

RIT OFFICIAL BULLETIN



GRADUATE STUDY / ' 8 4



Rochester Institute of Technology

Calendar 1984-85

	Graduate Registration	No Classes	Non-Matriculated Student Registration	Classes Begin Day Colleges	Exam Week	Last Day of Quarter
Fall Quarter	Sept. 5, 6	Nov. 21-25	Sept. 7	Sept. 7	Nov. 16-20	Nov. 20
Winter Quarter	Nov. 26	Dec. 22-Jan. 2 Feb. 7 (day) Feb. 24-Mar. 3	Nov. 27	Nov. 27	Feb. 20-23	Feb. 23
Spring Quarter	March 4	May 20-28	March 5	March 5	May 14-17	May 17



Acknowledgements

Dean, Dr. Paul Bernstein

Art Director, John Massey

Graphic Designer, Walter Kowalik

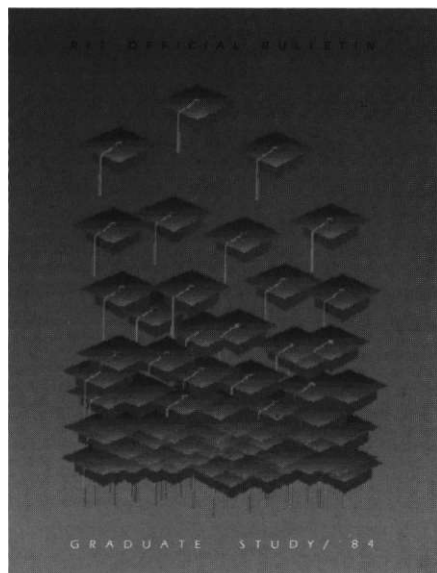
Coordinator, Karen Beadling

Cover Consultants, Dr. Peter Giopulos and Dr. Richard Zakia

Photography, Jim Castelein, Rod Reilly, Sue Weisler

Composition, Rochester Mono/Headliners

Printed by Cohber Press Inc.



About this bulletin—

This Graduate Bulletin does not constitute a contract between the Institute and its students on either a collective or individual basis. It represents RIT's best academic, social, and financial planning at the time the Graduate Bulletin was published. Course and curriculum changes, modifications of tuition, fee, dormitory, meal and other charges, plus unforeseen changes in other aspects of RIT life sometimes occur after the Graduate Bulletin has been printed but before the changes can be incorporated in a later edition of the same publication. Because of this, Rochester Institute of Technology does not assume a contractual obligation with its students for the contents of this Graduate Bulletin.

RIT admits and hires men and women, veterans and disabled individuals of any race, color, national or ethnic origin, or marital status, in compliance with all appropriate legislation, including the Age Discrimination Act. The compliance officer is James Papero.

Graduate Study 1984-85
Produced by RIT
Communications and the
Graduate Council

Write or phone:

Rochester Institute of Technology
Admissions Office
P.O. Box 9887
Rochester, NY 14623
(716) 475-6631

© Copyright 1984 Rochester Institute of Technology

Contents

Graduate Education at RIT.	4
Accreditation.	6
Programs of Study.	7
Philosophy of Graduate Education at RIT.	8
Admission.	8
Costs.	10
Steps Toward Degree.	11
Student Services.	14
Course Numbering.	17
The College of Applied Science and Technology.	18
The College of Business.	33
The College of Continuing Education.	45
The College of Engineering.	51
The College of Fine and Applied Arts.	65
The College of Graphic Arts and Photography.	75
The College of Liberal Arts.	90
The College of Science.	92
National Technical Institute for the Deaf.	101
Officers and Deans.	104
The Board of Trustees.	104
Index.	105
Campus map (inside back cover)	

RIT Official Bulletin

Vol. LXXXIV

No. 3

July 27, 1984

The RIT Official Bulletin (USPS 715-400) is published six times annually by Rochester Institute of Technology, One Lomb Memorial Drive, P.O. Box 9887, Rochester, N.Y. 14623, monthly in March and May, semi-monthly in July and August. Second-class postage paid at Rochester, N.Y. *Postmaster:* Send address changes to Rochester Institute of Technology, Office of Admissions, One Lomb Memorial Drive, Box 9887, Rochester, N.Y. 14623.

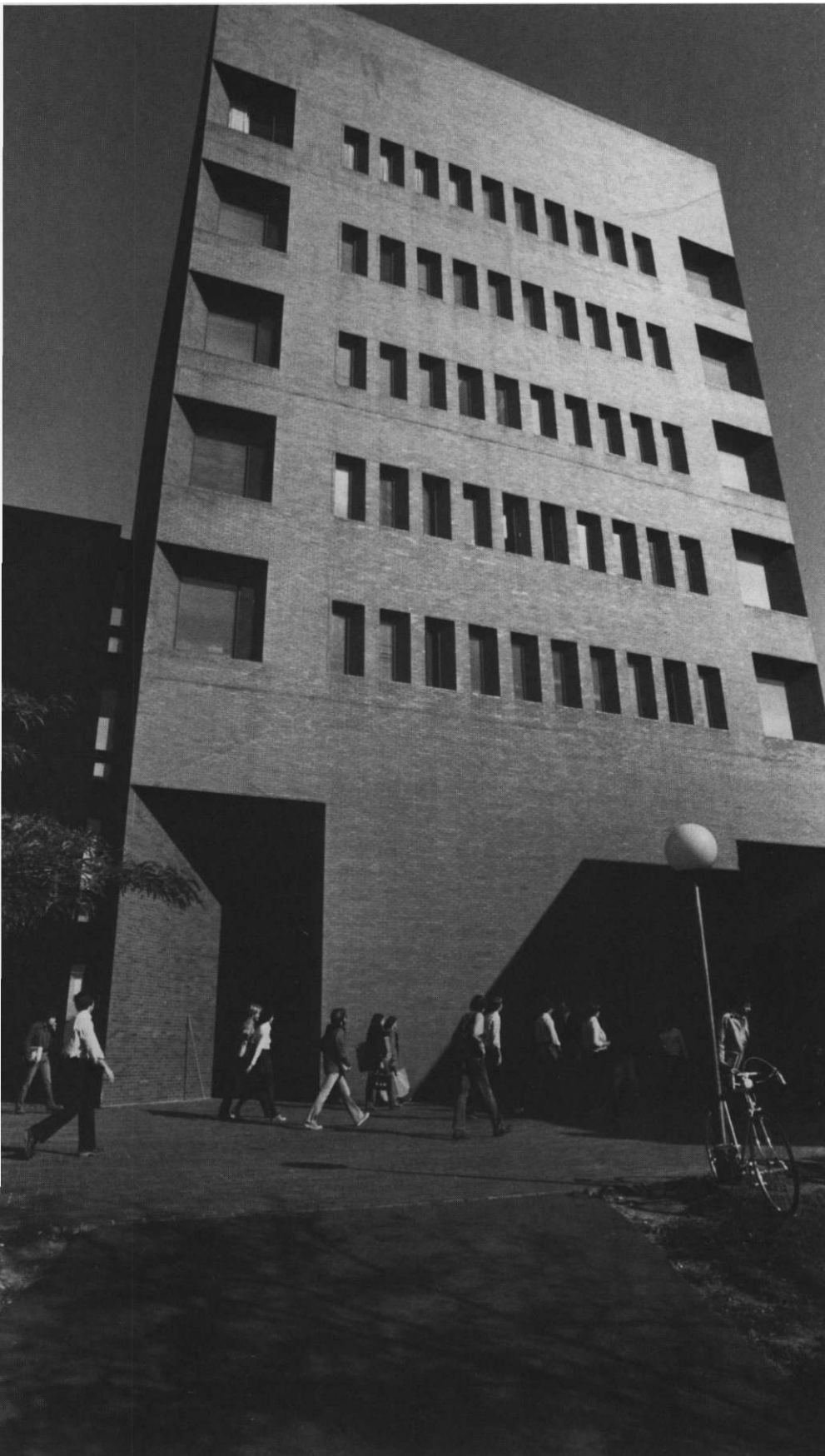
About RIT

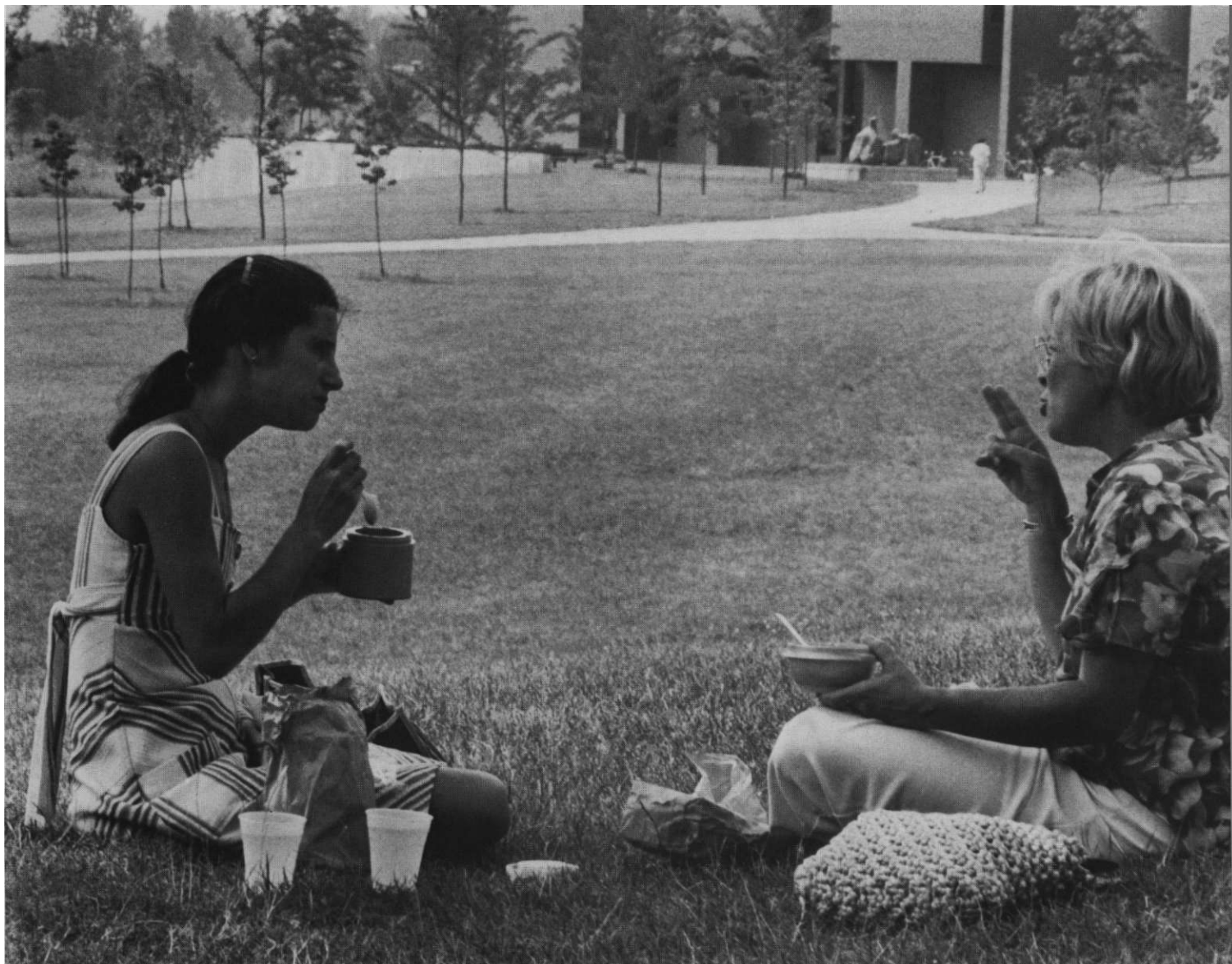
Founded in 1829, Rochester Institute of Technology has been a pioneer in career-oriented and cooperative work-study higher education. RIT includes a modern 1,300-acre campus and the RIT City Center in downtown Rochester. The nonsectarian, coeducational, independent Institute prepares students for technical and professional careers in a changing world.

RIT consists of 9 colleges: Applied Science and Technology, Business, Continuing Education, Engineering, Fine and Applied Arts, Graphic Arts and Photography, Liberal Arts, Science, and the federally-funded National Technical Institute for the Deaf.

Graduate Education at RIT

About 26 years ago, Rochester Institute of Technology expanded its educational responsibilities to include graduate curricula, the first being in the area of fine arts. Encouragement from a variety of professional sources plus student demand caused the Institute to initiate programs in the arts and crafts leading to the master of fine arts degree. Shortly thereafter, RIT appointed a Graduate Council and petitioned for a charter 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 a 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 another area of responsibility for RIT. Considerable need was indicated for sophisticated statisticians,

particularly individuals who could undertake the complex task of collecting, analyzing, and interpreting data necessary for industrial planning. Accordingly, the College of Continuing Education created a Department of Statistics and began to offer work leading to a master of science degree in applied and mathematical statistics.

Soon thereafter the College of Engineering entered the field of graduate education through new programs in electrical and mechanical engineering. These curricula were designed to meet the needs of the academically capable engineers in industry who wished to continue studies in a graduate degree program. The graduate curricula in engineering provided students with meaningful opportunities to associate with those who were engaged in the daily application of scientific engineering and

management knowledge in business and industry.

By 1968 important unmet demands for graduate training in business administration were apparent in the Rochester area and beyond. In view of this considerable need, the College of Business developed a master of business administration program which encompassed all of the management and business areas common to middle and upper-middle management. The new curriculum was also designed to provide a balance between the behavioral and quantitative aspects of business management.

Later in 1968, in addition to the two-year MFA program, the College of Fine and Applied Arts developed a program in art education leading to the master of science in teaching degree. The program was specifically designed for secondary school teachers of fine and



applied arts who wished to improve their understanding and skills and earn certification.

The need for additional people with technological training in the graphic arts became apparent from the numerous requests RIT received for a graduate program in printing. As a result, the School of Printing introduced a graduate program, operational in January, 1969, leading to the MS degree.

Recent additions to the list of graduate degree programs now available include the MFA in photography and the graduate internship leading to a master of engineering degree.

The Department of Instructional Technology has developed an MS degree program in instructional technologies for those engaged in teaching or directing multi-media communications. This combines and builds upon the several communication/graphics/visual disciplines long associated with RIT. The master of science degree in career and

human resource development has been designed to provide graduates with the background necessary to help organizations better utilize human resources, plan and implement career education programs, and help individuals make career choices. In addition, the College of Applied Science and Technology now offers three programs through its School of Computer Science and Technology. These are the MS in computer science, the MS in computer systems management, and the MS in information science. The Department of Packaging Science also started its master of science degree program in the spring of 1983 in response to demand from industry for people with graduate education in packaging. RIT is one of only four schools in the country to offer an MS degree in packaging.

RIT has also initiated a new MS interdisciplinary program involving science and engineering in the area of materials science. In addition, our College of Fine and Applied Arts began an MS offering

in medical illustration in 1981-82 and will inaugurate this September its MFA program in computer graphics design, while the College of Business recently started an MS program in human services management.

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

Accreditation

The Institute is chartered by the legislature of the State of New York and accredited by the Middle States Association of Colleges and Secondary Schools. In addition to institutional accreditation, curricula in some of the colleges are accredited by appropriate professional accreditation bodies. Specific mention of these is included in the college descriptions, where applicable.

Graduate Programs of Study

	Graduate Degrees Offered	Programs Available in	HEGIS* Code	For More information See Page
College of Applied Science and Technology	Master of Science	Career and Human Resource Development Computer Science Computer Systems Management Instructional Technology Information Science Packaging Science Information Science	0826 0701 0701 0699 0702 4999 0702	18
	Certificate			
College of Business	Master of Business Administration	Accountancy Business Options Listed on page 36	0502 0506	33
	Master of Science	Human Services Management	2199	
College of Continuing Education	Master of Science	Applied and Mathematical Statistics	1702	45
College of Engineering	Master of Science	Electrical Engineering Mechanical Engineering Materials Science and Engineering**	0909 0910 0915	51
	Master of Engineering	Engineering (EE, ME, IE)	0901	
College of Fine and Applied Arts	Master of Fine Arts or Master of Science for Teachers	Ceramics and Ceramic Sculpture	1009	65
		Graphic Design	1009	
		Industrial & Interior Design	1009	
		Glass	1009	
		Metalcrafts and Jewelry	1009	
		Painting	1002	
		Printmaking	1002	
		Weaving and Textile Design	1009	
		Woodworking and Furniture Design	1009	
		Medical Illustration	1299	
	Master of Fine Arts	Computer Graphics Design	1009	
		Art Education	0831	
College of Graphic Arts and Photography	Master of Science	Printing Technology	0699	75
	Master of Science	Imaging and Photographic Science	1011	
	Master of Fine Arts	Photography	1011	
College of Science	Master of Science	Chemistry	1905	92
		Clinical Chemistry	1223	
		Materials Science and Engineering**	0915	
National Technical Institute for the Deaf	None	Educational Specialists for the Deaf		101

Enrollment in other than registered or otherwise approved programs may jeopardize a student's eligibility for certain student aid awards. All the above programs are registered according to the indicated HEGIS* code.

*Higher Education General Information Survey

* Joint program of Colleges of Engineering and Science

Philosophy of Graduate Education at RIT

Graduate education has been part of the mission of the Rochester Institute of Technology since the first graduate program in Fine and Applied Arts was begun in 1958. During the ensuing years, student demand has led to the emergence of more than 40 graduate programs in such diverse areas as fine arts, business, engineering and career education. These offerings have drawn on the total resources of the Institute and have received wide acceptance.

From its beginnings as the Mechanics Institute, RIT has stressed both "earning a living and living a life." Its offerings have also emphasized the amalgam of formal education and experience, and have included a definitive commitment to career training in a context of social responsibility. In particular, RIT's graduate thrust has been oriented in the direction of technology and business, as well as the aesthetic content of the fine arts, photography, and printing.

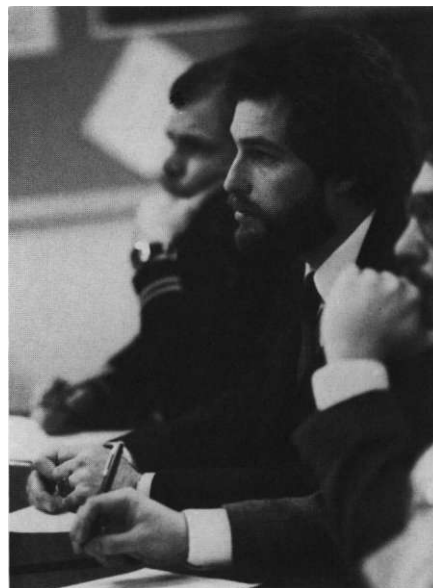
RIT's graduate programs stress the applications of specialized knowledge that enable students to use their professional knowledge and skills to attain personal and career goals. Further, their graduate accomplishments at the Institute are basic to continuing lifelong learning, career development and personal satisfaction. In certain areas, the MS or MFA is the terminal degree in the field, while in others it provides the base for work at a higher level.

Another fundamental objective of graduate education at RIT is that it be characterized both by effective teaching and quality scholarship. Out of these concerns have risen selective research projects that aid education of students and provide continuing opportunities for professional growth. At RIT many of our research projects—including projects in energy, graphic arts, information and communication—are under the umbrella of the RIT Research Corporation. These projects bring

industry experts to campus to interact with faculty and graduate students, give graduate students the opportunity to assist with research projects and keep faculty members up to date on current industry practices. In addition, through the Research Corporation, graduate students utilize special libraries and research facilities as they study in their fields.

Graduate programs at RIT help students understand the conceptual structure and organization of knowledge of their chosen programs. Such an understanding is a necessity if our graduates are to cope with the accumulation of knowledge and technological change in the professions. These programs provide the educational base for additional learning, and offer access into and mobility within one or more professional areas. Through their education, RIT's graduate learners become equipped with the knowledge, skills, and attitudes to stay abreast in their professional fields.

Graduate study should help students to mature as perceptive problem-solvers who will emerge as professional and community leaders. It should provide a strong base for independent study and experimental learning. Above all, graduate education should help students become skillful and incisive professionals who perceive the human purposes that underscore all learning.



2. The Admissions Office will acknowledge the inquiry or application, instructing the student as to the information required by the school or department to which he or she is applying before the admission can be made.
3. Once a student has made formal application, the Admissions Office will prepare an applicant folder for him or her. All correspondence and admission data will be collected by the Admissions Office, and placed in the applicant's folder. The applicant's file folder will include an RIT application, previous college or secondary school records, applicable test scores, recommendations (if required) and other documents that may support admission of the candidate.
4. When all relevant admission data has been received, the applicant's folder will be sent to the appropriate school or department for action.
5. When the school or department has made a decision on the application, this decision and the applicant's folder will be returned to the Admissions Office.
6. The Admissions Office will notify the student of the admission decision.

7. Academic departments may informally advise non-matriculated students, but no formal program of study can be approved prior to matriculation.

8. The formal program would be laid out by the dean's designee (department head, coordinator or program director, etc.) and is the one that must be followed by all students applying for admission or readmission.

Readmission

1. If a student has become inactive (has not completed a course in four quarters) or has withdrawn from RIT, Institute policy requires the student to reapply for admission. Readmission applications are handled according to the following policy:

A. Students who left the program with a GPA of 3.0 or better (in good standing) and will return to the program within two years of the time their last course was completed, will be readmitted to the program upon reapplication.

B. Students who left the program with a GPA of 3.0 or better and return to the program more than two years after the last course was completed, must meet current admission standards upon reapplication. The program of study shall be subject to review and will be rewritten. Previous waiver and/or transfer credit may be lost and program deficiencies may need to be made up.

C. Students who leave a program with a GPA below 3.0 must meet current admission standards upon reapplication. Readmission will be based on all information, including previous graduate level work. Program requirements in effect at the time of reapplication will apply. Previous waiver and/or transfer credit may be lost and program deficiencies may need to be made up.

D. In addition, each college will have the responsibility, upon readmission, of determining which previous courses, if any, will be applicable toward the degree.

E. The Seven Year Rule

In all cases, students must complete the program within seven years of the date of the oldest course counted toward their program. This does not

apply to prerequisites, Bridge Program courses in Computer Science, or similar requirements in other departments.

F. This policy will take effect on September 1, 1984.

RIT admits and hires men and women, veterans and disabled individuals of any race, color, national or ethnic origin, or marital status, in compliance with all appropriate legislation, including the Age Discrimination Act. The compliance officer is James Papero.

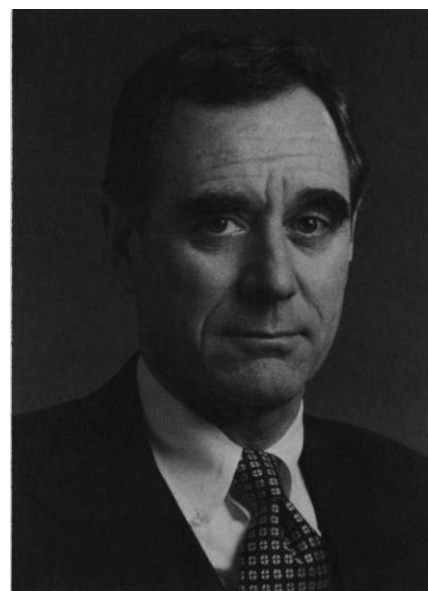
The basic entry requirements for master's degree candidates include the completion of a baccalaureate degree and whatever other evidence of the applicant's potential to successfully complete graduate studies may be required by the particular college. Rare exception to the baccalaureate requirement can be made in the case of candidates who have demonstrated unusual competence in their field of specialization. For these exceptions the recommendation of the department chairperson or director and the approval of the appropriate dean is required.

In certain cases graduate students may be admitted prior to, but conditional on completion of, the baccalaureate degree. Applicants should not be considered for admission prior to the start of their final year of undergraduate study. The student must present a final transcript within one quarter after first registering for a graduate program.

