research project is required.
Cr. 4

Relief Press Methodology

51-650

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.

Cr. 4

Gravure and Screen Printing Methodology 51-652

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.

Cr. 4

Photographic Reproduction Technology 51-654

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.

Cr. 4

Computers in Management

51-609

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. (51-608)

Cr. 4

Photographic Workshop for Teachers 98-767Gr

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 R.I.T. 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 R.I.T. 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.

Cr. 9

Research Projects

51-672

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.

Research and Thesis Guidance

51-691

An experimental or survey study of a problem area in the graphic arts. Credit variable.





College of Science

College of Science

MASTER OF SCIENCE DEGREE IN CHEMISTRY

OBJECTIVES

1. To provide through course work and research experience an opportunity for the student to increase both the breadth and depth of his background in chemistry.
2. To provide through the research experience an opportunity for the student to engage in independent study which will develop his ability to attack scientific problems on his own initiative with a minimum of supervision.
3. To provide the opportunity for the student to strengthen his knowledge and understanding in allied fields, such as Mathematics and Physics.
4. To provide the background of course work and research which is appropriate for those individuals who wish to pursue a program leading to the Ph.D. Degree in Chemistry at some other institution after they have completed this program.

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.

PROGRAM

The M.S. Degree program in Chemistry is open to both full and part-time students. While a majority of the courses are scheduled at times convenient for the latter, there may be some required courses that are only available during regular day school hours.

Each student will, with his advisor, 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 73-500 and 73-600 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: 73-501, 73-511, 73-522, and 73-531. As part of the required credits each student must have 2 quarter hours in Seminar, 73-640; and 6 quarter hours in upper division courses from related departments.
2. A minimum of 9 quarter hours in research and submission of a satisfactory thesis. This requirement may be waived for part-time students who, in the opinion of the faculty, are receiving comparable experience in their regular work.
3. A reading knowledge of French, German, or Russian (or English for foreign students to whom it is not a native language).
4. The passing of an oral thesis defense or comprehensive examination.

More information may be obtained by contacting Dr. T.C. Morrill (Chairman, Graduate Committee in Chemistry) through the Department of Chemistry or by phone (716) 464-2544.

Course Descriptions

Inorganic Chemistry 73-501, 502
The properties and structures of the elements and their compounds in relation to electronic and stereochemical principles; inorganic laboratory techniques. (73-323, 73-333)
C. 3, L. 3 (optional), Cr. 4

Instrumental Analysis 73-511, 512
Application and limitations of instrument methods in both qualitative and quantitative analyses. Laboratory use of photoelectric colorimeters, spectrophotometers, potentiometers, pH meters and titrimeters. (73-213)
C. 3, L. 3, Cr. 4

Advanced Organic Chemistry 73-521
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. (73-323)
Cr. 3, Cr. 3

Advanced Organic Chemistry 73-522
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. (73-323 and 73-333.) (Note: 73-521 is recommended but not required)
C. 3, Cr. 3

Qualitative Organic Chemistry 73-525
A combination of chemical and spectroscopic techniques is used to identify the structure of "unknown" organic compounds. (73-323)
C. 2, L. 6, Cr. 4

Chemical Thermodynamics 73-531
A study of the basic fundamentals of thermodynamics and their use in deriving the interrelationships of thermodynamic functions. Applications to thermochemistry, chemical and phase equilibria are made. (73-333, 75-232)
C. 3, Cr. 3

Principles of Magnetic Resonance 73-533

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. (73-333 and 75-232)

C. 3, Cr. 3

Inorganic Chemistry 73-601

Theory of bonding in coordination complexes, crystal and ligand field theory, substitution reactions of octahedral and square planar complexes, kinetics and mechanism of inorganic reactions, electron transfer reactions, Marcus Theory. (73-501)