Graduate applicants who do not fully satisfy all admission criteria as to grades, test scores or other credentials, but do show sufficient promise to qualify for a trial period of graduate study may be admitted on probation to the Institute. Such students must achieve a 3.0 ("B") program cumulative grade point average by the end of their first 12 quarter credit hours of graduate study. Those students who do not meet this criterion will be suspended. Responsibility for specific requirements and maintenance of the student's appropriate status rests with the department in consultation with the Admissions Office and the Registrar.

Evaluation of transfer credit (see p. 12) is made by the academic school or department in question and the College of Liberal Arts. For students applying to the College of Continuing Education, transfer credit will be evaluated within that college.

Graduate programs specialized and diverse



RIT President M. Richard Rose

RIT proud of link with Rochester

"RIT means access to employment and significant contributions to the community for thousands of young people and adults," says President M. Richard Rose. "For those of us who work and study here, RIT is a dynamic and progressive university that always has been willing to take those extra steps necessary to maintain relevant career and professional programs.

"RIT continues to provide opportunities for its alumni to improve themselves and their families educationally, professionally, financially and socially.

"In many ways, RIT also symbolizes much of what we find so desirable about our community, particularly through its attractive blend of tradition, culture, innovation, business and education.

"In many ways, RIT has grown hand-in-hand with greater Rochester itself. Its very roots are in the area's early industry, and we share the city's pride in 1984, its sesquicentennial year. Our link to business and industry can be seen in our broad array of College of Continuing Education programs, focused on assisting individuals in career advancement.

"This link with greater Rochester's history and growth also makes RIT a special place for the entire community. It's a link of which we're very proud. We hope you will share in this pride as RIT provides access to the future."



Dr. Paul Bernstein

"RIT is a highly specialized institution and our graduate program is a reflection of that," says Dr. Paul Bernstein.

"The hallmark of our overall graduate program is the diversity of the individual programs," he says.

Bernstein is dean of Graduate Studies. He received his bachelor's and master's degrees in education from Temple University, and his Ph.D. in history from the University of Pennsylvania, and has been at RIT since 1966.

"Each of our graduate programs is built as a freestanding unit," he says. "As such, they are designed to fill a specific need in a given field of study.

"As a need developed in a specialized field and RIT felt it could satisfy that need, a program was developed," he says.

"Good examples of that are the materials science and MBA programs. We perceived a real need for people in this area from our discussions with business and industrial leaders, and then proceeded to develop these interdisciplinary offerings with their encouragement."

Costs

On the date of publication, the tuition for graduate students pursuing a master's degree is:

Full-time (12-18 credit hours)—
\$2211/quarter

Part-time (11 credit hours or less)—
\$188/credit hour

Master of Science (CCE)—
\$147/credit hour

Internship*—\$69/credit hour

In addition, any graduate student carrying over 18 credit hours of study will be charged the full-time tuition rate plus \$188/credit hour for each hour of study exceeding 18.

All full-time graduate students are required to pay a Student Activities Fee of \$15 per quarter.

Tuition and fee payments are due on the following dates:

Fall Quarter, August 15, 1984;

Winter Quarter, November 1, 1984;

Spring Quarter, February 7, 1985;

Summer Quarter, May 7, 1985.

These due dates are rigid. If payment is not received by the date stated, the student must appear at the registration day for the quarter desired. (See calendar on inside front cover.)

The Institute Reserves the Right to Change Its Prices Without Prior Notice. Nonmatriculated students are charged graduate rates for graduate courses.

**Applied only to the internship portion of the master of engineering degree in the College of Engineering, the industrial research option of the MS degree in the Department of Chemistry and the External Research Option in the MS in Clinical Chemistry in the Department of Clinical Sciences. It also applies to the MS degrees in business technology and career information in the College of Applied Science and Technology.*

Note: Matriculated graduate students enrolled in CCE or Day College undergraduate courses will be charged the Day College graduate tuition rate.

12-Month Payment Plan

For the 1984-85 academic year RIT offers a 12-month payment plan, which combines the elements of a prepayment/deferred payment plan. For further information about the plan, contact the Bursar's Office at (716) 475-6186, -6188.

Deferred Payment Plan

RIT has made arrangements for a deferred payment plan. With this plan you may defer no more than 50 percent of your quarterly balance. There is a flat rate finance charge for this plan. For further information regarding this plan, call the RIT Bursar's Office at (716)475-6186, 6188.

Refund Policies

Advance deposits are non-refundable. The acceptable reasons for the withdrawal with refund during the quarter are:

For a full refund

1. Active military service: A student called to active military service during the first eight weeks of the term may receive a full tuition refund. If called after the eighth week, he may elect to complete the course by making special arrangements with both his instructor and department, or to withdraw and receive a full tuition refund. If he withdraws, he will have to repeat the course at a later date.

2. Academic reasons: Students sometimes register before grades for the previous quarter are available. If such a student later finds that he or she is subject to academic suspension, or has failed prerequisites, the student will be given a full refund upon withdrawal. It remains the student's responsibility to contact his or her department to assure that the withdrawal form and refund are properly processed.

3. If part-time students drop a course during the Official Drop Period (first 10 days of classes during that specific quarter), they may contact the Bursar's Office for a 100% refund for that course dropped. Courses dropped after the Official Drop Period will not result in any tuition refund.

For a partial tuition refund

A student must officially withdraw or take a leave of absence FROM THE INSTITUTE in order to be eligible for a partial tuition refund.

A partial refund will be made during a quarter if withdrawal/leave of absence is necessitated for one of the following reasons:

1. Illness, certified by the attending physician, causing excessive absence from classes
2. Withdrawal for academic reasons at the request of the Institute during a quarter
3. Transfer by employers, making class attendance impossible
4. Withdrawal for academic or personal reasons at the request of the student, approved by the student's advisor or department representative, the Institute Coordinator for Academic Advising and the Bursar

These partial refunds will be made according to the following withdrawal schedule and percentage of tuition reduction.

During the first week of classes—
90% tuition reduction

During the second week of classes—
75% tuition reduction

During the third week of classes—
60% tuition reduction

During the fourth week of classes—
50% tuition reduction

Fifth and subsequent weeks—No
tuition reduction

Note: Non-attendance does not constitute an official withdrawal.

A student is not "officially withdrawn" until he or she receives the student's copy of the withdrawal form. The date on which a withdrawal form is properly completed shall be the date of "official withdrawal" used to determine the refundable amount. If a student drops his or her course load from full-time (12 or more credits) to part-time (less than 12 credits) status during the Official Drop Period, he or she may contact the Bursar for a refund based on the differential between the full-time tuition payments and the total per-credit-charge for the part-time load.

No refund will be made for classes dropped after the Official Drop Period unless the student is officially withdrawing from the Institute. Fees are not refundable.

Appeals process

An official appeals process exists for those who feel that individual circumstances warrant exceptions from published policy. The initial inquiry in this process should be made to Richard B. Schonblom, bursar. Unresolved matters will be referred for further action to William J. Welch, controller.

Room and board

To complete a withdrawal from RIT, a resident student or a non-resident student on a meal plan must check out with Housing and/or Food Service. Refunds, when granted, are from the date of official check-out.

Partial refund schedule:

1. Room
 - a. During the first week of classes
90% of unused room charge
 - b. During the second week of classes
75% of unused room charge
 - c. During the third week of classes
60% of unused room charge
 - d. During the fourth week of classes
50% of unused room fund
 - e. Fifth and subsequent weeks—
No refund
2. Board
 - a. During the first four weeks, 75% of
unused board charge
 - b. After the first four weeks, 50% of
the unused board charge

Fees

Fees are not refundable.

Financial aid

Fellowships and graduate assistantships are often available. Please write to the appropriate department chairperson or dean, or contact the Financial Aid Office (475-2186).

In addition, RIT Graduate Scholarships will be offered in 1984-85 in the colleges of Fine and Applied Arts, Continuing Education (applied statistics), Graphic Arts and Photography, Science, Applied Science and Technology, and Business. Additional funds are available for minority applicants. For information, write to the Dean of Graduate Studies, or call (716) 475-6523.

Tuition Assistance Program

New York State residents who show ability to pursue a full-time program may receive awards from \$100 to \$600 as a graduate student.

Other

Fees for all proficiency examinations in the MS degree programs offered by the Center for Community/Junior College Relations and the College of Business are charged at the rate of \$20 per quarter credit hour covered by the examination. Arrangements for such proficiency examinations are made through the director of the Center for Community/Junior College Relations.

Graduate degree programs

A master's degree at RIT may be obtained in programs ranging from accountancy to photography, from computer science and technology to environmental design. (Please refer to p. 7 for a complete listing of graduate programs of study.)

Upon completion of the stipulated requirements, a student's academic department certifies him or her for a degree. A statement of requirement completion will be listed on the transcript in the appropriate term. After commencement, a statement verifying that a degree has been awarded will be posted to the transcript. Degrees for fall, winter and spring graduates are mailed during the Summer Quarter. Degrees for summer graduates are mailed during the Fall Quarter.

The steps toward earning your degree

Graduate registration

Matriculated graduate students are those who have applied and been formally accepted into a graduate program through the Office of Admissions. Such students may register for graduate level courses (700-800) that fit their home department approved programs. When registering for graduate courses outside the home department, not in the normally approved program, the approval of the department offering the course is also necessary.

Non-matriculated (undergraduate or graduate) students will be allowed to take graduate courses with the department's approval and with the knowledge that the course work completed while a non-matriculated student may not apply to any given baccalaureate or master's program.

Matriculated and non-matriculated graduate students may register for undergraduate level courses with the understanding that these courses may not always apply to an RIT master's program. In certain cases, where educationally sound programs will result, appropriate undergraduate courses as approved by the faculty advisor and by the department may be included in a master's program. However, no more than nine undergraduate quarter credit

hours (600 level or below) may be applied toward the 45 quarter credit minimum (12 undergraduate hours for those programs requiring 48 or more quarter credit hours). Where undergraduate work is allowed, it must be well planned and closely controlled. Careful and well-informed advisement should be employed to assure a quality program. In the majority of cases, most, if not all, course work will be at the graduate (700-800) level.

Credit requirements

The minimum credit requirement for a master's degree is 45 quarter (or 30 semester) credit hours. Students should refer to the section covering the college in which they will enroll to earn the credit hour requirements. At least 36 of these quarter credit hours must be earned at the graduate level in residence at the Institute.

External master's degree programs allow for varying amounts of acceptable graduate transfer credits. Thus, the residency requirement may be decreased, if approved by the Graduate Council and vice president for academic affairs. Other exceptions pertaining to a group of students must be approved by the Graduate Council.

Transfer credit

A maximum of nine quarter credit hours in a 45 credit hour program or 12 quarter credit hours in a 48 credit hour program or more may be awarded as transfer credit from other institutions (except for the external degree offered through the Center for Community/Junior College Relations). A request for transfer credit must be made at the time of application for graduate student status. Only a grade of B (3.0) or better may be transferred.

Transfer credits are not calculated in the student's Grade Point Average (GPA) but will count toward overall credit requirements for the degree. Transfer credits do not count in the satisfaction of residency requirements.

A graduate student who wishes to take work at another institution and transfer it to his or her degree work at the Institute must obtain prior permission.

Thesis requirements

Included as part of the total credit hour requirement may be a research and

thesis requirement as specified by each department. Some departments have requirements in place of a thesis. 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 the student's 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 thesis must be recorded on the student's permanent record.

Candidacy for an advanced degree

A graduate student must be a candidate for an advanced degree for at least one quarter prior to receipt of the degree.

The position of the Graduate Council is that a student is a candidate for the master's degree when he or she has been formally admitted to the Institute as a graduate student.

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

Summary experience

The Graduate Council regards some form of integrative experience as necessary for candidates of advanced degrees. Such requirements as the comprehensive examination, the oral examination of the thesis and a summary conference are appropriate examples, provided they are designed to help the student integrate the separate parts of his or her total experience. The nature of the experience will be determined by the individual college or department.

Overlapping credit for second degree

At the discretion of the Graduate Committee in the specific degree area, 9-12 previous master's quarter credit hours can normally be applied toward satisfying requirements for a second mas-

ter's degree. The use of a given course in two different programs can be allowed only if the course that applied for credit toward the first degree is a required course for the second degree. The course must be used in both programs within five years; i.e., no more than five years between time used for first degree and applied again toward second degree.

In no case shall less than the minimum 36 quarter credit hours of residency be accepted for the second degree. If duplication of courses causes a student to go below the 36-hour limit in the second degree program, he or she would be exempted from these courses but required to replace the credit hours with departmental^A approved courses. An RIT student will not be admitted through the Admissions Office to the second degree program until the first program has been completed.

Financial standing

Tuition and fees paid to the Institute cover approximately 60-70 percent of the actual expense of a student's education. The rest of the cost is borne by the Institute through income on its endowment and from the gifts of alumni and other friends.

Students, former students, and graduates are in good financial standing when their account is paid in full in the Bursar's Office. Any student whose account is not paid in full will not receive transcripts, degrees or recommendations from the Institute.

The Institute reserves the right to change its prices without prior notice.

Summary of requirements for master's degree

1. Successfully complete all required courses of the Institute and the college. These requirements should be met within **seven years** of the date of the oldest course counted toward the student's program. Extensions of this rule may be granted through petition to the Graduate Council.
2. Complete a minimum of 45 quarter credit hours for the master's degree. At least 36 quarter credit hours of graduate level course work and research (courses numbered 700-800) must be earned in residence at the Institute.
3. Achieve a program cumulative grade point average of 3.0 (B) or better. (See p. 13 for further details.)

4. Complete a thesis or other appropriate research or comparable professional achievement, at the discretion of the degree granting program.

5. Pay in full, or satisfactorily adjust, all financial obligations to the Institute.

Note: The dean and departmental faculty can be petitioned, in extraordinary circumstances, to review and judge the cases of individual students who believe the spirit of the above requirements have been met yet fall short of the particular requirement. If the petition is accepted and approved by the faculty, dean and vice president for academic affairs, a signed copy will be sent to the registrar for inclusion in the student's permanent record.

Definition of grades

Grades representing the students' progress in each of the courses for which they are registered are given on a grade report form at the end of each quarter of attendance. The letter grades are as follows:

A Excellent

B Good

C Satisfactory

D and F grades do not count toward the fulfillment of program requirements for a master's degree.

The grades of all courses attempted by graduate students will count in the calculation of the program cumulative grade point average. This program cumulative grade point average shall average 3.0 ("B") as a graduate requirement. The dean of the college or his designee must approve all applications for graduate courses a student wishes to repeat.

Quality points

Each course has a credit hour value based on the number of hours per week in class, laboratory or studio and the amount of outside work expected of each student. Each letter grade yields quality points per credit hour as follows:

A 4 quality points

B 3 quality points

C 2 quality points

D 1 quality point

E and F count as 0 in computing the grade point average (GPA). The GPA is computed by the following formula:

$$\text{GPA} = \frac{\text{total quality points earned}}{\text{total hours}}$$

There are other evaluations of course work that do not affect GPA calculations. Only I, W and R (as described below) can be assigned by individual faculty members at the end of a quarter.

Registered (R)—a permanent grade indicating that a student has registered for a given course but has yet to meet the total requirements of the course or has continuing requirements to be met. The grade is given in graduate thesis work.

Completion of this work will be noted by having the approved/accepted thesis title, as received by the registrar from the department, typed upon the student's permanent record. Full tuition is charged for these courses. "R" graded courses are allowed in the calculation of the residency requirement for graduate programs.

Incomplete (I)—this grade is given when the professor observes conditions beyond the control of the student such that the student is not able to complete course requirements in the given quarter. This is a temporary grade that reverts to an F if the registrar has not received a "change of grade" form from the professor by the end of the second succeeding quarter. Full tuition is charged.

Withdrawn (W)—will be assigned in courses from which a student withdraws after the second week of classes or if a student withdraws from all courses in a given quarter. A student can change from credit to audit or from audit to credit status for a course only during the first 10 days of classes.

Audit (Z)—indicates a student has audited the course. The student need not take exams and full tuition will be charged. Audited courses do not count toward the residency requirement.

Transfer (T) (credit)—assigned through the admission process and, possibly, through later review (see p. 12 for details).

Credit by examination (X)—assigned for the successful completion of various external or Institute examinations provided such examinations cover or parallel the objectives and content of the indicated course. Credit must be assigned in advance of any credit received through registration for the indicated course. X graded courses do not count toward the residency requirement. A maximum of 12 quarter credit hours is allowed for graduate courses.

Exceptions to the maximum transfer credit or credit-by-exam for graduate programs can be granted by the dean of Graduate Studies in unusual circumstances upon appeal from the dean of the college involved.

Waived—Waived courses are those courses eliminated from the list of requirements that a student must take to graduate. For graduate students, required courses may be waived because of previously completed academic work, but in no case shall the resulting graduate program requirements be reduced below 45 quarter credit hours. In addition, waiver credit for graduate courses can be applied only towards required, not elective, courses. The process of waiving courses and thereby reducing graduate program requirements is not to be confused with the process of exempting certain requirements that are then replaced by an equal number of credit hours, thus retaining the total number of credit hours in the specified program.

Changing grades—once a grade has been reported by a faculty member it is not within the right of any person to change this unless an actual error has been made in computing or recording it. If an error has been made, the faculty member must complete the appropriate form, and the completed form must be approved by the head of the department in which the faculty member teaches and the head of the department enrolling the student. When approved by both of these individuals, the form is to be forwarded to the registrar. There is, however, an appeal procedure for disputed grades through the Academic Grievance Committee of the college in which the course was offered, with final appeal to the Institute Hearing and Appeals Board.

Academic probation and suspension

Any matriculated graduate student whose program cumulative GPA falls below a 3.0 after 12 quarter credit hours or subsequently will be placed on probation and counseled by the departmental advisor concerning continuation in the graduate program.

Those students placed on probation must raise their program cumulative GPA to the 3.0 level within 12 quarter credit hours or be suspended from the graduate program.

Should it be necessary to suspend a graduate student for academic reasons, the student may apply for readmission to the dean of the college or his designee upon demonstration of adequate reason for readmission.

Student Services

The Wallace Memorial Library

Wallace Memorial Library is a high technology, multimedia resource center with a collection of over 340,000 items. Included in the holdings are 2,700 journal subscriptions, 17,000 theses, 122,000 microforms, 1,700 cassettes, tapes and records, and over 200,000 books. Access to the collection is provided through an online computer catalog. Services include interlibrary loans, computerized literature searching of commercial data bases, class instruction, individual taped tours and access to the Archives and Special Collections Room.

The library also contains a special collection of materials on the deaf to serve the National Technical Institute for the Deaf. Supplementing the main library is the Graduate Chemistry Library in the College of Science.

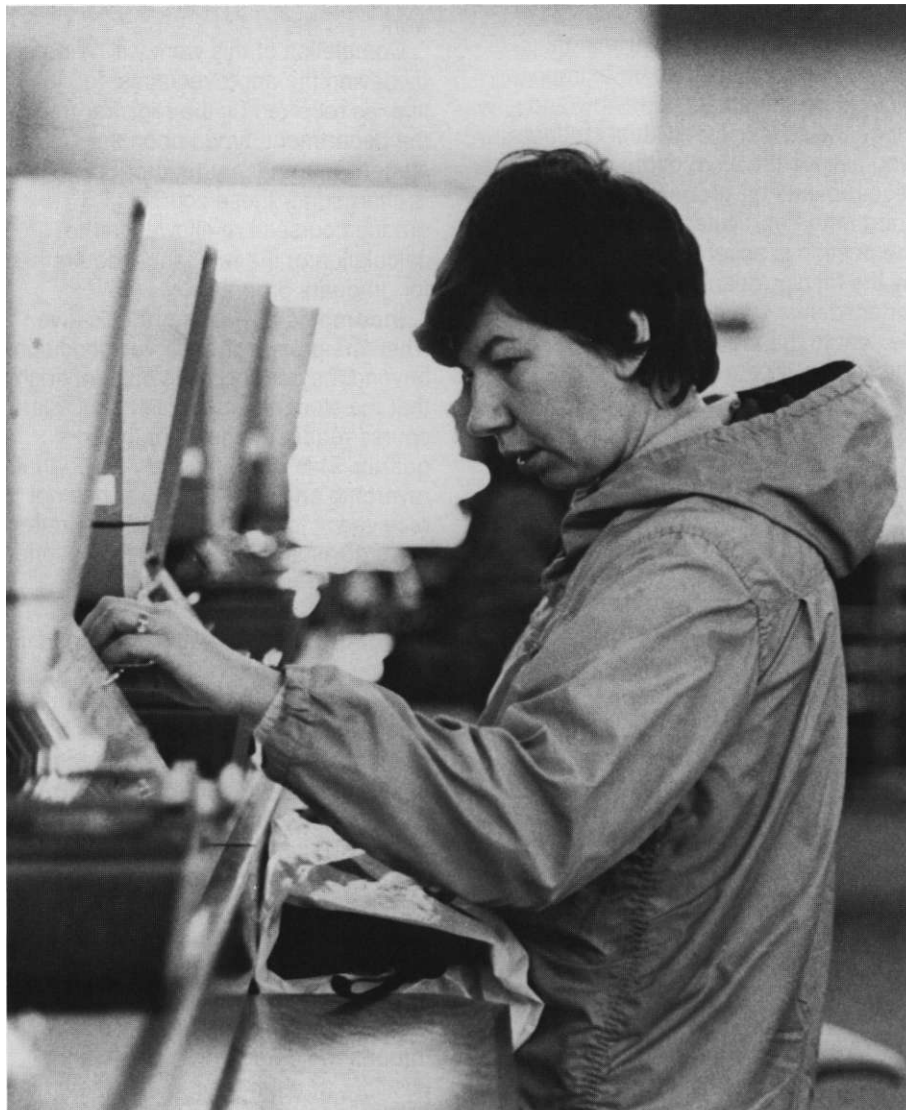
The Media Resource Center located just inside the library entrance on the main level contains a variety of audio-visual equipment and non-print media for individual use. In addition, the center contains more than 70,000 slides. Preview facilities and study carrels are also provided.

The Audiovisual Service Department houses a collection of nearly 400 films and provides materials, equipment, and assistance for classroom instruction. Approximately 3,500 films are shown in classrooms each year.

The library is open over 100 hours a week with extended hours before finals.

Reference librarians are available during the week and on weekends to provide individual assistance, and a special instruction librarian offers service for the hearing-impaired and disabled. The Center for the Visually-Impaired houses a Kurzweil Reading Machine and other aids.

For additional information call 475-2562.





Counseling Center

The Counseling Center, located in Grace Watson Hall, offers a variety of services to RIT graduate students.

These services include:

- Personal Counseling
- Career Counseling
- Career Resource Center
- SIGI
- Testing
- Research
- Developmental Programs
- Consultation

Counseling Center hours are 8:30-4:30, Monday through Friday and 8:30-8:30, Wednesdays. For more information about Counseling Center services, call 475-2261.

Learning Development Center

The Learning Development Center provides individual and group instruction in efficient reading, study procedures, mathematics and writing skills. These services are available at no additional charge during the day to all graduate students of the Institute and may be scheduled at the center, located on the second floor, north end, of the administration building.

Child care

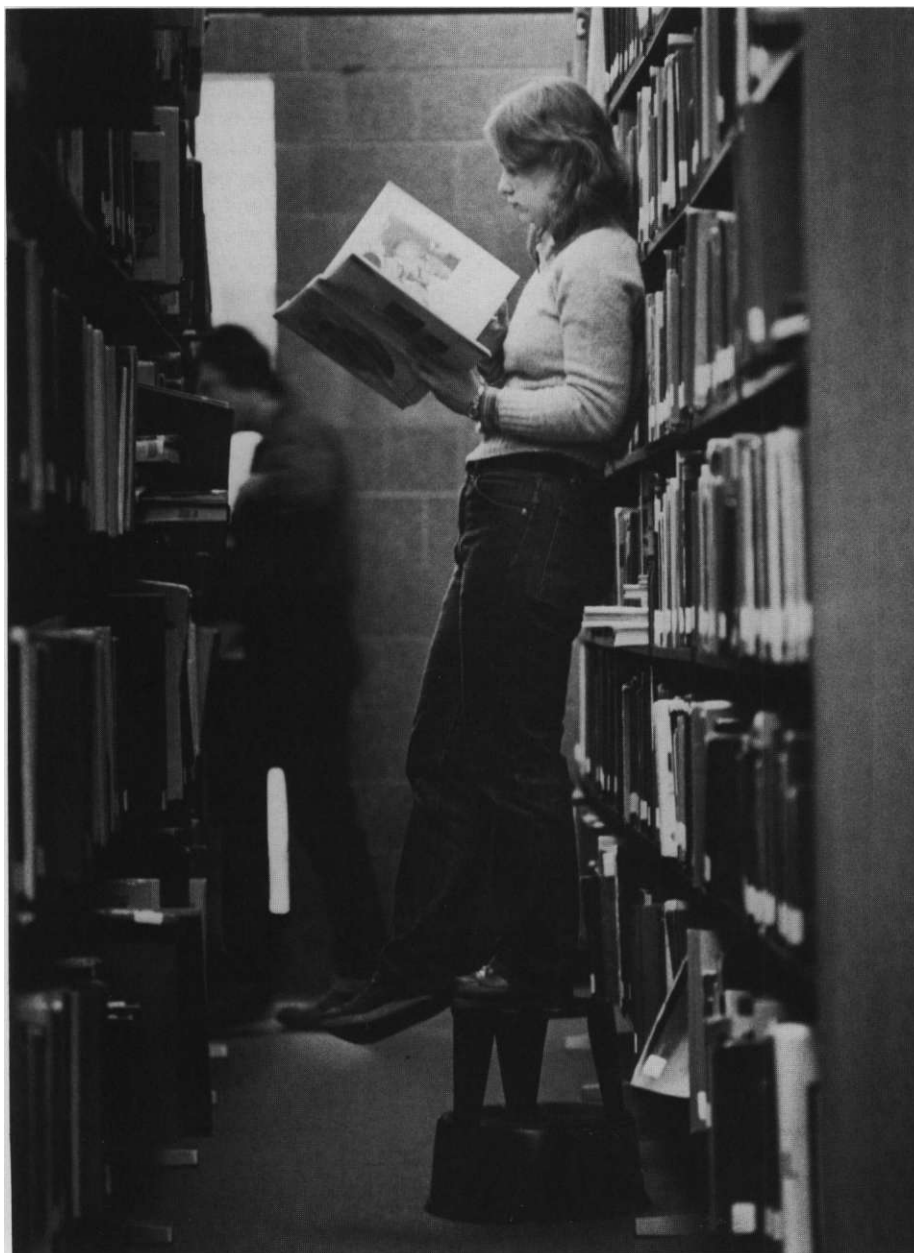
RIT's Horton Child Care Center offers preschool and kindergarten programs for the children of students, faculty, and staff. For complete information, call (716)424-1244.

Housing

RIT has four campus apartment complexes on the campus for both married and single students. You should apply through the Office of Off-Campus and Apartment Life, Rochester Institute of Technology, P.O. Box 9887, Rochester, N.Y. 14623. This should be done at your earliest convenience.

The residence halls are designed and programmed primarily for undergraduate students. Due to increased enrollment and the number of returning students living in the halls, they have been filled beyond capacity for the past several years. Entering students are frequently tripled.

There are several large apartment complexes within a short distance of the campus. Please call the Residence Life Office at (716) 475-2572 for information.



Identification cards

You'll need an RIT identification card to use any campus facility.

You apply for your identification card at the time of your first registration.

For further information, call the ID office at 475-2125.

Automobile registration

Those students having automobiles on campus must register these vehicles with Campus Safety at the time they first register for classes, or upon bringing the automobile onto campus for the first time.

Enrollment of veterans

Courses and programs at the Institute are approved for the education of veterans under the Veterans Readjustment Benefits Act, the Rehabilitation Acts, and War Orphans Act.

To receive benefits, an eligible veteran or dependent must submit an application for the VA "Certificate of Eligibility." This application must be sent to the VA Regional Office in Buffalo, N.Y., well in advance of the beginning of the starting quarter. These applications are available at your local VA Office or on campus from the Veterans Affairs Office.

Visit the Veterans Affairs Office and complete the necessary forms to ensure your benefits will arrive on time for the beginning of school.

Students who have been receiving benefit payments at other institutions or while participating in a different program and wish to transfer into one of RIT's many programs will be required to complete and submit a "Request for Change of Program or School" form.

To ensure a smooth transition and successful academic program completion at RIT, start your benefits paper work early. For benefits assistance or information, call the Veterans Affairs Office at 475-6641.

Emergencies; Escort Service

In case of emergency (fire, injury) the Institute's 24-hour emergency number 475-3333, should be called. For routine security services, 475-2853, which is staffed 24 hours a day, should be contacted.

Center for Cooperative Education and Career Services

RIT's particular philosophy is called career education—and The Center for Cooperative Education and Career Services supports the Institute's commitment to preparing students for "the making of a living and the living of a life." We made a commitment to career education as early as the 1880s. Our friends called it a bright new idea; we called it common sense.

Since 1912 RIT has developed one of the country's largest and strongest co-op programs. Students and employers alike look to the program as a beginning experience with that potential employee in that particular company. Many co-op positions lead directly to permanent positions upon graduation. Other students find permanent positions through the outstanding on-campus recruitment program, bringing employers and students together in a professional environment for interviewing. We think the center helps the student have an edge over the competition when graduation arrives.

Graduates, co-op students and alumni find the services of The Center for Cooperative Education and Career Services a boon in the career development and career entry process. Individual career counseling, group skills sessions, reference/credential services, job listings, use of resource library, and on-campus interviewing provide a steady linkage from campus to the workplace. The center provides these services to students at no fee. All students approaching graduation are encouraged to attend one of the many orientation sessions to the use of the center and register for use of all services during the important job-search period. Graduate students often seek their counselors in the center early in the graduate program. Those students know that the employer seeking qualified graduates with an advanced degree contacts the center for job listings and interviews with graduate students. The Center for Cooperative Education and Career Services is committed to linking RIT students to career experiences and to career entry upon graduation.

Student Health Service

Student Health Service provides primary level medical care on an outpatient basis. The staff includes physicians; medical nurse practitioners; registered nurses; and an interpreter for the deaf. Some specialties—psychiatry, gynecology—are available on campus by appointment. In addition, Student Health Service provides health education programs.

Student Health Service is located on the second floor of the George Eastman Memorial Building. Students are seen on a walk-in basis (Monday through Friday, 8:30 a.m. to 4:00 p.m.; to 4:30 p.m. for emergencies). Appointments for follow-up treatment are arranged when necessary. A registered nurse is on duty in Nathaniel Rochester Hall in the evening.

For emergency transportation, the RIT Ambulance is available. The unit can be reached through Campus Safety at 475-3333.

Payment of a quarterly Student Health Service fee is mandatory for all full-time undergraduate students. All other students may pay either the quarterly fee or on a fee-for-service basis. Some laboratory work ordered through Student Health Service is not covered by this fee; there is a nominal charge for this service. Prescription medicines may be obtained from local pharmacies through Student Health Service, but the health fee does not include prescription medications.

The Institute *requires* students to maintain health insurance coverage as long as they are enrolled at RIT. Students may obtain coverage either through RIT or their own insurer.

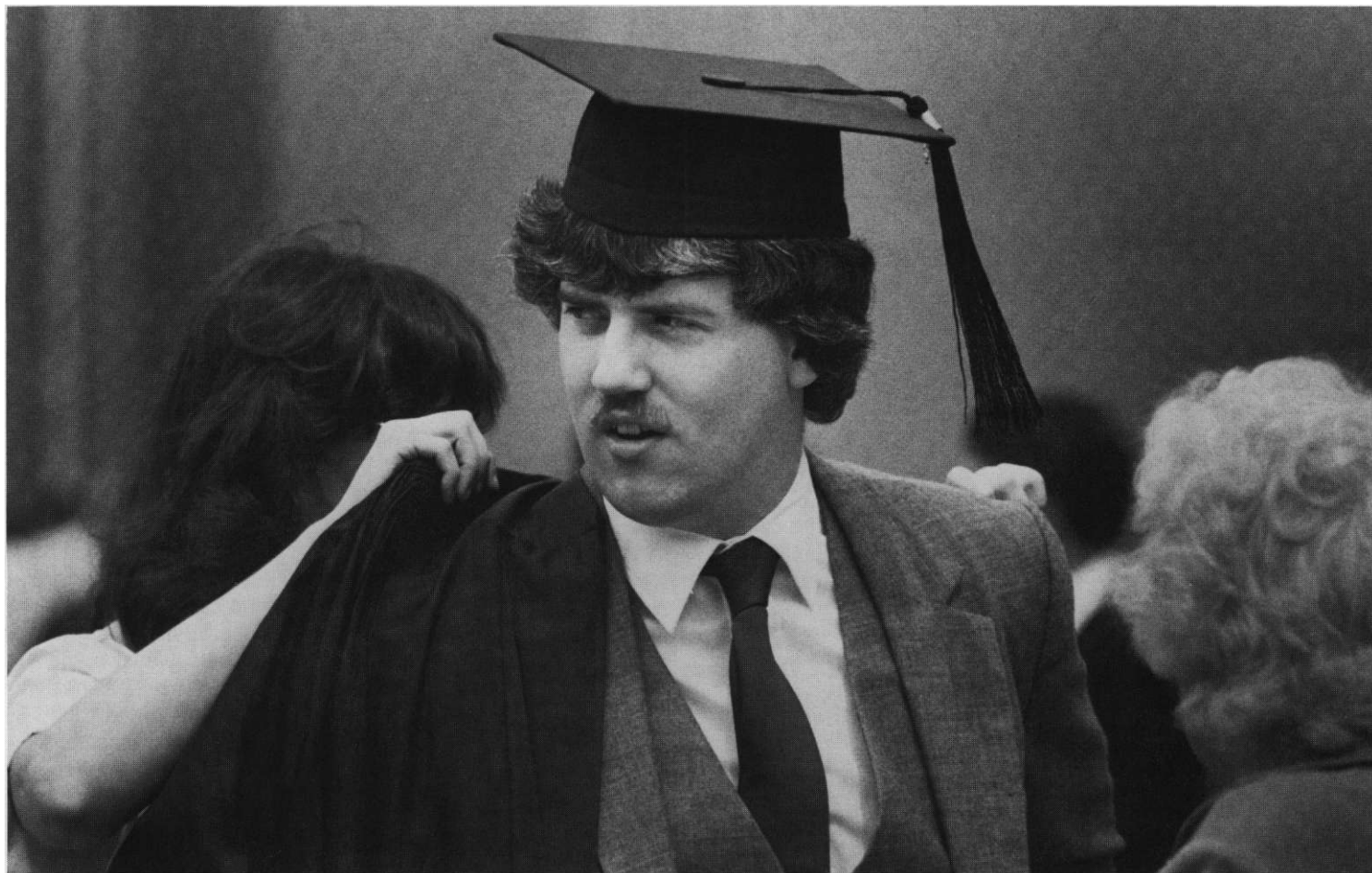
Questions about Student Health Service or health insurance should be directed to the office (475-2255).

Health records: Medical records are confidential. Information will not be released without the written consent of the student. Exceptions to this rule are made only when reports are required by the public health laws of New York State.

Institutional and civil authority

Students must recognize that they are members of the local, state and federal communities, and that they are obliged to live in accord with the law without special privilege because of their status as students or temporary residents.

Course Numbering



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

In addition to its title, each course is identified by two numbers.

The alpha-numeric directly to the left of the course title is the official Institute course number. The number will appear on grade reports, transcripts, and other official correspondence. This is what the alpha-numeric means:

First letter: College offering the course

Second and Third letters: School or department of that college

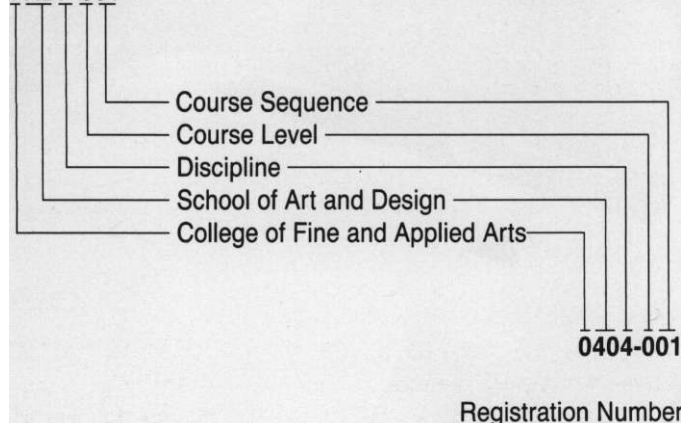
Fourth letter: Discipline

First number: Course level: 0 = Non credit; 1 = Diploma; 2 or 3 = Lower level degree courses; 4, 5 or 6 = Upper level undergraduate degree courses; 7 or 8 = Courses for graduate credit.

Second and Third numbers: Course differentiation and sequencing

Course Number

FADF-001



Directly below the alpha-numeric in the course description is the **registration number**. You must use this number with a section number (i.e., 01, 02) when you register for a course, because the alpha-numeric cannot be read by the computer system. Course prerequisites are shown in parentheses after course descriptions.

College of Applied Science and Technology

Dennis C. Nystrom, Dean

Higher education in any of the technological disciplines requires commitment of both the student and the institution. The academic areas within the College of Applied Science and Technology represent RIT's commitment to curricular innovation, program flexibility and academic rigor. The College of Applied Science and Technology is composed of six units: School of Computer Science and Technology, Department of Instructional Technology, Department of Packaging Science, School of Engineering Technology, Department of Career and Human Resource Development, and School of Food, Hotel and Tourism Management.

Many College of Applied Science and Technology programs are academic leaders in the regional, state, or even national educational communities. Students entering computer science have three graduate programs from which to select; others will follow in succeeding years. The career and human resource development program provides a sound background for this emerging quantitative field. Programs in instructional technology answer the demand for skilled and professional systems oriented training and educational technologists. The master's program in packaging science was added in response to demand from industry for people with graduate education in packaging.

The following graduate programs are currently offered in the College of Applied Science and Technology.

Master of Science degree in Career and Human Resource Development

This program provides the necessary courses and internship experiences to enable the graduate to serve in a variety of positions related to career education and human resource development. Extensive use is made of persons from personnel and training, as well as other employment areas in business, industry, and education. Serving as faculty members and internship supervisors, they bring to the courses the practical as well as the theoretical sides of their professions. Upon completion of the program, the graduate has a well-rounded knowledge of the goals, procedures, and fundamentals of various career fields. Full- or part-time study is available.





Master of Science degree in Computer Systems Management

This curriculum, the first of its kind in the United States, is designed to prepare competent personnel for the management of computer installations. Graduate management courses and computer courses are combined in such a way that the student concentrates in areas where he or she has the least experience, and is strengthened in those areas of knowledge already acquired. Both full-time and part-time students are enrolled in this curriculum.

Master of Science degree in Computer Science

Graduates of computer science, science, engineering, or business programs who wish to pursue advanced technical and theoretical studies in the field, for purposes of employment or further graduate study at the doctoral level, will find this curriculum offers the opportunity to tailor a program that will satisfy their goals. Both day and evening courses are available.

Master of Science degree in Information Science

The newest program offered by the School of Computer Science and Technology, Information Science, is designed to prepare the graduates for work in those areas of business, industry and education where information is managed by data systems. The

students coming from other educational programs will be given sufficient computer studies to move into automated data information positions in their academic field.

Master of Science in Instructional Technology

Instructional Technology is a general name that covers the development of training and instruction in a variety of work areas. RIT graduates are employed in business, industry, educational institutions and health institutions. RIT's instructional technology program offers a graduate degree emphasizing instructional development with possible options in training and development, higher education, and allied health. The program may be pursued on a full- or part-time basis and allows flexibility in the selection of electives to meet individual needs. Most courses are offered in the evening hours to enable those already employed to pursue a degree.

Master of Science degree in Packaging Science

This graduate program is a natural extension of the undergraduate curriculum, and is one of only a very few graduate curricula in the U.S. Students completing undergraduate studies may continue the study of packaging at a more intensive level, and those who are already working in industry can use the program to enhance career develop-

ment or allow for concentrated study in an area of interest. There is enough flexibility in curriculum requirements to tailor programs to suit individual need. Courses are generally offered late in the day so that people presently employed full-time may pursue the degree.

Department of Career and Human Resource Development

Clint Wallington, Director

This program has been designed to provide graduates with the background necessary to help organizations better utilize human resources, to plan and implement career education programs, and to help individuals make career choices. The program combines elements of business, guidance, adult learning, statistics, and automated information systems to meet the demands of the emerging human resources field.

Two concentrations are offered to provide the student with the knowledge that is needed for a career in either the private business and industrial sector or in community based organizations and educational institutions.

Students who choose the human resource development concentration

will be prepared to function in broad-based human resource development activities in the business and industrial sector. Skills in human resource forecasting, differential statistics, management development, labor relations, and automated information systems are coupled with core competencies in career decision making and counseling. The basic functions of business are also covered. Emphasis is placed on the development of qualified career development experts who possess basic personnel administration competencies.

The students who choose the career education concentration will learn to help clients investigate career options, identify the skills and interests needed for various jobs, and translate career trends and opportunities into valid and reliable information. The student also will understand group dynamics and basic counseling skills. In addition, the program will provide useful skills in conducting new program feasibility studies, planning curriculum, and teaching or facilitating career education programs. Potential employers include: community and junior colleges, four-year colleges and universities, K-12 school systems, social service agencies, and career information centers.

The master's program consists of more than classroom work. Students must develop a major project relating to their career goals. Many have found exciting internships in major corporations. Examples of recent research projects include: a nationwide search to determine why engineers reject certain job offers, the organization and development of career resource centers, career advisement for adults in continuing education programs, and the development of position descriptions.

Admission requirements

Admission decisions for this program are based on the review of the baccalaureate degree, undergraduate grades, the Graduate Record Examination, interviews, a personal goal statement and work experience. Applicants should have at least three years of full-time work experience or the equivalent of part-time work. Interviews and the personal goals statement are evaluated as they relate program goals to the individual's inclinations and aptitudes for functioning as a career development specialist.

Graduate assistantships

A limited number of departmental assistantships are sometimes available on a quarterly basis. These assistantships are for full-time students and involve 15-20 hours of work per week.

Degree requirements

A minimum of 52 quarter hour credits of combined required and elective courses is required for the degree. A maximum of 12 quarter hour credits may be transferred from other graduate institutions.

A full-time student who enters the program in the summer or the fall quarters and who has the necessary prerequisites should be able to complete the degree in four consecutive quarters if he/she starts in the fall quarter. Many students, however, are part-time students and pursue their degree work over a period of two or three years.

Most courses are offered in the evening and on Saturday to enable students to work as they attend classes. Students are individually advised and should develop a program of coursework upon acceptance in the program.

Curriculum foundation studies

Specific educational competencies that are expected of individuals in the program may be satisfied by prior documentable mastery in non-credit courses, approved experience, and competency examinations, and/or by graduate or undergraduate courses.

- A. Basic Statistics
- B. Basic Sociology
- C. Basic Psychology
- D. Basic Economics

Required Core

	Credits
0615-703 Management of Learning	2
0615-742 Career Decision Making Concepts	4
0615-745 Career Concepts: Production or Commerce or	
0615-746 Services (one course required)	3
0615-748 Information Retrieval Systems in Career Planning	4
0615-749 Manpower Forecasting Fundamentals	4
0615-760 Career Counseling Skills	4
0615-777 Career Development Project	2
0102-740 Organizational Behavior	4
0240-712 Fundamentals of Statistics II	3
Total	30

Concentrations

Students choose one concentration and follow the requirements indicated below.

Career Education

Concentration	Credits
0615-743 Education/Business/Industry Interrelationships	2
0615-745 Career Concepts:	
0615-746 (one course in	
0615-747 addition to the one taken as part of the required core)	3
0615-753 Group Dynamics for Career Development	3
Electives	14
Concentration Total	22
Credits from Required Core	30
Total	52

Human Resource Development Concentration

0102-741 Organization and Management	4
0102-748 Employee and Labor Relations	4
0102-750 Personnel Systems	4
Electives	10
Concentration Total	22
Credits from Required Core	30
Total	52

Suggested Electives

0615-751 Occupational/Industrial Environments	3
0615-752 Career Education in Colleges and Special Settings	3
0615-754 Human Resource Topics	1-3
0615-762 Career Education Seminar	3
0613-757 Techniques of Work Analysis	3
0613-770 Interpersonal Communications	2
0102-746 Management and Career Development	4
0102-755 Compensation and Reward Systems	4

Additional courses, especially those from the College of Business or the Department of Instructional Technology, College of Applied Science and Technology, may be used as electives with the approval of the program director.

School of Computer Science and Technology

Wiley R. McKinzie, Director
Peter G. Anderson, Chairman,
Graduate Studies

The School of Computer Science and Technology offers three graduate programs leading to the degrees described below. Graduate courses may be taken during late afternoon or evening through course offerings by the School of Computer Science and Technology.

The master of science in computer science program prepares students for a wide variety of computer related careers in business, industry, and academia. Graduates are prepared to work in computer systems software design, specification, applications, and education.

This option is particularly suited to individuals who already have a strong background in a field in which computers are applied, such as engineering, science, or business.

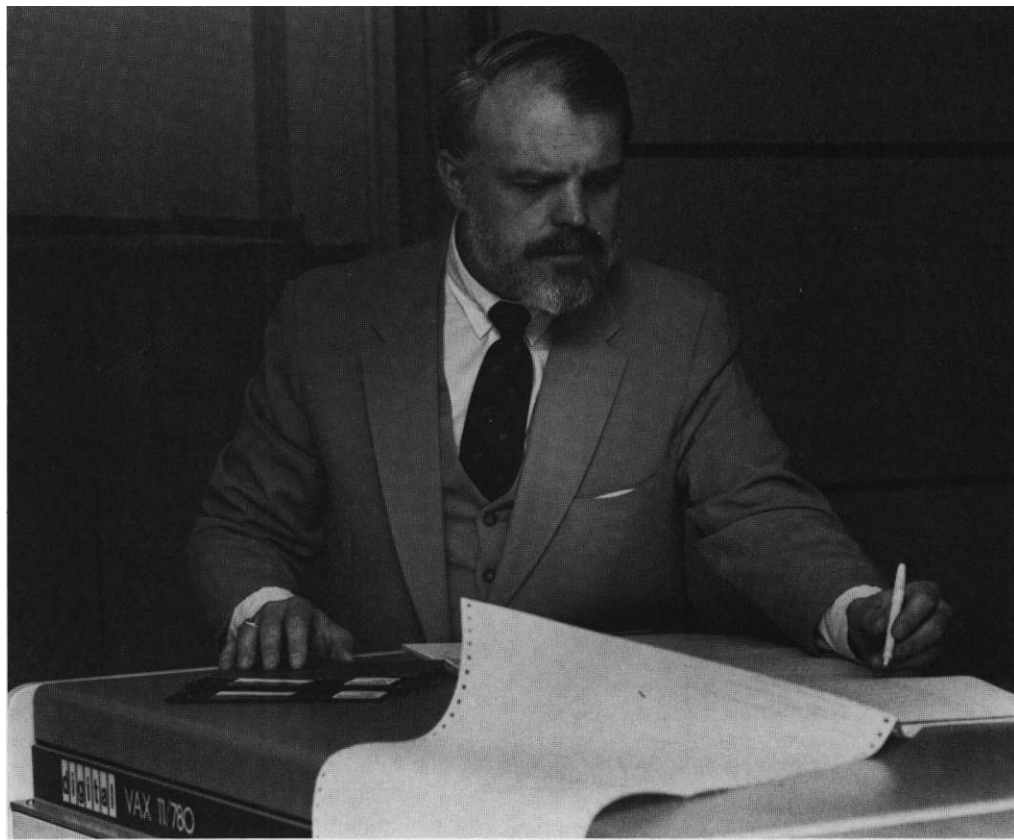
The master of science in computer systems management program is directed to individuals who will be taking positions in managerial leadership, managing data processing centers and leading programming projects.