C. 3, Cr. 3

Atomic and Molecular Spectra 73-611

The theory and use of high resolution spectroscopy in the fields of U.V.-visible, infrared, and nuclear magnetic resonance. (73-333, 73-511)

C. 3, Cr. 3

Physical Organic Chemistry 73-621

A theoretical treatment of the basic tools used in mechanism elucidation. The interpretation of kinetic, stereochemical, and spectral data is emphasized. (73-333, 73-522)

C. 3, Cr. 3

Stereochemistry 73-622

Advanced treatment of steric relationships and stereoisomerism in organic compounds. (73-522)

C. 3, Cr. 3

Heterocyclic Chemistry 73-623

The preparation, properties, and reactions of heterocyclic systems, especially for small rings, is presented. (73-323)

C. 3, Cr. 3

Natural Products 73-624

Isolation, characterizations, and properties of some of the following: alkaloids, carbohydrates, proteins, steroids, terpenes. (73-323)

C. 3, Cr. 3

Organic Chemistry of Polymers 73-625

Introduction to the chemistry of organic macromolecules and a survey of their properties and applications, step- and chain-growth polymerization mechanisms. (73-323, 75-232)

C. 3, Cr. 3

Physical Chemistry of Polymers 73-626

Study of the physical properties of polymers; theoretical and experimental aspects of molecular weight determinations, thermodynamics of polymer solutions, rubber elasticity and phase equilibria; light scattering, osometry, viscosity, and sedimentation techniques will be emphasized.

C. 3, Cr. 3

Quantum Mechanics 73-634

The Schrodinger equation, variational and perturbational 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. (73-333)

C. 3, Cr. 3

Quantum Chemistry 73-635

The application of quantum mechanics to the covalent bond, diatomic molecules, resonance and complex molecules. Molecular spectroscopy. Elements of quantum statistical mechanics. (73-634)

C. 3, Cr. 3

Radiochemistry 73-636

The nature of nuclear radiations, their detection, identification, and use in science and industry. Laboratory experiments in counting techniques and the use of radioisotopes in studying chemical phenomena. (73-502)

C. 3, Cr. 3

Chemical Kinetics 73-637

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. (73-333)

C. 3, Cr. 3

Topics in Chemistry 73-639

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.

C. 3, Cr. 3

Chemistry Seminar 73-640

Cr. 1

Research and Thesis Guidance 73-691

Hours and credits to be arranged. Chemical research in a field chosen by the candidate, subject to approval of the Department Head and advisor.



**Center for Community College
Faculty Development**

Center for Community College Faculty Development

ROY I. SATRE, *Dean*

MASTER OF SCIENCE DEGREES IN BUSINESS TECHNOLOGY OR ENGINEERING TECHNOLOGY

The graduate programs are designed primarily for community college faculty and will provide flexible programs of study for persons with specific interest in teaching at the lower division level.

Programs of study will be offered to meet the requirements of both prospective and currently employed two-year college faculty in technical fields to develop proficiency, understanding and competence commensurate with current and future teaching positions at community and technical colleges. Specific objectives include:

1. Introducing students to advanced knowledge in their technical specialty.
2. Providing understanding of the educational objectives of two-year colleges.
3. Developing competence as a teacher in career programs at the two-year college level.
4. Developing teaching approaches based on student needs.
5. Increasing awareness of the need for providing education to students disadvantaged by socio-economic backgrounds.

ADMISSION

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 MS (BT) program will normally be required to take the admissions test for graduate study in Business.

PROGRAM REQUIREMENTS

To be eligible for the Master of Science degree, a minimum of 48 quarter credit hours beyond the baccalaureate degree with satisfactory grades must be completed in an approved program of study. At the present time, graduate work may be completed leading to the M.S. (Engineering Technology) and M.S. (Business Technology) through the CCCFD on a full-time or part-time basis.

PROGRAM RESOURCES

In order to provide the necessary breadth of courses to offer the flexible scheduling required by individual candidates, the CCCFD programs rely heavily on other colleges and schools at R.I.T. for graduate level instructional services.