The master of science in information science program provides students with a background in automated information systems. Specific emphasis is in the areas of data base systems, data management, information storage and retrieval, and data communications systems. Potential employers include public, university, and law libraries; medical information centers; and information vendors.

The sixth-year certificate program in information science is intended for persons with an MS in library science, or the equivalent, who need training in computer automated information processing.

Facilities

The School of Computer Science laboratory consists of an Ethernet connecting:



two VAX-11/780 systems,
two PDP-11 systems (11/34 and
11/70),
five MassComp MC-500 computer
systems,
two MC6800-based microcomputer
systems,
200 CRT terminals (half supporting
color graphics)

All of these computers run the UNIX (*)
operating system.

Our Digital Logic Lab is equipped
with several single-board microcom-
puters supporting courses and indi-
vidual student projects and theses.
Other lab facilities include graphics
workstations and personal computer
systems.

Among the programming languages
that are available on our systems are:
Awk, C, Efl, Fortran77, M4, Ratfor,
Ada(**), Apl, Prolog, Spitbol, Xlisp,
Lisp, Concurrent Euclid, Pascal,
Modula2, Macro-11, Fp, and Altran.

Computer science graduate students
have dial-in access to our systems and
are encouraged to use home terminals
and personal computers. (The RIT
Bookstore carries computer equipment
and software and provides discounts for
our students.)

Entrance requirements

The student's application to the
computer science graduate program
must indicate how the prerequisites
listed below have been met.

Undergraduate degree: The applicant
should have a baccalaureate or equiv-
alent degree from an accredited institu-
tion and a minimum cumulative grade
point average of 3.0 (B).

Computer science and mathematics:
Applicants must have a basic
competence in mathematics (college
algebra) and a familiarity with the
concepts and facilities of modern
computers (specifically, programming in
some high-level language such as
Pascal and programming in an
assembly language).

The Bridge Program

Students whose mathematics and
computer science backgrounds are
weak may prepare to enter the master's
degree program by completing the
following sequence of courses:

Mathematics (12 quarter credits):

SMAM-204 College Algebra

BBUQ-781, EIEI-715, or CTAM-711

Statistics

SMAM-265 or CTDS-230 Discrete

Mathematics

(*) UNIX is a trademark of AT&T.

(**) Ada is a registered trademark of the U.S.
Government-Ada Joint Program Office.

Computer Science (16 quarter credits):

ICSS-701 Programming I
ICSS-702 Programming II

A Bridge Program can be designed in ways different from that described above. Often other courses can be substituted, and courses at other colleges can be applied. (See the computer science "Graduate Studies Handbook" for more details.)

Financial Aid

Some graduate assistantships are available in the School of Computer Science and Technology. Information may be obtained from:

Graduate Studies Chairman
School of Computer Science and Technology
Rochester Institute of Technology
One Lomb Memorial Drive
P.O. Box 9887
Rochester, N.Y. 14623

The Curriculum

Graduate programs of study consist of four sections of courses: the Bridge Courses (courses named above), the Computer Science Graduate Core (and Business Core for CSM students), electives, and concentration and thesis area.

Students who have covered the material in their undergraduate programs may have one or more of the Bridge Course requirements waived.

The Computer Science Core is:

ICSS-706 Foundations of Computing Theory
ICSS-708 Computer Organization and Programming
ICSS-709 Programming Language Theory
ICSS-720 Computer Architecture
Computer systems management students also must take the following Business Core courses:
BBUA-701 Accounting Concepts for Management
BBUQ-780 Management Science
BBUB-740 Organizational Behavior
Information science students must take:
ICSS-836 Data Base Systems
ICSS-736 Data Base Systems Implementation

Electives: Elective courses provide breadth of experience in computer science and applications areas. Students may include graduate courses outside computer science in this section (e.g., science, engineering, or business). The following (as well as many other courses contained in this catalog) are typical computer science electives:

ICSS-610 EDP Auditing
ICSS-721 Microprocessors & Microcomputers
ICSS-730 Modeling & Simulation I
ICSS-744 Data Communications and Networks
EECC-655 Real-Time Computation
ICSS-770 Fundamentals of Computer Graphics
ICSS-809 Operating Systems I
ICSS-846 Information Storage & Retrieval
ICSS-852 Coding Theory

The concentration section consists of an integrated sequence of at least three courses and a related thesis. Four possible concentration areas are:

Applications of computer science data bases; simulation and modeling; computer graphics; data communications; artificial intelligence; information storage and retrieval.

Computing Systems

Computer, multiprocessor, and microprocessor architectures; real-time computing; operating systems and programming environments; languages and their implementation.

Mathematics of computer science coding theory; complexity; computability; theory of parsing; numerical analysis; graph theory.

Software Engineering

On-line system design; data processing administration; systems development; advanced computer utilization; software engineering and modern programming practices.

Students in the computer systems program form their concentration sequence as follows:

ICSM-719 Data Processing Administration
ICSM-725 Systems Development
ICSM-765 Adv. Computer Utilization

Students in the information science program form their concentration sequence as follows:

ICSS-846 Information Storage & Retrieval
ICSP-744 Data Communications & Networks I
ICSS-745 Data Communications & Networks II

Students' programs of study must be designed cooperatively with a graduate advisor.

The Master's Thesis

The thesis is the capstone of each graduate program. Before registering for ICSS-899 (thesis) a student must submit an acceptable thesis proposal to a three-member faculty committee.

Sixth Year Certificate Program in Information Science

This program is highly recommended for librarians and data managers who wish to enhance their knowledge in computer automated information systems. *A master's degree in library science or the equivalent from an accredited institution is required.*

Prerequisites and Required Courses: College mathematics (precalculus), programming in a high-level language (Pascal is recommended), and programming in assembly language are prerequisites. The following five courses (20 credits) are required:

ICSS-703 Algorithms & Data Structures
ICSS-708 Computer Organization & Programming
ICSS-709 Programming Languages
ICSS-836 Data Base Concepts
ICSS-846 Information Storage & Retrieval

Twelve credits of electives, chosen cooperatively with a graduate advisor, complete this certificate program.

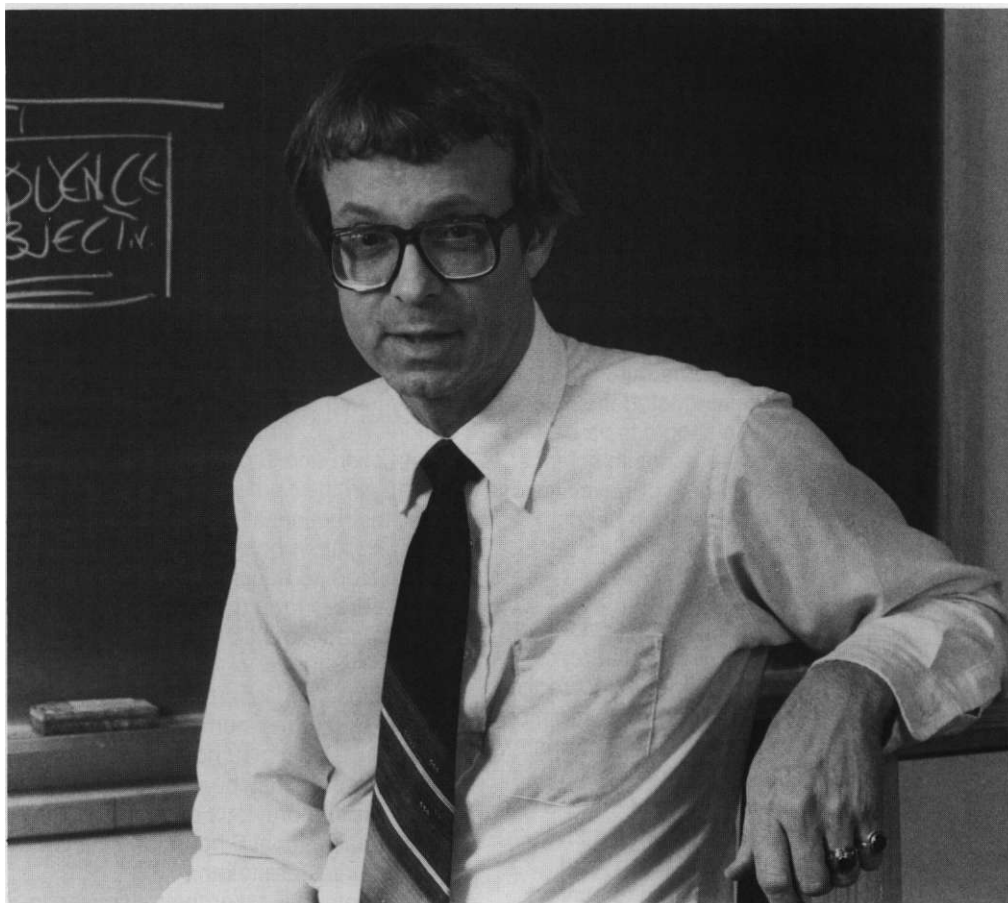
Clint Wallington, Director

Instructional technology is a broad field which includes the development of training programs and instruction in a wide variety of settings—business, industry, government, and education. Instructional technology is based on adult learning and a pragmatic systems approach to preparing training. As such, instructional technology includes needs assessment, instructional objectives, course and lesson development, the use of instructional techniques, and evaluation of training.

While the term "training" or "instructional program" can include training which ranges from a short seminar to an extended sequence of courses, instructional technology at RIT specializes in the development of course-sized programs, especially courses which teach technical skills for business and industry. There is an added emphasis on developing self-instructional courses which will provide the greatest return for the training dollar invested.

While the instructional technology program and its training and development option are primarily oriented toward business and industry, options in higher education and in allied health are available for those with appropriate backgrounds and interests. As a further alternative, a student seeking a more general background in instructional development may elect to choose from the various options and electives to develop a program option which best suits his/her needs.

The program has a practical orientation which also includes adequate coverage of the new information and theories of instructional technology. Students must complete an actual instructional development project and develop instructional modules as part of the project. The projects are intended to demonstrate competence in the student's selected career area. The department encourages each student to produce a portfolio of work that represents the skills acquired during his or her study for the MS degree. The port-



Photograph by Brian Snook

folio will contain such items as the needs analysis studies, evaluation plans, course development, and actual training materials.

Training and development option

The training and development option is designed primarily for trainers and developers in business, industry, and government. Organizations today are discovering an increasing need for effective and efficient training. Companies are developing technical skills training and are looking toward other training activities to increase workers' job satisfaction, motivation, and productivity. The training and development professional, a key figure in the development of instruction in these areas, must be proficient in analyzing training needs, designing effective and cost-efficient courses and training packages, setting up evaluation procedures, and maintaining information systems about the organization's training efforts. RIT's training and development option is designed to help students learn not only the instructional design and management skills but also the interpersonal communications skills vital to working on a training team.

As much as possible, experiential learning through work-related projects and internships is integrated into the program of study.

Higher education option

Community colleges, four-year colleges and universities are beginning to recognize the merits of instructional technology and instructional development, particularly in instances where the institution must increase productivity. Developed in conjunction with RIT's Career and Human Resource Development program, the higher education option emphasizes instructional development in the context of postsecondary education. As with the training and development option, students are required to complete a major project, either in their work outside the Institute or with RIT's own faculty development and media services.

Health science option

Instruction in the field of health science education is undergoing major changes. Health science training institutions are re-examining their goals, their students, and their instructional meth-

ods. Many are turning to instructional technology, particularly instructional development, as a way to improve their instruction. The instructional developer plays a key role in the development process. The Instructional Technology Department is concerned with training individuals to successfully apply the principles and processes of instructional technology in health science training—from nursing and medical technology to medicine and dentistry. Because of the nature of health science training, students interested in this option should have earned an academic degree in health science or a directly related field or have significant work experience in the health sciences.

Admission requirements

Persons interested in admission to the program must have a baccalaureate degree or equivalent from an accredited institution. Because it is not uncommon for a person to make a career change by pursuing the MS degree, the content area of the baccalaureate degree is not specified. A strong interest in instructional technology is assumed, and applicants are encouraged to contact the department for personal guidance.

As can be seen from the course listing, the department does not emphasize media production skills. Students entering the program are assumed to have some skill in or knowledge of media production. Students without these basic skills are encouraged to acquire them through course work or personal projects.

Applicants are evaluated on previous grade point average, the Graduate Record Examination, personal references, and previous work and school experience. Non-matriculated students may, with special permission, take 10 hours, or 3 courses (whichever comes first), before matriculation. Successful completion of the course does not change any requirements for entry into the program nor does the department necessarily count any such courses toward degree requirements. An individual interview with the department director prior to application is strongly recommended in order to clarify program requirements and personal goals.

Degree requirements

The degree requires the completion of 48 quarter hours at the graduate level. Of the 48 hours, 24 hours (8 core courses) are required of all students. Students taking a specific option—training and development, higher education, health science—must also meet the credit hour requirements of that option. No matter which option (if any) is chosen, students without previous training and development experience or instructional development experience should also take ICIT-755 and ICIT-756, Criterion Referenced Instruction and Technical Training I and II early in their programs. ICIT 750 and 751, Instructional Development I and II, must be taken before a student has completed 18 hours of the program.

The courses for a typical degree are:

Required Core Courses: 24 hours
CRIII: 3 hours

Options and Department Electives:
9 hours (minimum)

Free Electives: 12 hours (maximum)
CRI I and II may be waived on the basis of previous experience. If so, an additional 6 hours of elective courses are taken.

Students may tailor their electives to their own needs and career choice within the following constraints. Of the maximum hours (12 or 18) of free electives allowed: no more than 10 total hours may be taken in RIT departments outside of instructional technology; no more than nine graduate hours may be transferred from another college or university; no more than eight hours may be taken in any combination of special project courses—ICIT-722, -840, or -850.

A full-time student entering in the fall or summer quarter should be able to complete the MS degree in one year (usually four quarters, but sometimes three). Part-time students are welcome and will be able to complete their degrees during the evenings, when most courses are offered. Students are individually advised and should develop a tentative program prior to or immediately after acceptance into the program. All students must complete their program within **seven** years after the first course has been taken at RIT.

Application materials may be obtained from the department or from the Office of Admissions.

For further information, contact Dr. Clint Wallington, director.

Required Courses

	Credit Hours
Introduction to Instructional Technology I—ICIT-700	Variable credit, 2 required
Psychology of Learning and Teaching—ICIT-735	4
Instructional Development I—ICIT-750	4
Instructional Development II—ICIT-751	4
Criterion Referenced Instruction and Technical Training I—ICIT-755	3
Group Dynamics for Career Development—IJCC-753	3
Interpersonal Communications—ICIT-770	2
Selected Topics in Instructional Technology—ICIT-780	2

Training and Development Option

Core Courses (minimum 10 hours of courses below are required)

Applications of Behavioral Psychology to Training and Adult Learning—ICIT-736	4
Criterion Referenced Instruction and Technical Training I and II—ICIT-755 and -756	each 3
Techniques of Work Analysis—ICIT-757	3
Developing Instructional Modules—ICIT-758	3

Higher Education Option

Core Courses (minimum of 8 hours required)

Sources of Information in Instructional Technology—ICIT-705	3
Evaluation of Training and Instruction—ICIT-721	4
Management and Budgeting in Instructional Technology—ICIT-762	4
The Two-Year Colleges—IJCC-701	1-3
Education/Business/Industry Interrelationships—IJCC-743	2

Health Science Option

Core Courses (minimum of 8 hours required)

Evaluation of Training and Instruction—ICIT-721	4
Applications of Behavioral Psychology to Training and Adult Learning—ICIT-736	2 or 3
Criterion Referenced Instruction and Technical Training I and II—ICIT-755 and 756	6

Department of Packaging Science

David L. Olsson, Director

The master of science degree program in packaging science is designed to accommodate a wide range of needs of people in differing circumstances. It is flexible enough to meet the needs of professionals who have been working in the field for a number of years, and it is suitable for those students who wish to pursue a graduate program immediately upon receiving the BS degree.

In addition, although an undergraduate curriculum in packaging science is preferred as preparation for the MS program, graduates from certain other disciplines can successfully pursue this program if certain basic packaging science courses are coupled with appropriate work experience.

Requirements

Students entering the program will have a graduate academic advisor appointed and will develop their programs of study in consultation with their advisor. They may utilize the model curriculum to complete their degree requirements, or may propose alternative course work. All programs must be consistent with the general outline of the model curriculum, and have advisory approval. In instances where the student has insufficient academic or practical preparation to study packaging at the graduate level, he or she will work out an appropriate program to correct such deficiency, by selecting one or more from the following list of undergraduate courses: Packaging Principles, Materials I, Materials II, Container Systems, Production Systems, Packaging for Distribution, Packaging for Marketing, and/or Shock and Vibration. These courses may not be used for credit toward the MS degree.

Further, a basic competence in statistics and basic computer literacy will be assumed. Applicants for graduate study may satisfy these requirements by having completed the equivalent of CTAM-712, and having completed a course in a programming language.

Lacking this background, applicants will be required to take CTAM-711 and CTAM-712, and/or ICSP-205, or equivalent course work to remedy a background deficiency.

Application for admission for graduate study in packaging will be made through the RIT Office of Admissions. Final acceptance of the candidate for graduate study will be determined by the Department of Packaging Science. All applicants must (1) have earned a B (3.0) average grade in their final two years of undergraduate degree work, (2) submit transcripts of undergraduate work to the RIT Office of Admissions, and (3) submit two letters of recommendation to the Department of Packaging Science. Normally, completion of the last two years of the undergraduate degree program with a B average will serve to satisfy entrance requirements. In those cases where there may be some question of the capability of the applicant to complete this program of graduate study, he or she may be required to submit his or her scores on the Graduate Record Examination to support the candidacy.

The curriculum

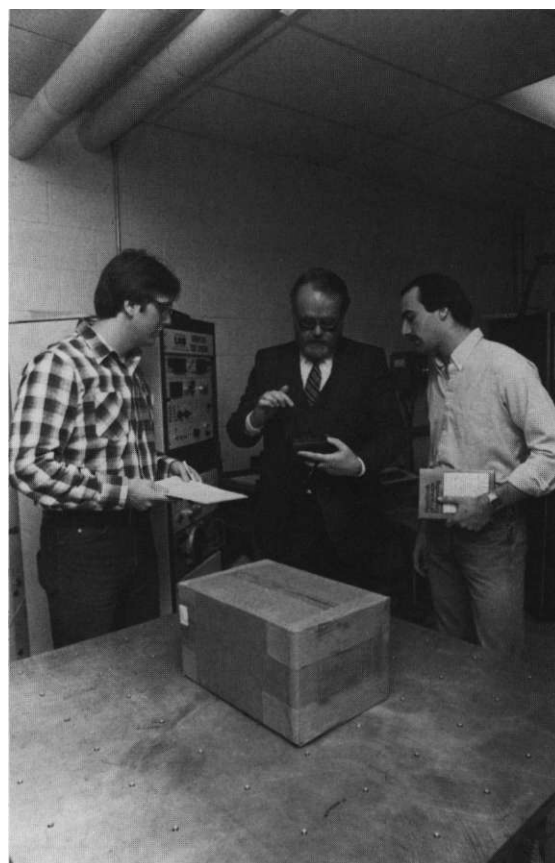
The curriculum is comprised of three components identified as (1) packaging core courses, (2) research, and (3) elective credit. The MS degree program requires completion of 48 credits of graduate-level course work, as follows:

Packaging core course work

Completion of a minimum of 20 credits in graduate-level packaging courses, including IPKG-701, Research Methods, and any four of the following:
 IPKG-721 Packaging Administration
 IPKG-731 Advanced Packaging Economics
 IPKG-742 Distribution Systems
 IPKG-750 Graduate Seminar
 IPKG-752 The Legal Environment
 IPKG-763 Packaging for End-Use
 IPKG-770 Computer Applications
 IPKG-783 Packaging Dynamics
 IPKG-799 Advanced Packaging Design

Research

Students in the master's program will be required to prepare and defend a 12-credit thesis which has been completed under the supervision of their advisor. They may also elect to take up to 8 credits of independent study credit, but this may NOT be used as credit towards the 20 credits of packaging core course work.



IPKG-798 Independent Study

1-4 credits, maximum of 8 credits; does not count as "core"

IPKG-890 Graduate Thesis

12 credits; required. The type of research done and the area of study will be agreed upon by the student and the advisor before enrolling for graduate thesis credits.

Elective credit

In addition to packaging core (20 credits, including Research Methods) and thesis (12 credits), each student will complete a minimum of 16 elective credits selected in consultation with the advisor, to complete the degree requirement.

In general, graduate-level course work will be selected to meet degree requirements, but, in limited circumstances, where individual need indicates that it would be appropriate, a limited number of 500-level undergraduate courses (not to exceed 12 credits, in total) may be used to fulfill elective credit.

Department of Career and Human Resource Development

All courses are offered on demand with sufficient enrollment.

Note: Graduate courses applicable to the program are also listed under the College of Business.

IJCC-701 The Two-Year Colleges

Registration #0615-701

The study of the philosophies, organizations, development, finance, goals, curricula, and spirit of the two-year college.

Credit 3

IJCC-702 Teaching, Learning, Content, & Environment

Registration #0615-702

Advising/counseling relationships, learning styles, student activities, motivations, developmental education, and the implications of the "open door" policy are investigated.

Credit variable (1-3 credits)

IJCC-703 Management of Learning

Registration #0615-703

Systems of curriculum planning and cognitive styles, goals, objectives, evaluation, measurement, and productivity are studied as they relate to the accountability of faculty, students, and administration.

Credit variable (1-6 credits)

IJCC-704 Instructional Techniques

Registration #0615-704

To develop professional competence in direct applications and uses of various learning styles, including television, special audiovisuals, prepared lectures, seminars, computer-assisted instruction, and programmed learning.

Credit variable (1-4 credits)

IJCC-742 Career Decision Making Concepts

Registration #0615-742

Based upon prior knowledge of basic sociological and psychological constructs, this course concentrates on the processes and influences involved in choices regarding careers. The relative and collective impacts of peers, teachers, friends and relatives, immediate family, and professional advisors are analyzed. Additional course goals include applications of processes such as socialization, acculturation, assimilation; status and role playing; and perception to related activities such as career education-orientation-advising. Current psychological research relating personality/self concepts/motivation to career decision making will be studied. A special topic involves the problems of communicating information on emerging careers to individuals to effect real and valid perceptions.

Credit 4

IJCC-743 Education/Business/Industry Interrelationships

Registration #0615-743

A study of the interrelationships of the world of formal education to the business, industrial, and labor communities. Constraints, problems, and values of cooperative effort will be studied in relation to organizations of varying size. Elementary, secondary and postsecondary education, differing size business organizations and industrial groups that involve differing levels of technical specialization are studied.

Credit 2

IJCC-745 Career Concepts: Production

Registration #0615-745

Credit 3

IJCC-746 Career Concepts: Commerce

Registration #0615-746

Credit 3

IJCC-747

Career Concepts: Services

Registration #0615-747

These three courses form a single set and are separated only to facilitate registration and scheduling flexibility.

Each of these three courses concentrates on particular careers. Production includes manufacturing, construction, mining, skilled trades, design and engineering related fields, and food processing and the field of agriculture, fisheries, etc. Commerce covers general business, banking and finance, sales and advertising, communications, hospitality and tourism, retail and wholesale distribution and related fields. Service includes allied health careers, education, government and civil service, law and criminal justice careers, and other service careers.

Each course is designed to present a foundation view of several types of a particular employer. Investigated will be systems of career opportunities, management, personnel policies, employer/employee relations, required training/educational levels, manpower long-range projections, philosophies, in-house education and training, competitive relationships, national/international affiliations, and civic/humanitarian expectations.

Credit 3

IJCC-748 Information Retrieval Systems in Career Planning

Registration #0615-748

The primary goal is the ability to use several data based computer systems for the storage and retrieval of career information. This includes a sufficient understanding of the computer systems, languages and dictionaries for efficient utilization.

Additional goals are an awareness of other systems based upon media and print materials, and the ability to evaluate various systems. (CTAM-712 or equivalent)

Credit 4

IJCC-749 Manpower Forecasting Fundamentals

Registration #0615-749

Two different purposes that depend on a common base are goals for this course. The common base is an understanding of the techniques, theories and limitations of manpower forecasting as it applies to numbers in current occupations and to the probabilities of emerging careers.

The two purposes are: (1) the ability to provide, as a generalist having a broad knowledge of different careers, assistance to discipline specialists in feasibility studies for new educational programs, and (2) to assist people in making decisions in those careers for which insufficient information exists. The ability to assist people in making decisions about the pursuit of a career that is projected to be available several years later will be studied in order to develop a uniform and responsible judgment in those areas where probability statements are extremely important. (CTAM-712 or equivalent)

Credit 4

IJCC-750 Seminar

Registration #0615-750

This is a series of interdisciplinary discussions led by course participants from different teaching disciplines and outside resource persons. The topics concern the challenges involved in teaching, and in educational planning, leading to a better understanding of the total learning by the two-year college students.

Credit 2

IJCC-751 Occupational/Industrial Environments

Registration #0615-751

This course offers educators firsthand exposure to industrial and/or occupational work environments, with focus on the various components of the work force such as research, skilled trades, computer-related areas, production supervision, finance and retailing. Students will have presentations from executives, training directors, employment personnel and workers about skills required for entry-level jobs, application and interview procedures, scope of work, economic benefits, salary and wage scales, employment outlook, and worker and employment expectations.

Credit 3

IJCC-752 Career Education in Colleges & Special Settings

Registration #0615-752

The course goals are to develop the abilities and knowledge necessary to function effectively in college career education and information centers and other organizations helping adults develop career plans. Topics include career education components in community/junior and four year colleges and universities; multiple, middle and late careers; advocacy; spouse and family concerns; and special settings for career assistance.

Credit 3

IJCC-753 Group Dynamics for Career Development**Registration #0615-753**

This course concentrates on the abilities needed to plan, conduct and evaluate various group counseling and peer assistance processes as used in assisting individuals to formulate career plans. Each participant will understand the appropriate functions, advantages and disadvantages of different group dynamic procedures; and will demonstrate the required "attending," listening, guidance, problem solving, and decision making skills needed to plan and moderate such sessions.

Credit 3

IJCC-754 Human Resources Topics**Registration #0615-754**

This course provides classroom studies, research, and experiential learning that relate general knowledge about occupations and careers to information about individual and personal characteristics needed for success in the careers. The specific topics and objectives will vary each time the course is offered in order to meet differing needs. They will, however, relate to career development, planning, advising and counseling. Applications to human resource planning, personnel administration, career education, and career assistance will be stressed. Interested persons should understand the particular objectives for a scheduled offering of the course prior to registration. Because of the differences in selected concentrations within the general goal, the course may be repeated for credit.

Credit variable (1-4 credits)

IJCC-760 Career Counseling Skills**Registration #0615-760**

Students are introduced through demonstration and role playing to selected interviewing and counseling skills including attending, listening, questioning, paraphrasing, reflection of feelings, giving directions, and interpreting. The primary tenets of related counseling theories are presented and discussed.

Credit 4

IJCC-762 Career Education Seminar—Women**Registration #0615-762**

An elective course for students in Career and Human Resource Development concentrating on the ability to provide effective counseling for women who wish to enter non-traditional career fields. Case studies, first person presentations, readings, media and discussions are used to develop the knowledge and skills needed. A project related to the elimination of bias and stereotyping in career counseling materials will be required.

Credit 3

IJCC-763 Career Education Seminar—Handicapped**Registration #0615-763**

An elective course for students in Career and Human Resource Development concentrating on the ability to provide effective counseling for handicapped persons who wish to plan and succeed in desired careers.

Credit 3

IJCC-777 Career Development Project**Registration #0615-777**

This is a variable (1-3) credit course that is required of all students unless they have had sufficient approvable experience. It is an opportunity to practice one or more of the defined functions in career education or human resource development. Proposals require approval of the director before registration. (IJCC-742, IJCC-760, and 30 hours of coursework)

Credit variable (1-3 credits)

IJCC-840 Teaching Internship**Registration #0615-840**

An individual arrangement with an appropriate community or junior college will be made for those persons not having sufficient experience. This will provide definite teaching assignments and responsibilities, together with participation in other faculty functions, including advising, committee work, planning, and student evaluation on a full semester or term basis at a two year college. Supervision, assistance, and evaluation will be provided by a mentor in the participating college and by the CHRD.

Credit variable (1-3 credits)

IJCC-850 Special Projects**Registration #0615-850**

This course provides for independent study, investigation, or research activities in subject matter areas not formalized by the Center's program, but having specialized value. Proposals require approval by the director. (IJCC-742, IJCC-760, and 30 hours of coursework)

Credit variable (1-3 credits)

School of Computer Science and Technology

Undergraduate Computer Science and Technology students may take 700 and 800 level courses only by consent of the Chairman of Graduate Studies and the consent of the instructor.

Graduate students must obtain the consent of a graduate advisor in order to enroll in graduate courses not listed in their own program of study.

Computer Science

ICSS-701 Programming I**Registration #0603-701**

Fundamentals of computer programming and problem-solving using a structured programming language (Pascal or Ada). Introduction to and use of an interactive editor and file system. Applications in business, science, mathematics, engineering, education, systems programming, and graphics will be covered. Techniques will be introduced for data representation and structuring, sorting, and searching. (Computer literacy)

Credit 8

ICSS-702 Programming II**Registration #0603-702**

Computer programming in macro assembly language. Combining program segments written in assembly language with segments in a high-level language. Modern programming practices, tools, and techniques from the point of view of the software life-cycle: specification, design and prototyping, coding and verification, integration, and maintenance. (ICSS-701 or equivalent: programming proficiency in a high-level language; algorithms and data structures)

Credit 8

ICSS-703 Algorithms and Data Structures**Registration #0603-703**

Topics include data representation, data structures such as: linked lists, trees, stacks, queues, hash tables, sparse matrix techniques. Searching and sorting techniques, file structure and maintenance. Programming projects will be required. (ICSP-210 or equivalent)

Credit 4

ICSS-706 Foundations of Computing Theory**Registration #0603-706**

Review of discrete mathematics with emphasis on graph theory and proof techniques. A study of computer programs in the abstract, including program flow graphs, program transformations, the structuring theorem, abstract automata, and formal languages. An overview of computability and algorithmic complexity. (SMAM-265 or equivalent; ICSS-320 or ICSS-703)

Credit 4

ICSS-708 Computer Organization and Programming**Registration #0603-708**

An introduction to the basic concepts and terminology of hardware and software systems including such topics as elementary circuit design, interrupt programming, and virtual memory. The intent is to prepare the student for future study in computer architecture and operating systems. Programming projects will be required. (Assembly language; Data Structures)

Credit 4

ICSS-709 Programming Language Theory**Registration #0603-709**

A survey of several important modern programming languages, their methods of specifying data and control structures, and their approach to functionality; syntax and semantics specification systems. Programming projects will be required. (Assembly language; Data Structures)

Credit 4

ICSS-720 Computer Architecture**Registration #0603-720**

Review of classical computer architectures, the design of operation codes and addressing modes, data formats, and their implementations. Analysis of internal and external bus structures. Architectural features to support virtual storage and page-replacement policies, high-level language features, and operating systems. Speed-up techniques. Future directions. (ICSS-708)

Credit 4

Credit 4

ICSS-852 Coding Theory**Registration #0603-852**

Study of error correcting codes and their applications. Topics include algebraic structure of group codes, linear switching circuits, cyclic codes and the decoding problem. (ICSS-706)

Credit 4

ICSS-856 Theory of Parsing**Registration #0603-856**

Application of theoretical concepts developed in formal language and automata theory to the design of programming languages and their processors, syntactic and semantic notation for specifying programming languages, theoretical properties of some grammars, general parsing, non-backtrack parsing, and limited backtrack parsing algorithms. (ICSS-706)

Credit 4

ICSS-860 Compiler Construction**Registration #0603-860**

Language definition, lexical analysis, syntactic analysis, storage allocation and management, code generation, code optimization, diagnostic generation, bootstrapping. (ICSS-706 and ICSS-709)

Credit 4

ICSS-890 Seminar**Registration #0603-890**

Current advances in computer science.

Credit 2-4

ICSS-895 MS Thesis**Registration #0603-895**

Capstone of the master's degree program. Student must submit an acceptable thesis proposal in order to enroll.

Credit 4-8

ICSS-899 Independent Study**Registration #0603-899**

Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to study computer science topics in greater depth and more detail. (Faculty approval is required prior to registration.)

Credit 4

Computer Systems Management

ICSM-719 Data Processing and Administration**Registration #0611-719**

A study of management topics as related to data processing, management planning, computers and profits, security and privacy, data processing planning, and managerial development. Other selected topics will be discussed based upon specific interests of class participants. (Graduate Computer Science Core)

Credit 4

ICSM-725 Systems Development**Registration #0611-725**

A study of technically oriented data processing management, operations, cost control, and standards and documentation. Other selected topics will be discussed based upon specific interests of class participants. (ICSM-719)

Credit 4

ICSM-765 Advanced Computer Utilization**Registration #0611-765**

A study of management techniques for the evaluation, selection, and implementation of computer systems. Both hardware and software aspects are investigated. Topics include methodologies, possible problems, and common pitfalls involved in the processes. Students will be expected to make group presentations based on research. Outside speakers are invited for specific topics. (ICSM-719)

Credit 4

ICSM-790 Seminar**Registration #0611-790**

Current advances in computer science.

Credit 2-4

ICSM-799 Independent Study**Registration #0611-799**

Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to study computer science topics in greater depth and more detail. (Faculty approval is required prior to registration.)

Credit 2-4

Department of Instructional Technology

ICIT-700 Introduction to Instructional Technology I**Registration #0613-700**

An overview of the basic elements of instructional technology including: technology and its application to instruction; instructional development; past, present, and future trends in instructional technology; and instructional objectives. The course is a mix of self-instructional modules and seminars. Completion of modules and seminars on topics above are required (2 cr.). Additional modules cover specialized areas of instructional technology such as health sciences and community college applications, television and instruction, training and development. Course credit varies with the number of modules completed. Course required for graduation.

Credit variable (2-4)

ICIT-701 Introduction to Instructional Technology II**Registration #0613-701**

A continuation of ICIT-700 offering the student an opportunity to complete additional modules as described in ICIT-700 course description. (ICIT-700)

Credit variable (1-3)

ICIT-705 Sources of Information in Instructional Technology**Registration #0613-705**

Students develop general search techniques and strategies for finding information, evaluating it, and establishing a reference file. Sources of print material include journals and periodicals related to instructional technology, books, research reports and conference proceedings, catalogues and commercial information, and automated information systems. Interpreting recent copyright changes is also covered. Actual search problems are given and an information search project is required.

Credit 3

ICIT-710 Programed Instruction**Registration #0613-710**

Students review principles and techniques of preparing programed instruction; then design, produce and validate their own programed instruction materials; includes research and development related to programed instruction and sources of programed materials.

Credit 4

ICIT-712 Computer Assisted Instruction**Registration #0613-712**

Students review the use of the computer for instruction (computer-assisted instruction) and then produce their own teaching programs actually using a computer. Examines research about computer-assisted instruction, various hardware and software configurations, programming languages and sources of already developed computer-assisted courses, also discusses various methods of course and lesson development. (ICIT-710 or permission of department.)

Credit 4

ICIT-715 Instructional Television**Registration #0613-715**

Explores the various uses of television as an instructional medium, e.g., individualized instruction, instruction of mass audiences, stand-alone instruction, integrated instruction. Students must produce at least one television program. Surveys the hardware, technology and software of television.

Credit 4 (offered on demand)

Credit 2

ICIT-772 Group Development and Organizational Change**Registration #0613-772**

Similar in format to ICIT-770, the course extends the concept and practice of interpersonal communications to the area of work- and task-oriented team-building and organizational change. The course stresses actual personal interaction in a training laboratory environment while including some of the theoretical aspects of causing work-oriented, personal and organizational change. Offered on demand. (ICIT-750, 751, 757, 770)

Credit 3

ICIT-780 Selected Topics in Instructional Technology**Registration #0613-780**

This seminar provides a forum for a small group of students to examine various areas of interest to them. Students select topics, examine them thoroughly, and present the findings for group consideration. Required for graduation. (30 hours course work and all other required courses)

Credit 2

ICIT-840 Internship**Registration #0613-840**

Special opportunities may occur for students to obtain work experience in a job or environment similar or coincident with their career objectives. In fact, students are encouraged to locate such opportunities. This course recognizes this experience. A proposal (guidelines available from the department) must be submitted prior to registering for this course. (ICIT-750, 751 and 30 hours of coursework)

Credit variable (1-3)

ICIT-850 Independent Study**Registration #0613-850**

An opportunity for a student to explore, with a faculty advisor, an area of interest to the student. A proposal (guidelines available from the department) must be submitted prior to registering for this course. (ICIT-750, 751 and 30 hours of coursework)

Credit variable (1-3)

Department of Packaging Science

Packaging Science core courses are offered at least once each year. Research courses are offered on demand, in consultation with the instructor.

IPKG-701 Research Methods in Packaging**Registration #0607-701**

Discussion of procedures, methods, and requirements for carrying out the research project. Students pursue advanced study and research in the following areas: distribution packaging, package systems development, product and/or package damage in the physical distribution environment, materials, quality preservation, production and mechanical properties of packaging materials systems.

Credit 4

IPKG-721 Packaging Administration**Registration #0607-721**

Study of the role of packaging operations in the corporate enterprise. Positioning of the packaging function in the corporation, managerial practice, interpersonal relationships, and control techniques are considered. Individualized instruction, case analysis, and/or research papers supplement classroom instruction.

Credit 4

IPKG-731 Advanced Packaging Economics**Registration #0607-731**

An advanced study of the firm's economic behavior in relationship to activities within the packaging function. Included are packaging costs, production theory, and case studies demonstrating general trends in the packaging industry. Individual instruction, case study, and/or research paper required, as appropriate to the student's level or interest.

Credit 4

IPKG-742 Distribution Systems**Registration #0607-742**

Study of the shipping and handling environment encountered by goods in packages during distribution to the product user. Materials handling, warehousing, and the impact of the distribution environment on shipping container design and development are considered. Case study or individual research appropriate to student's interest.

Credit 4

IPKG-750 Graduate Seminar**Registration #0607-750**

Course concentrates on topic of current interest, depending on instructor, quarter offered, and mix of students. Content to be announced prior to registration dates. (Offered on sufficient demand.)

Credit 4

IPKG-752 The Legal Environment**Registration #0607-752**

An intensive study of federal, state, and local regulation that affects packaging. Individualized study and research on an interest basis.

Credit 4

IPKG-763 Packaging for End Use**Registration #0607-763**

An intensive study of package design requirements specific to use of a product at specified end points. Individual design and development of a package system and its specifications, appropriate to the needs of the product and the consumer/user.

Credit 4

IPKG-770 Computer Applications**Registration #0607-770**

Study of the application of computer techniques and data processing for packaging applications: specification development, test simulation, optimum sizing of package systems, process control, and similar applications will be presented. Computer program development and individual research on an interest basis.

Credit 4

IPKG-783 Packaging Dynamics**Registration #0607-783**

The study of instrumentation systems for analysis, evaluation, and application of shock and vibration test methods and data to package system design and development for specific products. Individualized instruction appropriate to student's interest.

Credit 4

IPKG-798 Independent Study**Registration #0607-798**

Student-initiated study in an area of specialized interest, not leading to a thesis. A comprehensive written report of the investigation is required. Cannot be used to fulfill core requirements. (Consent of the department)

Credit variable (may be taken for a maximum of 8 credits)

IPKG-799 Advanced Package Design**Registration #0607-799**

Advanced package design projects selected in consultation with the instructor. Individual study appropriate to area of interest and background of student. (Consent of department)

Credit variable (1-4)

IPKG-890 Graduate Thesis**Registration #0607-890**

An independent research project to be completed by the student in consultation with the major professor. A written thesis and an oral defense of the thesis is required. (Consent of department)

Credit variable (maximum of 12)

Graduate Faculty College of Applied Science and Technology

Dennis C. Nystrom, Ed.D., Texas A&M University—Dean, Professor

William Stratton, MS, SUNY at Buffalo—Associate Dean, Associate Professor

Wiley R. McKinzie, MS, SUNY at Buffalo—Director, School of CS & T, Associate Professor

David L. Olsson, Ph.D., Michigan State University—Director, Department of Packaging Science, Professor

Clinton J. Wallington, Ph.D., University of Southern California—Director, Departments of Instructional Technology and Career and Human Resource Development, Professor

School of Computer Science and Technology

Wiley R. McKinzie, MS, SUNY at Buffalo—Director, School of Computer Science and Technology, Associate Professor

Peter G. Anderson, Ph.D., Massachusetts Institute of Technology—Chairman, Graduate Studies, Professor

Rodger Baker, MS, University of Rochester—Associate Professor

John A. Biles, MS, University of Kansas—Assistant Professor

James R. Carbin, MS, Rensselaer Polytechnic Institute—Professor

Warren Carithers, MS, University of Kansas—Assistant Professor

Chris Comte, MS, Rochester Institute of Technology—Assistant Professor

Lawrence Coon, Ph.D., Ohio State—Associate Professor

Roy Czernikowski, Ph.D., Rensselaer Polytechnic Institute—Professor

John L. Ellis, Ph.D., University of Toledo—Associate Professor

Henry Etlinger, MS, Syracuse University—Associate Professor

James Hammerton, MBA, New York University—Assistant Professor

James Heliotis, Ph.D., University of Rochester—Assistant Professor

Jack Hollingsworth, Ph.D., University of Wisconsin—Professor

Guy Johnson, MS, Syracuse University—Associate Professor

Andrew Kitchen, Ph.D., University of Rochester—Associate Professor

Donald L. Kreher, Ph.D., University of Nebraska—Assistant Professor

Jeffrey Lasky, MBA, City University of New York; MS, University of Minnesota, Assistant Professor

Michael J. Lutz, MS, SUNY at Buffalo—Chairman, Undergraduate Studies; Associate Professor

Peter Lutz, Ph.D., SUNY at Buffalo—Associate Professor

Rayno Niemi, Ph.D., Rensselaer Polytechnic Institute—Associate Professor

Iheanacho Nwokogba, Ph.D., Vanderbilt University—Assistant Professor

Kenneth Reek, MS, Rochester Institute of Technology—Associate Professor

Margaret Reek, MS, Rochester Institute of Technology—Assistant Professor

Evelyn Rozanski, MS, Syracuse University—Associate Professor

Nan C. Schaller, MS, Union College—Assistant Professor

William Stratton, MS, SUNY at Buffalo—Associate Dean, Associate Professor

Walter Wolf, Ph.D., Brandeis University—Lecturer

Adjunct Faculty- School of Computer Science and Technology

Ahad Gholipour-Abbasi, MS, Mississippi State University

Vishwas Abhyankar, Ph.D., University of Rochester

James A. Chmura, MS, Rutgers University

Michael J. Ciaraldi, MS, Rochester Institute of Technology

Mary Kilmer, MS, Rochester Institute of Technology

Ralph Longobardi, Ph.D., Syracuse University

Walter Maurer, MS, Rochester Institute of Technology

Werner Schenk, MBA, University of Rochester

William Thiel, MS, Rochester Institute of Technology

Lawrence Ting, MS, Old Dominion University

Department of Instructional Technology

Clinton J. Wallington, Ph.D., University of Southern California—Professor

Thomas H. Zigon, MS, Rochester Institute of Technology—Instructor

Adjunct Faculty

Maureen Beausey, MS, Rochester Institute of Technology

Paul Kazmierski, Ph.D., Syracuse University

Russell Kraus, Ed.D., University of Massachusetts

Richard Riley, Ed.D., University of Rochester

Albro C. Wilson, MS, Rochester Institute of Technology

Carl Winkelbauer, M.Ed., University of Rochester

Department of Career and Human Resource Development

Clinton J. Wallington, Ph.D., University of Southern California—Professor

Donald D. Baker, Ed.D., University of Rochester

Andrew Dougherty, MBA, Bradley University—Distinguished Lecturer

Dennis C. Nystrom, Ed.D., Texas A & M University—Professor

Adjunct Faculty

James Austin, MS, Rochester Institute of Technology

Paul Kazmierski, Ph.D., Syracuse University

Nancy Neville, MA, Fordham University

Richard L. Rinehart, Ed.D., Michigan State

Department of Packaging Science

David L. Olsson, Ph.D., Michigan State University—Director, Professor

A. Ray Chapman, MBA, Rochester Institute of Technology—Assistant Professor

Daniel L. Goodwin, MS, Michigan State University—Associate Professor

Karen L. Proctor, MBA, Rochester Institute of Technology—Assistant Professor

Fritz J. Yambrach, MBA, Utah State University—Assistant Professor

College of Business

Dr. Walter F. McCanna, Dean
Barbara J. Howard, Director,
 Graduate Programs

RIT's graduate programs in management include the master of business administration and the master of science in human services management. Each program is designed for full- and part-time students.

Through a flexible, decision-oriented curriculum, graduate students focus on key aspects of modern management relevant to profit and non-profit organizations.

Tomorrow's manager must be able to handle highly complex problems set in an ever-changing environment. Recognizing this need, RIT's programs offer a broad management education that requires the individual to master a diverse combination of knowledge, skills and techniques. Underlying this educational mix is the belief that effective management requires effective integration of specialized knowledge, analytical problem solving and sensitivity to the behavioral realities of organizations.

The overall goal of RIT's graduate management programs is to provide an educational foundation for future professional growth, provide an applied program in state-of-the-art management techniques and develop in the student systematic and practical problem solving skills. "Every scenario for the next 20 years describes an environment in which managers must be adaptive, creative and growing. We have set for ourselves the goals of preparing students for that changing environment and providing them with the knowledge and tools such that they can apply what they've learned directly to their work," says Dr. Thomas E. Comte, associate dean in the College of Business at RIT.

The faculty in the College of Business bring to the classroom a blend of quality academic preparation and strong business background. Most of the professors have previous and continuing business experience, are active consultants, maintain memberships on numerous boards



of directors and are engaged in research "The breadth and depth of our faculty," says Dr. Comte, "provide the applied orientation and theoretical foundations that serve our students so well."

Since RIT graduated its first class of graduate business students in 1970, classes have grown consistently. During the past academic year, more than 600 students were enrolled.

"The majority of our students are people who've done undergraduate work in other areas—such as social work, graphic arts, liberal arts, or engineering—and see the need to enroll in a graduate program in management. Our programs are seen as a vehicle for professional growth and advancement."

Facilities

The College of Business is housed in the Max Lowenthal Memorial Building on RIT's Rochester campus. Facilities include a Learning Support Center,



time-sharing computer terminals on-line with RIT's new computer system and extensive software support, and an up-to-date business collection of texts, periodicals and reference services in the Wallace Memorial Library.

Master of Business Administration

The purpose of the MBA program is to enhance the depth and breadth of general management capabilities of the student. This is accomplished by providing the student with a basic core of coursework in the disciplines of behavioral science, economics, statistics, management science, and information systems. This work is accompanied by functionally oriented courses in accounting, finance, marketing and operations. These are followed by advanced courses, some of which are directed toward an area of concentration, while the remainder are chosen in elective areas designed to provide breadth to the student's program.

The faculty successfully utilize a combination of lectures, conferences, cases, simulations, computer applications and other techniques in its approaches to presentation of information and the analysis of managerial problems.