The faculty, instructional resources, and wide variety of the regular R.I.T. graduate course offerings are available to students enrolled in the Center's programs. Adjunct professors and visiting lecturers with special expertise in two-year college programs are utilized to assure that the community college graduate course series and special seminars offered are of high quality.

PLANS OF STUDY

Curricula will stress breadth of knowledge in the field of specialization rather than the necessarily restrictive emphasis of research-oriented pre-Ph.D. programs. Technological change, typical teaching schedules requiring multiple course preparations and the dynamic nature of employment opportunities for graduates of two-year colleges require that interdisciplinary programs be developed for prospective faculty, allowing for:

1. Maximum degree of individualistic scheduling allowing candidates to buttress prior educational and professional experiences with a graduate program providing the necessary breadth of professional knowledge to offer instruction on the "flexible-applied" level required for technical programs in community and technical colleges.
2. An inter-disciplinary approach to graduate study reflecting the fact that educational objectives of prospective two-year college faculty vary from those of traditional graduate students.
3. Teaching internship opportunities for prospective faculty lacking experience in the classroom.
4. Opportunity to become knowledgeable about the development, administration, functions, and specialized characteristics of two-year institutions and their curricula.
5. Opportunity to study the unique needs of junior college students and effective faculty-student relationships including counseling and factors of motivation.
6. Knowledge of instructional techniques including effective testing and evaluation of student performance.

INTERNSHIP

An integral and important aspect of the CCCFD graduate program is the inclusion of internship experiences in cooperation with two-year college campuses.

During the first three quarters of graduate study, full-time prospective faculty, admitted to the CCCFD, would participate in internship experiences that would include: visitations to various two-year colleges to observe organizational patterns, general program features, and teaching practice. A variety of two-year campuses would be visited with follow-up critiques and seminars being conducted by the CCCFD staff. Visitations would include regular associate degree programs, non-degree post-secondary programs, and special educational programs for socially and economically disadvantaged students.

For the teaching internship, the prospective faculty member would be responsible for a teaching assignment at a cooperating two-year college. A teaching load of approximately one-half a normal load with close supervision by a mentor from the faculty in the field of specialization that the intern expects to teach would be required. The Center and the cooperating campus will collectively define a program and schedule to develop the intern's competencies as a teacher. Included will be specific course preparations, presentations, and evaluations.

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. The program was specifically developed for persons preparing to teach in Business Technology programs at the two-year college level.

Objectives

In addition to the general objectives of the Center for Community College Faculty Development to offer programs of study meeting requirements of both prospective and currently employed two-year college faculty, the MS (BT) 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 specialties to the unique problems associated with two-year college business programs.
5. Completion of a teaching internship for prospective faculty lacking classroom experience.

The Master of Science in Business Technology program requires a minimum of 49 quarter credit hours beyond the baccalaureate degree. From the maximum of 65 quarter credits shown below, students who have completed previous graduate or undergraduate work in Business can waive from 12 to 16 quarter credits from the program, meeting the minimum of 49 quarter credit hours for the program.

<i>Courses:</i>	<i>Quarter Credit Hours</i>
1. Functional Areas of Business	
21-613 Basic Financial and Managerial Accounting	4
21 -622 Financial Management	4
21 - 644 Behavioral Science in Management	4
21 - 661 Marketing Concepts	4
2. Basic Core Courses in Business	
21 - 642 Legal & Social Environment of American Business	4
21 - 645 Economic Environment of American Business	4
21 -681,682 Managerial Decision Making I, II	4
3. Courses in Technical Area of Specialization	
12 quarter credits from 1 of the following areas: Accounting, Management, Marketing, Data Processing*, and Secretarial Science*.	
4. Allied Field in Business Technology	
8 quarter credits from the fields listed in 3 above.	
5. Community College Graduate Course Series	
A minimum of 10 quarter credit hours through the Center for Community College Faculty Development, including 90-601, The Two-Year College; 90 - 602, The Student in the Two-Year College and 90 - 603, Instructional Techniques in the Two-Year College.	
6. Teaching Internship for Prospective Teachers Lacking Classroom Experience	
90 - 606 Teaching Internship	3-12

*Tentative area of specialization, currently under study.