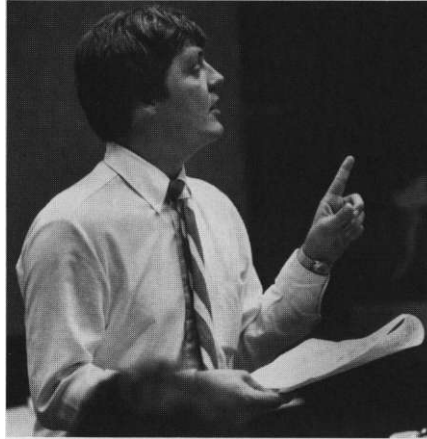
The MBA program requires 76 quarter credit hours (19 courses) and is designed so that a student will progress through the program in a logical sequence while allowing some program flexibility. Those students with previous coursework in business may reduce the number of courses required through waiver examinations. Students with a sufficient background may be able to complete the program with as few as 48 quarter credit hours (12 courses).

Students entering the program have widely varied academic backgrounds. To assure that all students are adequately prepared in the areas of mathematics and statistics, diagnostic tests are administered to all new students. Those students with inadequate skills will be required to take additional coursework in mathematics and/or statistics during their first quarter of study.

Increasing demands on the professional accountant have produced a need for broad educational preparation. In recognition of this need, the College of Business offers graduate programs leading to the master of business administration with an accounting option (corporate or public).

MBA with corporate accounting option

The MBA with corporate accounting option enables the student to obtain a broad education encompassing the behavioral and quantitative aspects of management while providing a concentration in accounting. Graduates of this program would generally hold positions in a treasurer's or controller's office or an organization's accounting department.



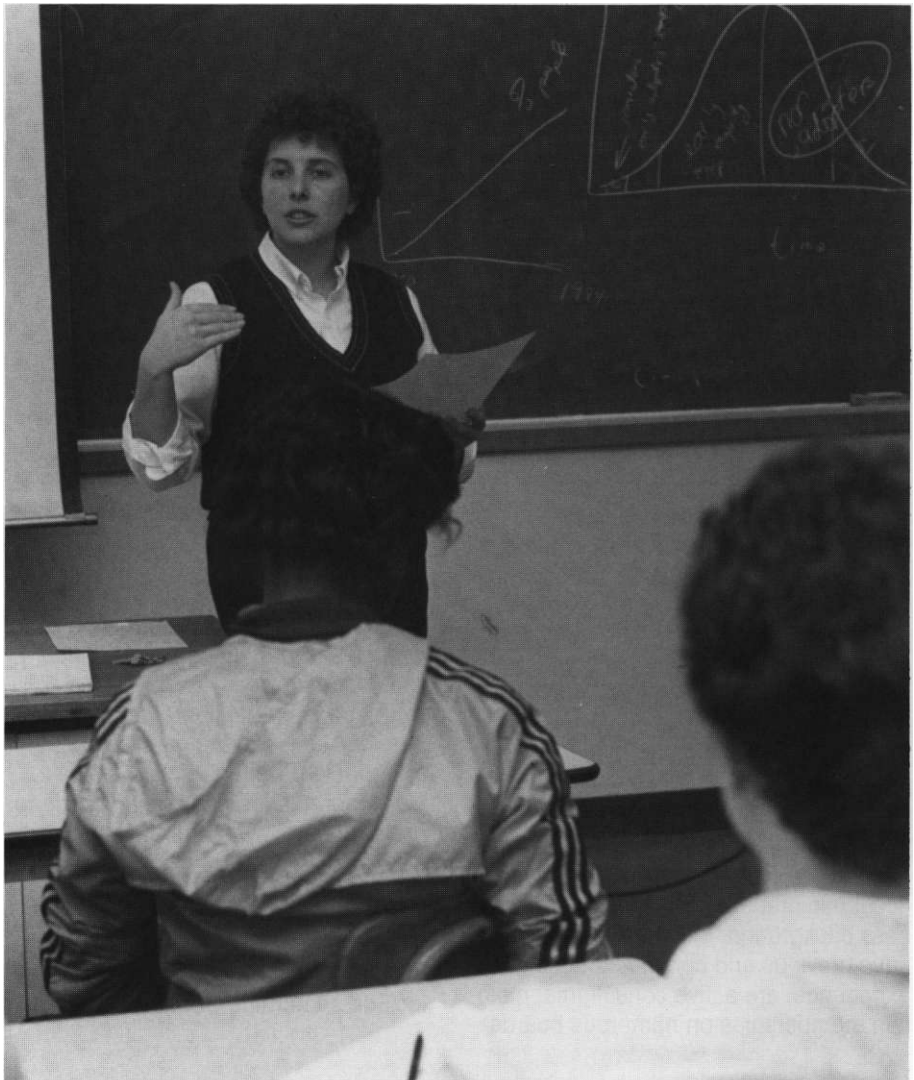
MBA with public accounting option

In addition to providing students with general management skills, the MBA with public accounting option prepares students for public accounting careers. Graduates of this program meet the educational requirements for either the Uniform Certified Public Accounting Examination or the Certificate in Management Accounting Examination.

The MBA with either accounting option is specifically designed for students without an extensive background in accounting or business at the undergraduate level, who wish to pursue a career in accounting.

3-2 MBA Program

Students majoring in management or economics in the John Wiley Jones School of Business at Geneseo are eligible to complete both the bachelor's degree and the master's degree in business administration (MBA) in five years. The program entails three years at Geneseo and two years at the College of Business at Rochester Institute of Technology.



Master of Science in Human Services Management

The master of science in the human services management program is designed to prepare students for managerial responsibilities in a human service setting. The curriculum is designed for persons whose professional focus is in the public or private not-for-profit organization. The program utilizes the diverse capabilities of the College of Business and the School of Human Services.

The curriculum is organized in three groups requiring 72 quarter credit hours (18 courses). The required courses provide the basic knowledge and techniques necessary to effective management. The interdisciplinary courses cover the interventive, interpersonal and communication skills essential for effective interaction with the community, other organizations, and colleagues. The elective courses may be taken in management, or related areas.

The MS in human services management is available to persons holding a variety of undergraduate degrees. Admission standards and procedures are the same as those for the MBA program with the exception of the admission test required. MS/HSM applicants may submit scores from either the Graduate Management Admission Test or the Graduate Record Exam.

General Information and Procedures

Admission

Any individual who wishes to study in the graduate business programs must first be admitted. Admission will be granted to graduates of accredited baccalaureate degree programs who, in the opinion of the Graduate Review Committee of the College of Business, have demonstrated their potential to successfully complete graduate business studies through their achievements in their undergraduate program,



through the results of the Graduate Management Admission Test, or, in the case of the MS in human services management, either the Graduate Management Admission Test or Graduate Record Exam, and applicable professional experience.

All applicants who are admitted prior to the conclusion of their baccalaureate program are required to submit their final transcript by the end of the first quarter of graduate work.

You do not have to have had any undergraduate work in business to be admitted to, or successful in, the program. College of Business graduate programs are appropriate to persons holding a wide variety of undergraduate degrees.

Students who have been accepted in a program and who do not enroll in the quarter for which they have been accepted will be allowed to defer enrollment (admission) for two quarters (the quarter of the initial acceptance and the following quarter). If a student wishes to defer enrollment beyond two quarters, his credentials will be re-evaluated on the basis of current admission standards.

Mathematics/statistics competency

All students entering the program are required to take a mathematics diagnostic test prior to registration to

demonstrate that they have the mathematics/statistics competencies needed for successful completion of graduate studies. Students whose mathematics/statistics competencies are inadequate must successfully complete mathematics/statistics courses designed for the programs during their first quarter of study.

Foreign students

Applicants from foreign countries where a degree or diploma is granted by an institution not holding accreditation may be admitted provided their study and performance approximates the standards of an accredited bachelor's degree and an ability to meet graduate standards is indicated. The TOEFL score must be submitted by applicants with limited or no experience in an academic program in the United States.

Procedures

To be considered for admission it is necessary to file an application and submit transcripts of all previous undergraduate and graduate work, and results of the Graduate Management Admission Test or, for the MS in human services management, the Graduate Record Examination or the Graduate Management Admissions Test. Information may be obtained from the College

of Business or by writing the Graduate Management Admission Test, Educational Testing Service, Box 966, Princeton, N.J., 08540, or Graduate Record Examination, Educational Testing Service, Box 955, Princeton, N.J., 08541. The test is usually given four times a year in convenient locations.

Orientation

All new students are required to attend an orientation session prior to enrolling in any courses. At the same time, the mathematics diagnostic test is administered. Students are given information regarding course selection, program planning and academic advising during the orientation. Student handbooks and registration materials are distributed at this time.

Non-matriculated students

Individuals already holding master's or doctor's degrees in business may enroll in graduate business courses as non-matriculated students. Evidence of previous degree must be presented to the College of Business before registering as a non-matriculated student.

Financial aid

Graduate research assistantships are available to deserving full-time graduate students. Assistants work with faculty on research projects, thus enhancing their education, and receive in turn tuition remission. The amount of the grant is dependent upon the nature of the appointment. Interested individuals should write to Graduate Business Programs, requesting an assistantship and indicating the quarter or quarters in which they desire aid.

Assistantships and most other forms of financial aid are available only to full-time students. For the part-time student, scholarship aid is available in the form of a tuition remission.

Other forms of financial aid such as fellowships, loans, and grants should be investigated through the Director of Financial Aid at RIT's Student Financial Aid Office.

Placement service

Students seeking employment after graduation should register with RIT's Center for Cooperative Education and Career Services approximately one year prior to graduation. This lead time will enable the student to take full advantage of resume preparation aid

and offers the opportunity to interview a wide variety of local and national firms as they visit the campus.

Credit hour requirement

Credit hour requirements vary depending on the particular program and a student's prior academic achievements. Normally, 76 quarter credit hours are required in the master of business administration program and 72 credit hours in the master of science in human services management. Each course carries four quarter credit hours. In certain cases, total credit hour requirements may be reduced by the use of waiver credit and/or transfer credit.

An admitted student with appropriate undergraduate business courses taken prior to entry in the MBA or MS in human services management program may waive some courses and thus reduce the total required hours accordingly.

Transfer credit

A maximum of 12 quarter credit hours may be awarded as transfer credit from other graduate programs provided the courses in question carry a grade of "B" or better. Any questions concerning waiver or transfer credit should be referred to the Graduate Business Programs Office.

Waiver credit

All waiver credit will be based on a test prepared and evaluated by the department responsible for the subject. If a student should waive more than 28 credit hours, he/she must take additional electives to meet the RIT 48 credit-hour requirement for the degree.

Academic standards

The average of the grades for all courses taken in the College of Business and credited toward the master's degree must be at least a "B" (3.0). Transfer credits from other colleges or institutions, waiver credits, or undergraduate course credits are not counted in the grade point computation. The policy on probation and suspension is explained in the section "Steps Toward Degree" in this Bulletin. The student must pay careful attention to that policy.

Full-time program

Those students desiring to minimize their time in school will find that four or five quarters of intensive study will allow them to complete degree require-

ments, if previous undergraduate or graduate work permits maximum course waivers and a 12 credit hours per quarter course load is carried.

Actual credit hour requirements will vary depending on the student's background and the major concentration.

Full-time students will find that, while certain courses may be scheduled during the day, they will take most courses during the evening hours and that each evening course meets once a week.

Part-time program

In addition to full-time study, all graduate programs are available on a part-time basis. Course requirements, faculty, and admission procedures correspond to the full-time program. The part-time MBA allows individuals from the greater Rochester area to prepare themselves for advancement in management without interrupting their careers. A feasible course load for the part-time student is one to two courses per quarter, permitting program completion in approximately three to four years if no courses are waived. Credit hour requirements and curriculum will be found in the following material.

The student must complete the program within seven years of initial registration.

Internship program

An internship affords graduate students the opportunity to gain working experience with an organization. Internships are generally paid positions lasting three to six months. No academic credit is granted, and an internship may extend the length of a student's program. Graduate students must apply to the internship program early in their graduate program. Students accepted into the internship program will be eligible to interview with organizations after completing a substantial portion of their coursework. Students must maintain good academic standing (GPA 3.0) to remain eligible for interviews. RIT will attempt to provide internships for qualified students, but is unable to guarantee that all students will be placed.

Course offerings

Information concerning courses to be offered in a given quarter will be available through the Graduate Business Programs Office. The Institute reserves the right to make any necessary

changes in course schedules or instructors, including the right to cancel courses, without prior notice. Day courses meet twice a week, and evening or Saturday courses meet once a week. The Institute makes no guarantee that every catalog course will be offered in any given year or that courses will be offered in a particular quarter or sequence.

MASTER OF BUSINESS ADMINISTRATION CURRICULUM Required Courses:

Course Number and Title	Credit Hours
*BBUA-703 Accounting Concepts for Managers	4
*BBUB-740 Organizational Behavior	4
*BBUQ-780 Management Science	4
*BBUQ-782 Applied Statistical Analysis II	4
*BBUE-711 Microeconomics	4
BBUB-741 Organization & Management	4
BBUF-721 Financial Management I	4
*BBUM-761 Marketing Concepts	4
BBUQ-743 Operations Management	4
BBUF-722 Financial Management II	4
BBUQ-790 Information Systems	4
*BBUE-712 Macroeconomics	4
BBUB-745 Business & Public Policy	4
BBUB-759 Integrated Business Analysis	4
	56

*Can be waived by examination, reducing the number of courses required for graduation.

Option Courses: Approved options are illustrated in the following material: Option Area Courses 12

Free Electives: Free electives may be selected from graduate level courses offered by the College of Business outside the group from which the option was selected, or from graduate level courses offered by other colleges of the Institute provided they have prior approval of the graduate office.

Free Electives 8

Total Hours 76

The course sequence followed by a student should generally be in the order in which the courses are listed above. *Students must adhere to the pre-requisite requirements.*

Master of Business Administration Curriculum

The following sequence is recommended. Students who find it necessary to vary this sequence should seek counseling from the Graduate Office.

Quarter 1

BBUA-703 Accounting Concepts for Managers
BBUB-740 Organizational Behavior
BBUQ-780 Management Science

Quarter 3

BBUF-721 Financial Management I
BBUM-761 Marketing Concepts
BBUQ-743 Operations Management

Quarter 5

Elective
Elective
Elective

Quarter 2

BBUQ-782 Statistical Analysis II
BBUE-711 Microeconomics
BBUB-741 Organization & Management

Quarter 4

BBUF-722 Financial Management II
BBUQ-790 Information Systems
BBUE-712 Macroeconomics
BBUB-745 Business & Public Policy

Quarter 6

Elective
Elective
BBUB-759 Integrated Business Analysis

CORPORATE ACCOUNTING OPTION

Course Number and Title	Credit Hours
BBUA-704 Accounting Theory I	4
BBUA-705 Accounting Theory II	4
BBUA-706 Cost Accounting	4
Two free electives	8
	20

Suggested electives:

BBUF-723 Theory of Finance
BBUF-724 Problems in Finance
Approved computer science courses

PUBLIC ACCOUNTING OPTION

Course Number and Title	Credit Hours
*BBUA-704 Accounting Theory I	4
*BBUA-705 Accounting Theory II	4
*BBUA-706 Cost Accounting	4
BBUA-707 Advanced Accounting	4
BBUA-708 Auditing	4
*BBUA-709 Basic Taxation Accounting	4
BBUB-754 Business Law	4
Two free electives	8
	36

*Can be exempted with equivalent undergraduate courses and approval of the director. If exempted, these courses must be replaced by 800-level accounting courses(s).

Suggested electives:

BBUF-723 Theory of Finance
BBUF-724 Problems in Finance
Approved computer science courses

This option meets the educational requirements for the Uniform Certified Public Accounting Examination and the Certificate in Management Accounting Examination.

DECISION SCIENCE OPTION

Course Number and Title	Credit Hours
BBUQ-785 Applied Regression Analysis	4
BBUQ-793 Business Forecasting Methods	4
One course from Group A	4
Two free electives	8
	20

Group A

BBUQ-784 Decision Analysis	
BBUQ-786 Mathematical Programming	
BBUQ-788 Survey Design & Sampling	
BBUQ-789 Simulation	
BBUQ-794 Multivariate Methods in Business	
BBUQ-795 Seminar in Decision Science	

FINANCE OPTION

Course Number and Title	Credit Hours
BBUF-723 Theory of Finance	4
Two courses from Group A	8
Two free electives	8
	20

Group A

BBUF-724 Problems in Finance	
BBUF-725 Securities & Investment Analysis	
BBUF-726 Capital Markets	
BBUF-729 Seminar in Finance	
Suggested electives:	
BBUE-713 Advanced Microeconomics	
BBUE-714 Advanced Macroeconomics	
BBUA-706 Cost Accounting	
BBUA-709 Basic Taxation Accounting	
Approved Statistics, Computer Science Courses	

MARKETING OPTION

Course Number and Title	Credit Hours
BBUM-762 Advanced Marketing Management	4
Two courses from Group A	8
Two free electives	8
	20

Group A

BBUM-763 Consumer Behavior	
BBUM-764 Marketing Logistics	
BBUM-765 Sales Management	
BBUM-766 International Marketing	
BBUM-767 Marketing Communications	
BBUM-769 Seminar in Marketing	

Suggested electives:

BBUB-770 Business Research Methods

GENERAL MANAGEMENT OPTION

Course Number and Title	Credit Hours
Three courses from Group A	12
*Two free electives	8
	20

Group A

BBUB-746 Management & Career Development	
BBUB-748 Employee & Labor Relations	
BBUB-750 Personnel Systems	
BBUB-753 Small Business Administration	
BBUB-758 Seminar in Management	

PERSONNEL/HUMAN RESOURCE MANAGEMENT OPTION

Course Number and Title	Credit Hours
BBUB-748 Employee & Labor Relations	4
BBUB-750 Personnel Systems	4
One course from Group A	4
*Two free electives	8
	20

Group A

BBUB-746 Management & Career Development	
BBUB-754 Compensation & Reward Systems	
BBUB-758 Seminar in Management	

*The following courses are considered free electives for the two management options: BBUB-742 Business & Society, BBUB-751 Legal Environment of Business, BBUB-770 Business Research Methods

Master of Science in Human Services Management Curriculum

Required Courses:

Course Number and Title	Credit Hours
'BBUA-703 Accounting Concepts for Managers	4
'BBUB-740 Organizational Behavior	4
BBUB-741 Organization & Management	4
'BBUQ-781 Introduction to Statistics	4
'BBUQ-782 Applied Statistical Analysis	4
BBUH-701 Economic Environment of Human Services	4
BBUF-721 Financial Management I	4
BBUH-711 Law & the Administrative Process	4
BBUH-712 Bureaucracy in Modern Society	4
BBUB-770 Business Research Methods	4
BBUB-750 Personnel Systems	4
	44

'Can be waived by examination, reducing the number of courses required for graduation.

Interdisciplinary Courses:
(Choose 4)

Course Number and Title	Credit Hours
BBUH-731 Intervention in the Community	4
BBUH-732 Cooperation & Conflict	4
BBUH-733 Interpersonal Skills	4
BBUH-734 Deviance, Conformity and Criminal Behavior	4
BBUH-735 Special Populations	4
	16

Electives:

Electives may be selected from graduate level courses offered by the College of Business or from graduate level courses offered by other colleges of the Institute provided they have prior approval of the director.

Total Elective Hours 12

Total Hours for Program 72

Graduate Business Courses

Accounting Group

BBUA-703 Accounting Concepts for Managers

Registration #0101-703

An introduction to financial and managerial accounting concepts, with particular emphasis placed on their use for managerial decision making. Topics covered will include: financial statements, transaction analysis, measuring economic values, responsibility accounting, budgeting, decentralized and divisional performance measurement.

Credit 4

BBUA-704 Accounting Theory I

Registration #0101-704

A comprehensive exposure at an intermediate level to accounting theory and practice. Emphasis is placed on applying underlying accounting theory to complex accounting problems. The effects of alternative methods are considered throughout the entire course. (BBUA-703)

Credit 4

BBUA-705 Accounting Theory II

Registration #0101-705

Continuation of Accounting Theory I with emphasis on liabilities, equity, long-term debt and special reporting problems. Included here is the Statement of Changes in Financial Position, pensions, leases, and accounting for changes in the price level. (BBUA-704)

Credit 4

BBUA-706 Cost Accounting

Registration #0101-706

A thorough study of the principles and techniques used to accumulate costs for inventory valuation and managerial decision making. Includes problems and procedures relating to job order, process, and standard costs systems, with particular attention to the problems of overhead distribution and control. (BBUA-703)

Credit 4

BBUA-707 Advanced Accounting and Theory

Registration #0101-707

Analysis and evaluation of current accounting thought relating to the nature, measurement and reporting of business income and financial position; concepts of income in relation to the reporting entity; attention to special areas relating to consolidated statements, foreign currency statement translation, governmental and not-for-profit accounting. (BBUA-705)

Credit 4

BBUA-708 Auditing

Registration #0101-708

The theory and practice of auditing 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 auditing techniques by statistical sampling and electronic data processing applications. (BBUA-705)

Credit 4

BBUA-709 Basic Taxation Accounting

Registration #0101-709

Study of federal income taxation of individuals, partnerships and corporations. Problems of the S Corporation and corporate accumulations are examined. Income tax and accounting concepts affecting revenues and deductions are compared, including concepts of gross income, basis, recognition of gain and loss, capital asset transactions, exemptions, deductions and credits. (BBUA-703)

Credit 4

BBUA-810 Advanced Taxation Accounting

Registration #0101-810

A study of federal income taxation as it relates to corporate and partnership tax planning particularly in reorganization, merger, and liquidation. Problem areas in property transactions including non-taxable exchanges and valuation will be explored. Family tax planning including the use of trusts, other income shifting devices in the environment of estate and gift taxes is examined. Emphasis will be on the need for tax planning in the complex business or personal situation. (BBUA-709 or equivalent.)

Credit 4

BBUA-811 Auditing Theory

Registration #0101-811

Advanced course in auditing where classical auditing cases, uses of computer and statistical accounting techniques, current official auditing pronouncements and changes in legal and ethical considerations are fully explored. (BBUA-708 or equivalent.)

Credit 4

BBUA-812 Accountancy Seminar

Registration #0101-812

A variety of advanced accounting topics are covered, depending on the instructor. Topics included would be: CPA problems, SEC accounting, small business accounting, non-profit accounting, internal auditing. (BBUA-705 or equivalent.)

Credit 4

BBUA-813 Financial Accounting Theory

Registration #0101-813

An advanced course in financial accounting theory that examines the basic assumptions, principles and postulates upon which current practice rests; and alternative theories of valuation and measurement. Critical analysis of the historical cost model and the several major current value models is the main emphasis throughout discussions of financial statements and their individual components. (BBUA-707 or equivalent.)

Credit 4

BBUA-814 Accounting Information Systems

Registration #0101-814

A complete analysis of management's need for financial data in decision making and the various alternatives available to provide the information in a timely, cost-effective manner. Topics covered will include manual, mechanical, and computerized alternatives to the capturing, compiling, and reporting of relevant data. (BBUA-703)

Credit 4

Economics Group

BBUE-711 Microeconomics

Registration #0103-711

This is an intermediate microeconomic theory course with applications. The fundamentals of consumer behavior theory, market demand, and the theory of the firm are stressed with applications. Also, resource allocation and product distribution are fundamentals to management and to understanding the role of a firm in an economy. (BBUQ-780)

Credit 4

BBUE-712 Macroeconomics

Registration #0103-712

This is an intermediate macroeconomic theory course with applications. A basic framework of product and money market equilibrium is explored with applications in fiscal and monetary policy. An understanding of major aggregate economic relationships is developed, as well as economic policy. (BBUE-711)

Credit 4

A study of the impact on the manager and organization of needs, demands, and restrictions imposed by employees, government, consumer, citizens' groups, and other environmental forces. The course examines possible managerial responses within the framework of several definitions of social responsibility. The implications of current events are an integral part of the course. (BBUB-740)

Credit 4

BBUB-745 Business and Public Policy**Registration #0102-745**

Legal issues in areas such as consumer protection, environmental law, occupational safety and health, employment discrimination, labor management relations, antitrust policies, and industrial policy. Ethical, economic, political, legal, and cross-cultural perspectives are considered.

Credit 4

BBUB-746 Management and Career Development**Registration #0102-746**

Study and application of current methods of developing managers, with a primary emphasis on career development of both managerial personnel in general and the person taking this course. Student is required to develop a career plan (career pathing). Implications of current technological developments for training, replacement, and advancement of managerial personnel are discussed. Insight is also provided into the organizational function of management development. (BBUB-740)

Credit 4

BBUB-748 Employee and Labor Relations**Registration #0102-748**

A study of labor-management relations as they influence managerial decision making in both union and nonunion organizations. Topics may include collective bargaining, conflicts and agreements between labor and management, sharing of productivity gains between labor and management, and contemporary issues. An analysis is made of how market forces, labor unions, employee associations, and labor law influence employee compensation. Employee and labor relations are studied in both private and public sector firms. (BBUB-740, BBUE-710)

Credit 4

BBUB-750 Personnel Systems**Registration #0102-750**

A study of personnel systems or the methods of the personnel and human resource management function in organizations. The major personnel topics studied include organizational staffing (selection and recruitment), training and development, compensation, safety and health, equal employment opportunity, human resource forecasting, and performance appraisal. Course includes experiential learning in such topics as job design, job analysis, selection interviewing, and performance evaluation. (BBUB-740, BBUE-782)

Credit 4

BBUB-751 Legal Environment of Business**Registration #0102-751**

An introduction to legal principles and their relationship to business practices. Business ethics and the environmental impact of the federal administrative agencies are stressed. Among the agencies considered will be the EPA, EEOC, FDA, OSHA, FTC and the NLRB. (BBUA-703, BBUB-740)

Credit 4

BBUB-753 Small Business Administration**Registration #0102-753**

Students enrolled in this course are provided the opportunity to serve as consultants to a specific small business firm within this geographic area. Under an arrangement with the Small Business Administration, and working under the supervision of a senior faculty member, teams of students provide management consulting about a variety of problems to small businesses. As a practicum this course does not have regularly scheduled class hours. Instead, students confer with their faculty member on an as-needed basis. (BBUA-703, BBUE-721, BBUM-761)

Credit 4

BBUB-754 Business Law**Registration #0102-754**

An introduction to the law of contracts, sales, agency, commercial paper, and partnerships. Among the subjects covered are: consumer protection, unfair methods of competition and the ethics of the business community. (BBUA-703, BBUB-740)

Credit 4

BBUB-755 Compensation and Reward Systems**Registration #0102-755**

A comprehensive analysis of compensation (wages and benefits) in contemporary organizations. Among the major topics studied are the role of money, the practical problems of developing and administering compensation programs, motivational factors related to compensation, motivational features of benefits, the role of government, and current trends in benefit packages. Forces shaping the establishment of wage rates in a given firm are also studied. (BBUB-740, BBUB-750)

Credit 4

BBUB-758 Seminar in Management**Registration #0102-758**

A presentation of current specialty topics within the broad field of management. Seminar topics have included organizational power and politics, improving individual and managerial effectiveness, managerial control systems, money and motivation, organization development, conflict resolution, and small business information systems. The course topic for a specific quarter will be announced prior to the course offering. Although a seminar, the course may include some lectures and examinations. (BBUB-740, BBUB-741)

Credit 4

BBUB-759 Integrated Business Analysis**Registration #0102-759**

Also referred to as business strategy and policy, this course provides 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 functional areas of marketing, production, finance, and personnel. This course is aimed at the formulation and implementation of business policy as viewed by top management. The case method is used extensively. Since this is a capstone course, the workload is considerably above average. (All other required courses)

Credit 4

BBUB-770 Business Research Methods**Registration #0102-770**

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. Introduces the use of multivariate techniques as a means for data reduction and the analysis of complex data bases. (BBUE-782, BBUM-761)

Credit 4

BBUB-771 Research Option**Registration #0102-771**

A practicum or thesis alternative permitting the student to confront a real management problem. Requirements include steps from design to completed management report. (To be developed with selected faculty)

Credit 4

BBUB-799 Independent Study**Registration #0102-799**

A supervised investigation and report within a business area of professional interest. The exact content should be contained in a proposal for review, acceptance, and assignment to an appropriate faculty member, who will provide supervision and evaluation. Appropriateness to written career objectives and availability of faculty will be included in the review and considerations for acceptance. (To be developed with selected faculty)

Credit 1-4

Marketing Group

BBUM-761 Marketing Concepts

Registration #0105-761

Critical examination of the marketing system as a whole; functional relationships performed by various institutions such as manufacturers, brokers, wholesalers, and retailers. Analysis of costs, strategies and techniques related to the marketing system. Both behavioral and quantitative aspects of marketing are considered. (BBUM-703, BBUE-711)

Credit 4

BBUM-762 Advanced Marketing Management

Registration #0105-762

Advanced study of selected problems that face marketing managers concerned with promotion, place, price, and product. Material centers on staff marketing functions. Research topics unique to the field of marketing are covered. (BBUM-761)

Credit 4

BBUM-763 Consumer Behavior

Registration #0105-763

A study of the market in terms of the psychological and socio-economic determinations of buying behaviors, including current trends in purchasing power and population movements. (BBUM-761)

Credit 4

BBUM-764 Marketing Logistics

Registration #0105-764

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 and within marketing institutions. Specific topics covered are unit geographic location, internal product flow, inter-unit transportation, and warehousing. (BBUM-761)

Credit 4

BBUM-765 Sales Management

Registration #0105-765

An examination of selling and sales management as they pervade both the marketing process and the management communications process. Topics covered include building and managing an effective sales force and selling philosophy and techniques creating managerial "win-win" situations with both superiors and subordinates. (BBUM-761)

Credit 4

BBUM-766 International Marketing

Registration #0105-766

A study of the differences in market arrangements as well as in the legal, cultural, and economic factors found in foreign countries. Topics included are planning and organizing for international marketing operations, forecasting and analysis; interrelationships with other functions; and product, pricing, promotion, and channel strategy. (BBUM-761)

Credit 4

BBUM-767 Marketing Communications

Registration #0105-767

A study of interrelationships of three communications mix functions: public relations, advertising, and sales promotion. Topics covered will center on the use of these functions in the development of models for persuasive communications and their inter-relationships with other elements of the marketing mix. (BBUM-761)

Credit 4

BBUM-769 Seminar in Marketing

Registration #0105-769

This course will take on different content depending on the instructor and quarter when offered. Topics that may be covered are: marketing models, marketing channels, articulation with top marketing executives, and marketing positioning. Specific content for a particular quarter will be announced prior to course offering. (Permission of instructor)

Credit 4

Decision Sciences Group

BBUQ-743 Operations Management

Registration #0106-743

An analytical approach to the theory and application of production and operations management. Combines quantitative models and qualitative considerations relating to analysis of time series data forecasting, quality assurance, inventory control, MRP, Project Management, and System Design. (BBUQ-780, BBUQ-782)

Credit 4

BBUQ-780 Management Science

Registration #0106-780

An introduction to quantitative approaches to decision making. Topics covered include linear programming, goal programming, integer programming, computer simulation, and calculus-based solution procedures. The emphasis is not on the techniques per se, but rather on showing how quantitative approaches can be used to contribute to a better decision-making process. (BBUQ-781 or equivalent)

Credit 4

BBUQ-781 Introduction to Statistics

Registration #0106-781

An introduction to the use of statistics in business. Topics covered include descriptive statistics, probability concepts, probability distributions, sampling methods, and sampling distributions. Includes the use of computerized data analysis.

Credit 4

BBUQ-782 Applied Statistical Analysis

Registration #0106-782

The course emphasizes the use of statistical tools in decision making. Topics include estimation of means and proportions, one and two sample tests of means, proportions, and variances, chi-square tests, and simple and multiple regression analysis. Extensive use of a statistical software package. (BBUQ-781 or equivalent)

Credit 4

BBUQ-784 Decision Analysis

Registration #0106-784

An introduction to decision analysis for the manager. Emphasis will be on (1) structuring the problem in terms of alternatives possible, decision attributes, and operational constraints; (2) quantifying the manager's judgments as probabilities; (3) assessing the utility of the manager's preferences; (4) analyzing the problem via evaluation of the alternatives and checking the sensitivity of the solution(s). Single and multiple attribute cases under certainty will be covered. (BBUQ-782)

Credit 4

BBUQ-785 Applied Regression Analysis

Registration #0106-785

The primary objective of this course is to teach the student how to effectively utilize a variety of data analysis techniques commonly referred to as regression analysis. Emphasis will be placed on model formulation and analysis. All students will be required to analyze several large data sets using a standard statistical package. Relevant theory will be introduced to enable the student to pursue further study in data analysis. (BBUQ-782)

Credit 4

BBUQ-786 Mathematical Programming

Registration #0106-786

An in-depth study of the application of mathematical programming to business decision making. The objective of this course is to present state-of-the-art methodology and applications of mathematical programming. (BBUQ-780)

Credit 4

BBUQ-788 Survey Design & Sampling

Registration #0106-788

This course will cover the following topics in survey design and sampling: (1) questionnaire design, (2) types of sampling techniques, (3) determination of sample size, (4) methods for increasing the response rate, (5) use of appropriate statistics to analyze results. (BBUQ-782)

Credit 4

BBUQ-789 **Simulation****Registration #0106-789**

An introductory course in the use of computer simulation in the solution of complex business problems. A simulation language is introduced and applied in the solution of a term project. Particular attention is focused on the types of problems for which computer simulation is a viable solution technique as well as methods for establishing the validity of the simulation. (BBUQ-780, BBUQ-782)
Credit 4

BBUQ-790 **Information Systems****Registration #0106-790**

The concepts and techniques for the design and implementation of a computer-based management system are studied. Topics include systems theory, the generation and collection of data, the transformation and dissemination of information, and the economics of information. (BBUQ-743)
Credit 4

BBUQ-793 **Business Forecasting Methods****Registration #0106-793**

An introduction to quantitative and qualitative forecasting methods and their use in business forecasting. The student will be taught how to recognize which forecasting procedures to use based upon an analysis of problem characteristics. Includes the use of interactive forecasting techniques. (BBUQ-782)
Credit 4

BBUQ-794 **Multivariate Methods in Business****Registration #0106-794**

An introduction to the use of multivariate techniques (other than multiple regression analysis) and their use in analyzing business data. The major objective will be to demonstrate the proper use of a variety of multivariate techniques using several large-scale data sets. The student will be required to use a standard statistical package. A major objective will be to teach the student how to interpret the output of a computer package in terms of the decision-making situation underlying the problem being investigated. (BBUQ-785)
Credit 4

BBUQ-795 **Seminar in Decision Sciences****Registration #0106-795**

This course will take on different content depending on the instructor and quarter when offered. Specific content for a particular quarter will be announced prior to course offering. (Permission of instructor)
Credit 4

Human Services Group

BBUH-701 **Economic Environment of Human Services****Registration #0115-701**

Studies of the macroeconomic forces impacting the agency environments, such as funding and service populations, and the microeconomic concepts which can be used to aid agency resource allocation decisions and in the analysis of alternate agency policies. Topics include national income concepts and policies and economic demand for services and benefit/cost considerations.
Credit 4

BBUH-711 **Law and the Administrative Process****Registration #0115-711**

Practices, problems, and issues in the implementation of public policy. Civil law, regulation, and statutes affecting contracts, internal and external publics, employee welfare, and fiduciary responsibilities. The exercise of governmental power and control over administrative action. Specific legal areas such as rule making, licensing, adjudication, and judicial review will be examined. (BBUH-701)
Credit 4

BBUH-712 **Bureaucracy in Modern Society****Registration #0115-712**

The nature of bureaucratic organization in modern Western societies, especially the United States; business corporations, trade unions, the military, hospitals, law enforcement agencies. Problems resulting from conflicts and values, constituencies, and theories among these institutions. (BBUH-740)
Credit 4

BBUH-731 **Intervention in the Community****Registration #0115-731**

Methods of agency intervention in specific problem areas, identified as needed by the community, with focus on the role of management. Covers approaches to community intervention with special attention focused on such problem areas as crime, poverty, health, mental health, education, cultural resources, and population conflict. Issues will regard the manner in which agencies formulate intervention strategies and implementation, particularly as the process involves the management role. (BBUH-740)
Credit 4

BBUH-732 **Cooperation and Conflict****Registration #0115-732**

Establishing working relationships between various providers of services and the resolution of system conflict. Topics to be covered include: the development of conflict between and within agencies, the evolution of a cooperative system of services, incompatible interest groups, competition among providers, problems of limited funding, and problems associated with the growth or decline of services. Emphasis is placed on the manager in the resolution of conflict. (BBUH-740)
Credit 4

BBUH-733 **Interpersonal Skills****Registration #0115-733**

The development of skills related to leadership, group dynamics, public relations, and aspects of personal growth. Self-awareness for the person in a managerial role will be stressed, particularly as this involves interaction with colleagues both within and outside the agency of employment. Management styles will be analyzed for strengths and weakness to develop an increased awareness of the particular characteristics leading towards beneficial managerial outcomes. (BBUH-740)
Credit 4

BBUH-734 **Deviance, Conformity, and Criminal Behavior****Registration #0115-734**

A study of the social and psychological factors identified with the genesis of specific social pathologies which are exhibited by groups and individuals. The course presents an analysis of the various forms of deviance including deviance from professional rules and norms; deviance from expected interaction patterns and traditional areas of deviance such as crime, alcoholism, mental illness, homosexuality, prostitution, counterculture, and revolutionary activities; methods of social reaction to deviance.
Credit 4

BBUH-735 **Special Populations****Registration #0115-735**

The needs of special populations such as the elderly, youth, ethnic minorities, women, the educationally disadvantaged, poor, and others. The course will address the particular considerations relevant to programming for these specific populations. Historical considerations will be raised.
Credit 4

Graduate Faculty College of Business

Walter F. McCanna, Ph.D., University of Wisconsin-Madison—Dean; Professor, Management

Thomas E. Comte, Ph.D., University of Missouri; MBA, Columbia—Associate Dean, Associate Professor, Management

Barbara J. Howard, MBA, BS, Rochester Institute of Technology—Director, Graduate Programs in Business

Department of Management

Robert Pearce, Ph.D., University of Chicago—Distinguished Lecturer and Chairman

Management Faculty

Robert J. Barbato, Ph.D., Michigan State—Assistant Professor, Management

Andrew J. DuBrin, Ph.D., Michigan State; MS, Purdue—Professor

Kenneth Graham, Jr., Ph.D., MBA, Union College—Assistant Professor, Management

William L. Mihal, Ph.D., University of Rochester; MS, Clarkson—Associate Professor

Karen Paul, Ph.D., Emory University—Assistant Professor, Management

Robert Pearce, Ph.D., University of Chicago—Distinguished Lecturer and Chairman

George Sullivan, BS, St. Peter's College; JD, Seton Hall University; LL.M., New York University—Assistant Professor

Philip R. Tyler, DBA, MBA, Michigan State—Associate Professor, Management; Director, Center for Management Development

Nathan B. Winstanley, Ph.D., Purdue University—Distinguished Lecturer

Department of Decision Sciences

Thomas A. Williams, Ph.D., Rensselaer Polytechnic Institute—Professor and Chairman

Decision Science Faculty

Terry L. Dennis, Ph.D., MSIA, Purdue—Associate Professor, Operations Systems

George A. Johnson, DBA, MBA, Indiana University—Professor, Operations Management

Thomas F. Pray, Ph.D., Rensselaer Polytechnic Institute—Associate Professor, Operations Systems

William J. Stevenson, Ph.D., MBA, Syracuse—Associate Professor, Operations Systems

Department of Marketing

Eugene F. Fram, Ed.D., SUNY at Buffalo—Professor and Chairman

Marketing Faculty

Yusuf A. Choudhry, Ph.D., MBA, Syracuse University—Lecturer, International Business and Marketing
Dale F. Gibson, MBA, Pennsylvania—Associate Professor, Marketing

Dean C. Siewers, Ph.D., North Carolina-Chapel Hill; MBA, Duke University—Assistant Professor, Marketing

Patricia A. Sorce, Ph.D., MS, University of Massachusetts—Assistant Professor, Marketing and Behavioral Science

Stanley M. Widrick, Ph.D., Syracuse; MBA, SUNY at Buffalo—Associate Professor, Marketing

Julian E. Yudelsohn, Ph.D., Northwestern; MBA, Emory—Associate Professor, Retailing/Marketing

Department of Accounting

Jose A. Rullan, MS, Rochester Institute of Technology; CPA—Instructor and Acting Chairman

Accounting Faculty

Stanley M. Dye, BA, Haverford; CPA—Distinguished Lecturer, Accounting, Former Partner, Coopers, Lybrand

E. James Meddaugh, Ph.D., Pennsylvania State; MBA, Drexel—CPA, Professor

Daniel D. Tesson, MS, Clarkson; CPA—Assistant Professor, Accounting

Department of Finance

John S. Zdanowicz, Ph.D., MBA, Michigan State—Associate Professor and Chairman; Director, School of Retail Management

Finance Faculty

James C. Galloway, Ph.D., University of Virginia; MBA, Pennsylvania—Assistant Professor, Finance

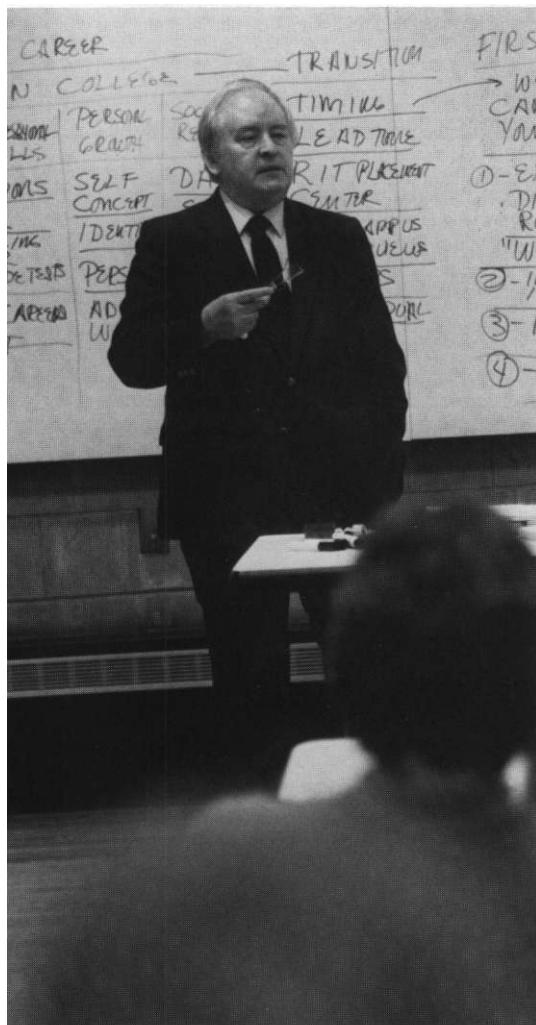
Lawrence E. McLean, Ph.D., Syracuse University; MBA, University of Chicago—Assistant Professor, Finance

Economics Faculty

You-Keng Chiang, Ph.D., Chicago—Professor, Economics

Steven C. Gold, Ph.D., SUNY at Binghamton—Assistant Professor, Economics

John A. Helmuth II, Ph.D., South Carolina—Assistant Professor, Economics



College of Continuing Education



Master of Science Degree in Applied and Mathematical Statistics

John D. Hromi, Frederick H. Minett
Professor; Director, Center for Quality and Applied Statistics: 475-2002

Edward G. Schilling, Paul A. Miller
Professor; Chairman, Graduate Statistics: 475-6129

Objectives

Statistics today is defined as the science of making decisions in the face of uncertainty. To aid those needing the basic statistical tools to collect and

analyze data, and to aid those needing to update their present statistical skills, the graduate program in statistics is offered by the College of Continuing Education at RIT through the Center for Quality and Applied Statistics.

Candidates

Currently, the students are engineers, managers, scientists, auditors, production and inspection personnel, and those interested in industrial research, quality control, reliability, metrology, and testing. Generally, the degree offers opportunity for immediate advancement in many early careers, and for career changes. The uniqueness of the program is its intent to help on the job today, or in the near future.

Part-time evening program

The program in applied and mathematical statistics is conducted on a *part-time evening basis* and is

intended primarily for full-time employees of business and industry. Each class meets once a week for three hours 6:30-9:30 p.m., unless otherwise arranged, with approximately six hours of homework. Normally, it takes two years to complete the program, attending two nights a week. Students from other programs at RIT may also participate, as may those without a degree objective who desire specialized training in particular statistical fields. Also, those in industry desiring to update their skills or extend their education in statistics further will find this program well-suited to their needs.

No entrance exam

Courses are offered on an open enrollment basis which is supportive of the RIT commitment to recurrent education. There are no entrance exams, and the program is self-contained at RIT. Students are expected to take an oral examination after completing the core courses.

A practical program

Both teachers and students work to put job experience and class studies together. For example, theses and papers often have job supervisor's approval and result is being put into effect rather than into the library. Theory is used for understanding, but is not necessarily an end in itself. Here theory means gaining knowledge of the underlying mathematical principles and learning how to solve problems intelligently.

Requirements

For the master of science in applied and mathematical statistics degree, the satisfactory completion of the following quarter courses is required:

Two basic courses:

(These may be waived by the department chairperson upon evidence of equivalent learning, experience or competency.)

CQAS-711 and 712 Fundamentals of Statistics I & II

Eight core courses:

CQAS-801 and 802 Design of Experiments I & II
 CQAS-821 and 822 Theory of Statistics I & II
 CQAS-841 and 842 Regression Analysis I & II
 CQAS-851 Nonparametric Statistics
 CQAS-881 Bayesian Statistics

Seven electives:

Taken from other courses listed under "Course Descriptions" in such areas as quality control, managerial decision making, multivariate analysis, sample surveys, reliability, and probability theory.

The total of 15 or 17 courses, each counting 3 quarter credits, comes to 45 or 51 credits depending on whether the basic courses (711-712) are waived. As indicated above, studies are normally completed in two to four years by attendance one or two nights a week.

The core courses are expected to be completed early in a student's program. Upon completion of the core courses or after 30 hours of instruction, an oral examination is required. After successful completion of the examination, the

remainder of the program is prepared with the advice and counsel of the department.

Levels of courses

There are 700 and 800 courses. The 700 level furnishes most of the standard methods currently used in industry; the 800 series covers theory and applications in special areas like the design of experiments. Generally, the 800 level is more advanced. From time to time, special courses are offered in topics of particular interest when requested by the students or as new fields of statistics open up.

Career guidance

The minimum of 24 credits in the 800 series (core courses above) is required. All other courses are elective. In consultation with a departmental advisor, a total program structured to achieve individual professional objectives is worked out with each person interested in such guidance.

Admission

Admission to the degree program will be granted to qualified holders of a baccalaureate degree from an accredited college or university who has acceptable mathematics credits through integral calculus. Applicants who fail to meet the latter requirement may, at the discretion of the department chairperson, be required to complete two or three undergraduate mathematics courses before being able to matriculate in the regular graduate program.

Although students are encouraged to begin their graduate studies at any time, it is highly advisable to formally seek admission to the program no later than after completion of the core courses. This will assure proper selection of courses, adequate administrative time for transcripts, etc., and an early oral exam to indicate student capability to attain the MS degree.

Procedure

To be considered for admission it is necessary to file an application, submit transcripts of all previous undergraduate and graduate work, obtain two letters of recommendation, and pay a \$25 application fee. RIT graduates do not have to pay this fee. Forms and instructions, including quarterly offerings and registration forms, may be obtained by writing to:

Director of Admissions
 Rochester Institute of Technology
 One Lomb Memorial Drive
 P.O. Box 9887
 Rochester, NY 14623

Transfer and interdisciplinary credits

Credit for courses of graduate stature in statistics, mathematics, computer programming, operations research, and other quantitative fields related to statistics may be accepted toward fulfillment of degree requirements at the discretion of the department chairperson with due regard to the candidate's objectives. However, to insure credit toward the degree, candidates should write the chairperson indicating courses for which he or she would like transfer credit for work in the past and to obtain prior approval of courses for which transfer credit is sought. While these matters would be discussed with either the candidate's advisor or the department at various times during the advisement process, it is essential that all agreements be documented *in writing*. A letter to the departmental chairperson will assure proper recognition of outside work accomplished toward the degree.