MASTER OF SCIENCE (ENGINEERING TECHNOLOGY) PROGRAM

The MS (ET) program is specifically structured for candidates wishing to teach in the Electrical or Mechanical Technology area. Flexible programs to develop teaching competence in specific specialization areas of Electrical or Mechanical Engineering Technology can be developed by following the general plan of study listed below. The MS (ET) program requires a minimum of 48 quarter credit hours beyond the baccalaureate degree.

1. Field of Engineering Technology Specialization

24 quarter credit hours

An approved schedule of courses are selected from the graduate offerings of the Department of Electrical Engineering, Mechanical Engineering, the Applied Statistics program, and/or technical courses offered by the CCCFD.

2. Allied Field in Engineering Technology

12 quarter credit hours

The same course selection as 1. above, plus other approved courses from any R.I.T. department to develop a specific competence.

3. The Community College Graduate Course Series

10 quarter credit hours

A minimum of 10 quarter credit hours through the Center for Community College Faculty Development, including 90-601, The Two-Year College; 90 - 602, The Student in the Two-Year College; and 90 - 603, Instructional Techniques in the Two-Year College.

4. Teaching Internship for Prospective Teachers Lacking Classroom Experience

90 - 606 Teaching Internship

3 to 6 qtr. cr. hrs.

The Student in the Two-Year College 90-602

An examination of the characteristics of the two-year college student. The unique needs of the student and effective student-faculty relationships, including counseling, factors of motivation, development of effective instructional approaches with cognizance of student needs, abilities, and objectives. Attention is directed towards the purpose and importance of student personnel services in the two-year college; intellectual and non-intellectual characteristics of the college students of today; the similarities and differences between two- and four-year students. Simulation of learning process will provide the opportunity to experience some of the problems and feelings of the two-year college student.

Cr. 3

Course Descriptions

The Two-Year College

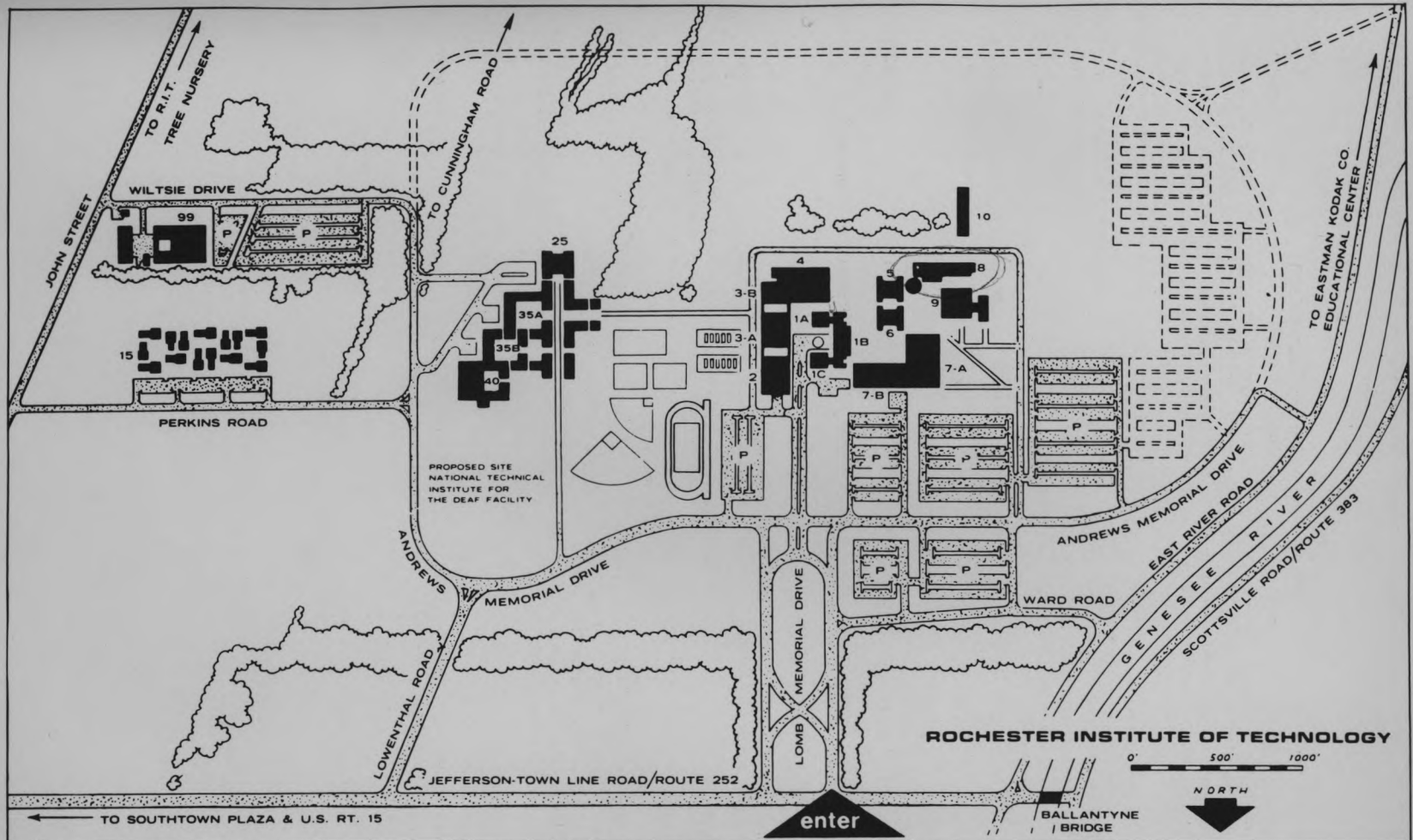
90-601

This course is designed to acquaint the student with the nature, purpose, and philosophy of the two-year college in American higher education. Attention is directed to the variety of institutions classified as two-year colleges. Specifically, the course includes an examination of the organization, finance, administration, curriculum, personnel, and student services of the various types of two-year colleges.

Cr. 3

- Instructional Techniques in the Two-Year College
90-603
- Selected topics of instructional techniques appropriate to the two-year college. Testing and measurement, instructional methods and techniques of effective teachers, measuring teaching effectiveness, and methods of instructional evaluation, instructional technology and course curriculum development.
Cr. 4
- Computers in Engineering Technology I 90-604
- 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.
(College Mathematics through calculus or equivalent)
Cr. 4
- Computers in Engineering Technology II 90-605
- 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.
Cr. 4
- Teaching Internship 90-606
- A structured teaching internship at a co-operating two-year college or other appropriate internship experience to provide classroom experience for candidates. Plans for the internship require approval by the Director of the Center for Community College Faculty Development.
Cr. 3-12
- Special Projects Related to Two-Year Colleges
90-607
- This course provides for independent study, investigation, or research activity in subject matter or 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 Director for Community College Faculty Development.
Cr. 3-6
- Mechanical Engineering Concepts (Thermo-Fluids)
90-608
- The first and second laws of thermodynamics are applied to fundamental problems in hydrodynamics and aerodynamics. Vorticity, circulation lift, and drag are studied.
Cr. 4
- Microelectronics 90-609
- 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.
Cr. 3
- Electromechanical Systems 90-610
- 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.
Cr. 3
- Engineering Concepts (Solid Body Mechanics) I
90-611
- 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 analogue and digital computers as aids in obtaining effects on systems by varying the parameters.
Cr. 4
- Engineering Concepts (Solid Body Mechanics) II
90-612
- A continuation of Engineering Concepts 90-611.
(Engineering Concepts 90-611 or equivalent)
Cr. 4

Numerically Controlled Machines	90-613	Seminar for Engineering Technology Faculty	90-620
Basic principles and capabilities of N/C; N/C machine and its controls; increment and absolute systems; point to point and continuous path systems; manual programming; use of computers and programs for N/C; N/C turning; design criteria and managing of N/C; nonmachining applications.		Weekly series of seminars that would bring all participants together with special resource persons when required to discuss a wide range of topics related to engineering technology. Effective instruction, engineering education and its interface with engineering technology, utilization of technicians by industry, effective teaching procedures, the relationship between private institutions and public two-year colleges are examples of topics to be included in this seminar.	
Cr. 3		Cr. 2-4	
Engineering Technology Analysis I	90-614	Instructional Techniques II	90-621
The fusion of three significant elements: 1) the historical base, 2) which lead to the development of certain areas of <i>mathematics</i> , 3) and how this mathematics is used in <i>engineering design</i> .		To provide the student with a deeper understanding of learning theories and educational psychology.	
Cr. 3		Cr. 4	
Communication Theory	90-616	Electromechanical Systems II	90-622
To provide the student with the basic principles of communication theory and applications in system design.		To study the major components and subsystems required for the operation of numerically controlled machines.	
Cr. 3		Cr. 3	
Microelectronics II	90-617	Electrical Measurements (for Mechanical Technology)	90-623
To provide a basic understanding of microelectronics, techniques, and applications.		To present the various electrical measuring devices, instruments, and transducers which the mechanical engineer is likely to encounter. Basic principles and applications are stressed.	
Cr. 3		Cr. 3	
Applications of Linear Integrated Circuits	90-618	Manufacturing Organization and Management	90-624
1) Review of the disadvantages and advantages 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.		To study the principles of manufacturing organization and management as they would be related to teaching the material in the two-year college.	
Cr. 3		Cr. 3	
Mechanical Systems Design	90-619	Engineering Technology Analysis II	90-625
To provide a comprehensive introduction to the analytical and graphical techniques required for the design of mechanism and machine parts.		To develop a mathematical background in selected areas pertinent to the understanding of engineering problems.	
Cr. 3		Cr. 3	



KEY TO BUILDINGS

1. GEORGE EASTMAN MEMORIAL BUILDING:
1A. Administration Tower (Information Desk)
1B. College of Business
1C. College of Continuing Education
2. FRANK RITTER MEMORIAL ARENA: Ice Rink
- 3A. GEORGE H. CLARK MEMORIAL GYMNASIUM
- 3B. EDITH WOODWARD MEMORIAL POOL
4. COLLEGE-ALUMNI UNION and
INGLE MEMORIAL AUDITORIUM
5. WALLACE MEMORIAL LIBRARY

6. COLLEGE OF GENERAL STUDIES
- 7A. JAMES E. BOOTH MEMORIAL building:
College of Fine and Applied Arts,
Bevier Gallery
- 7B. FRANK E. GANNETT MEMORIAL building:
College of Graphic Arts and Photography
8. CHESTER A. CARLSON MEMORIAL building:
College of Science
9. JAMES E. GLEASON MEMORIAL building:
College of Engineering and
School of Applied Science

10. The Annex
15. Married Student Housing
25. GRACE WATSON HALL: Dining Facility
- 35A. KATE GLEASON HALL: Residence Complex
- 35B. NATHANIEL ROCHESTER HALL: Residence Complex
40. SOL HEUMANN HALL: Residence Complex
99. Central Services
- (P) Parking lots, long term;
Short term lot at George Eastman Building

Rochester Institute of Technology

Office of Admissions & Records

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