Non-matriculated students

It is not necessary to be formally admitted or matriculated into the MS in statistics program in order to register for course offerings. Those who are eligible, however, should matriculate as early as possible, as recommended above. Those who do not have college degrees may be admitted to courses in fields of their special interest by consent of the department chairperson.

Grades, exams and theses

The candidate must attain an overall average grade of 3.0 (B) for graduation. An oral examination is required at the completion of the core courses to assure subject matter and verbal proficiency as well as ability to perform as a statistician in a working environment. Successful completion of each quarter course normally requires passing a final exam, submission of a written paper or thesis, or completion of a group project, as determined by the instructor. Students are encouraged to develop their writing and speaking skills as well as to use the computer as ways to improve their knowledge.



Location

Courses are offered at the Henrietta campus, at selected off-campus locations, and at in-plant training facilities.

Plans of study

Students may, with the permission of the departmental chairperson, secure credits toward the master's degree in two ways:

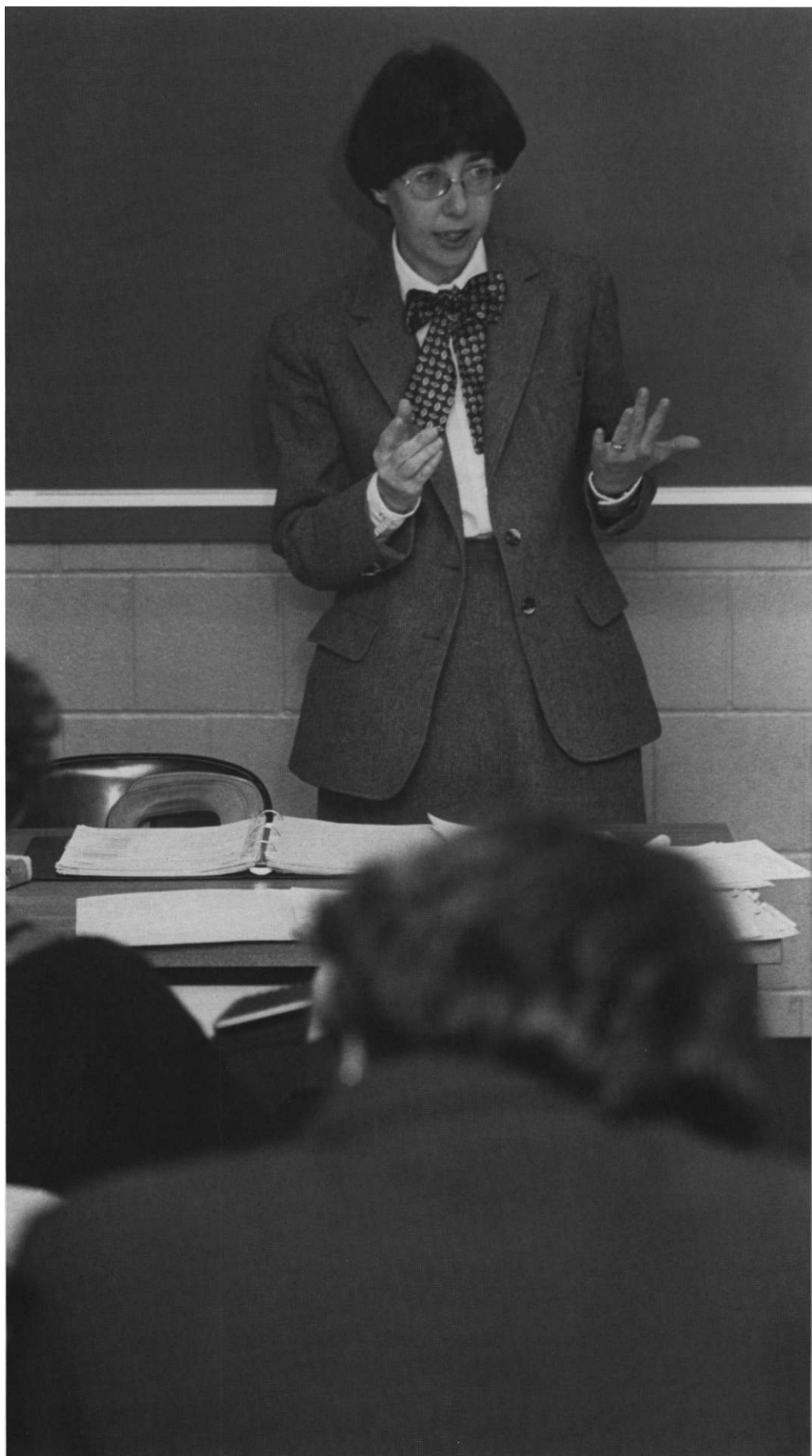
First, a student may complete the required 45 or 51 quarter credits, depending on whether the basic "Fundamentals" courses are waived by formal *classroom* attendance and receipt of satisfactory grades.

Second, three, six or nine of these credits may be obtained by submission of a satisfactory research project and *thesis*. The project and credits must be approved by the department chairperson prior to registration. A letter outlining the project and requesting this approval must be addressed to the chairperson by the candidate prior to the regular registration periods. The depth of the project will determine the number of credits received. Generally this type of credit should be sought at the end of the program after sufficient knowledge of the subject is available for use. CQAS-896, 897, and 898 are the registration numbers used for thesis work.

Faculty

Two full-time and some 15 adjunct faculty normally teach in the master's program in applied and mathematical statistics. All instructors have an industrial background. This is reflected in their realistic approach to the subject matter. Many of the faculty hold jobs which require them to apply daily what they teach at night; e.g., the quality control instructor installs quality control systems for his company. As with many others dedicated to continuing education, faculty members have a commitment to give the students personal attention. This often involves career counseling.

The faculty select textbooks, determine subjects to be taught, and keep students up to date with new developments in their fields. Quarterly meetings of the faculty provide a continuous avenue of communication. An Industrial Advisory Committee periodically advises the Chairperson and collegiate administrators on academic and administrative matters. It assists in the determination of how RIT can best serve local and regional needs.



Graduate Courses in Applied and Mathematical Statistics

CQAS-711 Fundamentals of Statistics I

Registration #0280-711

For those taking statistics for the first time. Covers the statistical methods used most in industry, business and research. Essential for all scientists, engineers, and administrators.

Topics: organizing observed data for analysis and insight; learning to understand probability as the science of the uncertain; concepts of random variables and their associated probability models; meaning and practical use of the Central Limit Theorem. (Consent of the department)

Credit 3 or 4 (offered each quarter)

CQAS-712 Fundamentals of Statistics II

Registration #0280-712

Continuation of CQAS-711.

Topics: concepts and strategies of statistical inference for making decisions about a population on the basis of sample evidence; tests for independence and for adequacy of a proposed probability model; learning how to separate total variability of a system into identifiable components through analysis of variance; regression and correlation models for studying the relationship of a response variable to one or more predictor variables. (CQAS-711 or equivalent)

Credit 3 or 4 (offered each quarter)

CQAS-721 Quality Control: Control Charts

Registration #0280-721

A practical course designed to give depth to practicing quality control personnel.

Topics: statistical measures; theory, construction, and application of control charts for variables and for attributes; computerization procedures for control charts; tolerances, specification, and process capability studies; basic concepts of total quality control, and management of the quality control function. (Consent of the department)

Credit 3 (offered in Fall and Spring Quarters)

CQAS-731 Quality Control: Acceptance Sampling

Registration #0280-731

Investigation of modern acceptance sampling techniques with emphasis on industrial application.

Topics: single, double, multiple, and sequential techniques for attributes sampling; variables sampling; techniques for sampling continuous production. The course highlights Dodge-Romig plans, Military Standard plans, and recent contributions from the literature. (Consent of the department)

Credit 3 (offered in Winter and Summer Quarters)

CQAS-761 Reliability

Registration #0280-761

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; Bayesian test programs. (CQAS-712 or equivalent)

Credit 3 (offered in Spring Quarter)

CQAS-801 Design of Experiments I

Registration #0280-801

How you design and analyze experiments in any subject matter area; what you do and why.

Topics: basic statistical concepts; scientific experimentation; completely randomized design; randomized complete block design; nested and split plot designs. Practical applications to civil engineering, pharmacy, aircraft, agronomy, photoscience, genetics, psychology, and advertising. (CQAS-712)

Credit 3 (offered each quarter)

CQAS-802 Design of Experiments II

Registration #0280-802

Continuation of CQAS-801.

Topics: factorial experiments; fractional, three level, mixed; response surface exploration. Practical applications to: medical areas, alloys, highway engineering, plastics, metallurgy, animal nutrition, sociology, industrial and electrical engineering. (CQAS-801)

Credit 3 (offered in Fall, Spring and Summer Quarters)

CQAS-821 Theory of Statistics I

Registration #0280-821

Provides a sound theoretical basis for continuing study and reading in statistics.

Topics: constructs and applications of mathematical probability; discrete and continuous distribution functions for a single variable and for the multivariate case; expected value and moment generating functions; special continuous distributions. (Consent of department)

Credit 3 (offered in Fall Quarter)

CQAS-822 Theory of Statistics II

Registration #0280-822

Continuation of CQAS-821.

Topics: supporting theory for, and derivation of sampling distribution models; applications and related material. Point estimation theory and applications, the multivariate normal probability model, its properties and applications; interval estimation theory and applications. (CQAS-821 or equivalent)

Credit 3 (offered in Winter Quarter)

CQAS-830 Multivariate Analysis I

Registration #0280-830

Deals with the summarization, representation, and interpretation of data sampled from populations where more than one characteristic is measured on each sample element. Usually the several measurements made on each individual experimental item are correlated, and certainly one should not apply to each measurement separately. This course covers the use of the basic multivariate techniques. Computer problem solving will be emphasized. Topics will include multivariate, t-test, ANOVA, regression analysis, repeated measures, quality control and profile analysis. (CQAS-801, 802)

Credit 3 (offered in Spring Quarter)

CQAS-831 Multivariate Analysis II

Registration #0280-831

A continuation of CQAS-830, this course covers the use of advanced multivariate techniques. Topics include principal component analysis, cluster analysis, multi-dimensional contingency tables, discrete discriminant analysis, multi-dimensional scaling, and regression with errors in the independent variables. Practical applications will be emphasized. (CQAS-830)

Credit 3 (offered in Summer only)

CQAS-841 Regression Analysis I

Registration #0280-841

A methods course dealing with the general relationship problem.

Topics: the matrix approach to simple and multiple linear regression; analysis of residuals; dummy variables; orthogonal models; computational techniques. (CQAS-802 or equivalent)

Credit 3 (offered in Winter Quarter)

CQAS-842 **Regression Analysis II****Registration #0280-842**

A continuation of CQAS-841.

Topics: selection of best linear models; regression applied to analysis of variance problems; nonlinear estimation and model building. (CQAS-841 or equivalent)

Credit 3 (offered in Spring Quarter)

CQAS-851 **Nonparametric Statistics****Registration #0280-851**

Distribution-free testing and estimation techniques with emphasis on applications.

Topics: sign tests; Kolmogorov-Smirnov statistics; run tests; Wilcoxon-Mann-Whitney test; Chi-Square tests; rank correlation; rank order tests; quick tests. (CQAS-712 or equivalent)

Credit 3 (offered in Fall, Spring and Summer Quarters)

CQAS-853 **Managerial Decision Making****Registration #0280-853**

Statistical decision analysis for management.

Topics: utilities; how to make the best decision (but not necessarily the right one); normal and beta Bayesian theory; many action problems; optimal sample size; decision diagrams. Applications to marketing; oil drilling; portfolio selection; quality control; production; and research programs. (CQAS-881 or equivalent)

Credit 3 (offered in Winter Quarter)

CQAS-856 **Interpretation of Data****Registration #0280-856**

Advanced topics related to use of statistics in investigational analysis including narrow limit gauging, practical designs of experiments, analysis of small sample data, analysis of means, identifying assignable causes and other methods for troubleshooting with statistical methods. (CQAS-712 or equivalent)

Credit 3 (offered in Spring Quarter)

CQAS-871 **Sampling Theory and Applications****Registration #0280-871**

An introduction to sample surveys in many fields of applications with emphasis on practical aspects.

Topics: review of basic concepts, sampling problem elements; sampling; random, stratified, ratio, cluster, systematic, two-stage cluster; wild life populations, questionnaires, sample sizes. (CQAS-712 or equivalent)

Credit 3 (offered in Winter and Summer Quarters)

CQAS-873 **Time Series Analysis****Registration #0280-873**

A methods course in modeling and forecasting of time series with emphasis on model identification, model fitting and diagnostic checking.

Topics: survey of forecasting methods, regression methods, moving averages, exponential smoothing, seasonality, analysis of forecast errors, Box-Jenkins models, transfer function models, case studies. (CQAS-841 or equivalent)

Credit 3 (offered in Fall Quarter)

CQAS-875 **Empirical Modeling****Registration #0280-875**

A course in model building based on the application of empirical data gathered through appropriate experimental design and analyzed through regression techniques.

Topics: response variable construction, experimental design methods, and related analysis techniques. (CQAS-802, 842)

Credit 3 (offered in Winter Quarter)

CQAS-881 **Bayesian Statistics****Registration #0280-881**

An introduction to Bayesian statistics and decision making which explores Bayes' Theorem in its relation to classical and Bayesian methodology.

Topics: probability, Bayes' theorem assessment of prior probabilities and likelihoods, hypothesis testing, and the multi-variable case. (CQAS-712 or equivalent)

Credit 3 (offered in Fall Quarter)

CQAS-886 **Sample Size Determination****Registration #0280-886**

The question most often asked of an industrial statistician is "What size sample should I take?" This course answers that question for a wide variety of practical investigational projects. Techniques for the full use of the optimal sample evidence are also offered. (CQAS-712 or equivalent)

Credit 3 (offered in Summer Quarter)

CQAS-891, 892, 893 **Special Topics in Applied Statistics****Registration #0280-891, -892, -893**

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)

Credit 3/Qtr.

CQAS-895 **Statistics Seminar****Registration #0280-895**

This course, or sequence of courses, provides for one or more quarters of independent study and research activity. This course may be used by other departments or other colleges at RIT 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)

Credit 3 (offered each quarter)

CQAS-896, 897, 898 **Thesis****Registration #0280-896, -897, -898**

For students working on the MS degree in applied and mathematical statistics who use a research project and thesis for three, six or nine credits. (Consent of the department required)

Credit 3 (offered each quarter)



Graduate Faculty College of Continuing Education

Donald D. Baker, BA, Trinity College; ME, MBA, Ed.D., University of Rochester—Associate Professor, Dean

John D. Hromi, BS, Carnegie-Mellon University; BEE, Clemson University, M Litt., University of Pittsburgh, D. Engr., University of Detroit—Frederick H. Minett Professor, Director, Center for Quality and Applied Statistics.

Edward G. Schilling, B.A., M.B.A., University of Buffalo, M.S., Ph.D., Rutgers University—Paul Miller Professor, Chairman, Graduate Statistics.

Mason E. Wescott, Ph.D., Northwestern—Professor Emeritus, Statistics

Anne M. Barker, BA, Nazareth College; MS, Rochester Institute of Technology

Thomas B. Barker, BS, MS, Rochester Institute of Technology

J. Douglas Ekings, BS, Virginia Military Institute; MS, University of Rochester

David L. Farnsworth, BS, Union College; MA, Ph.D., University of Texas

John K. Lynch, BS, MS, University of Wyoming

Martin J. Madigan, BS, MS, Rochester Institute of Technology

Charles S. Masick, BS, MS, MBA, University of Rochester

Robert M. Meisel, BS, ME, Rensselaer Polytechnic Institute; MS, Rochester Institute of Technology

John L. Pabrinkis, BS, MS, University of Rochester

Jacob C. Rubin, BS, College of the City of New York; MS, Rochester Institute of Technology

Richard R. Scott, BS, MS, Rochester Institute of Technology

William A. Swagler, Jr., BSIE, General Motors Institute; MS, Rochester Institute of Technology

Thomas K. Witt, BS, Kansas State University; MS, Rochester Institute of Technology

Donald A. Wright, BS, MS, University of Rochester

Hubert D. Wood, BS, George Washington University; MS, University of Rochester

Nicholas A. Zaino, Jr., BS, Rochester Institute of Technology; MSEE, Pennsylvania; MA, University of Rochester

College of Engineering

**Richard A. Kenyon, Dean
Engineering**

Master of Engineering degree

Master of Science degree in Electrical or Mechanical Engineering

The College of Engineering offers graduate programs leading to the master of engineering degree, or the master of science degree in electrical or mechanical engineering. The purpose of the graduate programs in engineering is to equip the graduate student with the insight, understanding and competence commensurate with demands of current and future positions in engineering.

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

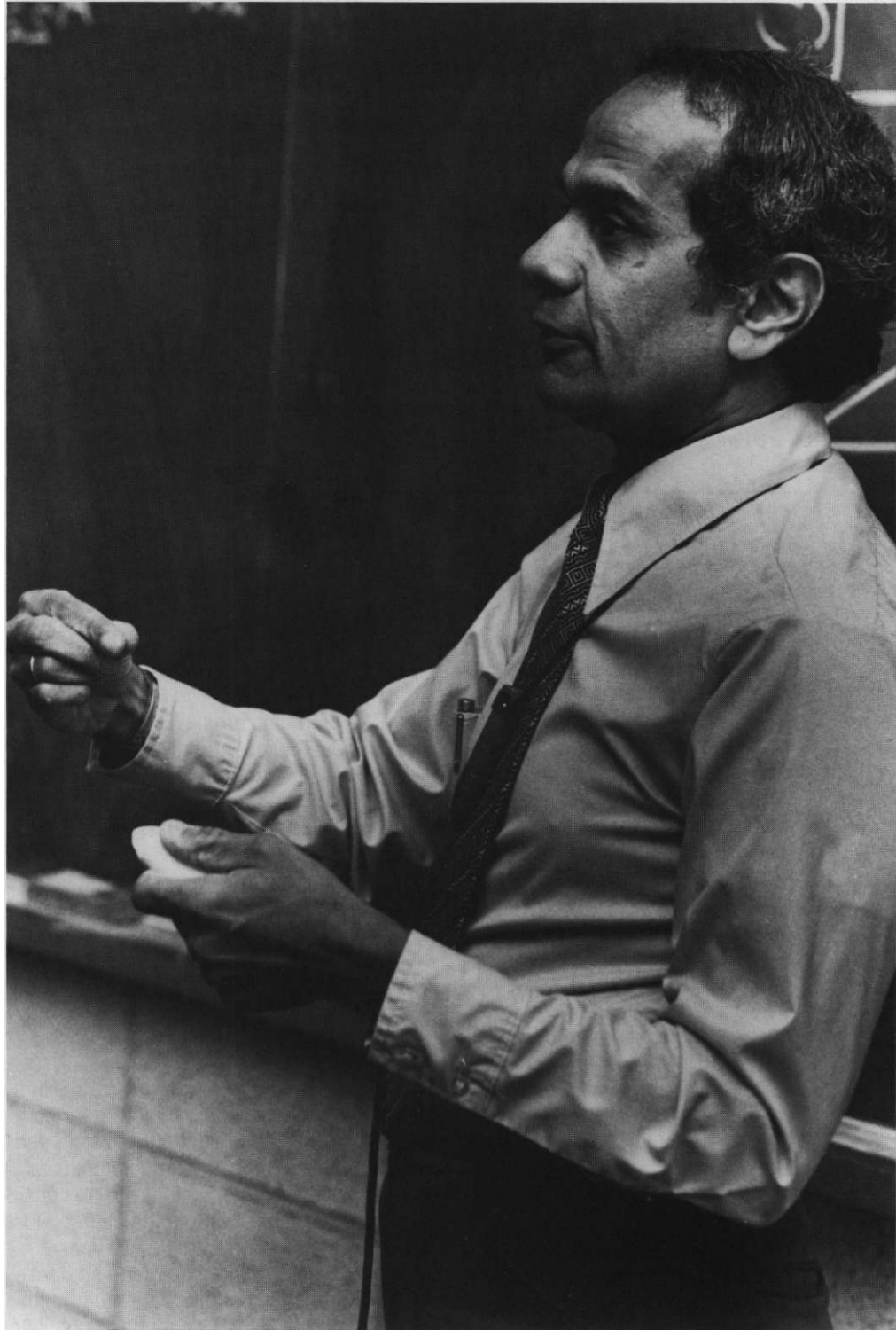
Part-time study

The College of Engineering encourages practicing engineers in the greater Rochester industrial community to pursue a program toward the master of science degree 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 in full-time industry must obtain the permission of his or her advisor and the approval of the department head.

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

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



Full-time study

Even though 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 may also enroll full-time graduate students. A full-time student may take up to 16 credits per quarter.

A full-time student in the master of engineering degree program alternates academic quarters with his or her internship. A full-time student can normally complete the degree requirements in one calendar year.

Financial aid

A limited amount of financial aid is available to the full-time student. Detailed information on aid can be obtained from the individual department heads.

In-plant graduate courses

In order to enable the practicing engineer to take graduate courses with the minimum amount of inconvenience, a number of courses for RIT credit are offered in selected industrial locations.

Admission

Admission

Any student who wishes to become a candidate for the master's degree must first be formally admitted to the appropriate graduate program. Formal admission to a graduate program gives matriculated status to a student.

An applicant is admitted as a graduate student if he or she has received a bachelor's degree from an approved undergraduate school, and if an examination of the required documents indicates the qualifications to undertake a graduate program.

Graduate applicants who do not fully satisfy all admission criteria (such as appropriate baccalaureate degree, grades, and other credentials) may be considered for admission with the condition that they will be required to take additional undergraduate courses to make up their deficiencies. Such courses will not normally count toward the graduate credits required for the master's degree.

All applicants who are admitted prior to the conclusion of their baccalaureate program are required to submit their final transcript by the end of the first quarter of graduate work.

To be considered for admission it is necessary to file an Application for Admission to Graduate Study accompanied by the appropriate transcripts of previous undergraduate and graduate study, and two letters of recommendation.

Non-matriculated status

An applicant is permitted to take graduate courses as a non-matriculated student if he or she has a bachelor's degree from an approved undergraduate school and the necessary background for the specific courses in which he or she wishes to enroll. The courses taken for credit can usually be applied toward the master's degree when the student is formally admitted to the graduate program at a later date. However, the number of credits that will be transferred to the degree program from courses taken at RIT as a non-matriculated student will be limited to an absolute maximum of 12 credits.

An applicant who wishes to enroll in a graduate course as a non-matriculated student must obtain permission from the person in charge of the graduate program in each department and the appropriate faculty member.

Graduate Record Examination

The College of Engineering does not require graduate applicants to take the Graduate Record Examination.

Plan of study

The programs are flexible and afford students an opportunity to plan a course of study suited to their own interests and directed toward their own objectives. Each graduate student should submit a plan of study to the department office within the first year after admission as a graduate student. To assure a coherent program and one which reflects the student's maturing capacities and aims, the plan may be revised on request.

Transfer credits

A maximum of nine quarter credits in a 45 credit hour program or 12 quarter credits in a 48 credit hour program can be transferred from graduate courses taken outside the Institute. To be considered for transfer credit, the course must have been taken within a five-year period prior to the date of the student's initial entry into a graduate program in engineering at RIT as a non-matriculated or regular student. Courses taken at another institution after the student's initial entry into a graduate engineering

program at RIT are also eligible for transfer credit. However, to insure transferability, prior approval should be obtained. The student should contact the individual department office about the procedure for obtaining transfer credits.

Faculty advisor

A member of the graduate faculty is appointed as a faculty advisor for each graduate student. The faculty advisor supervises the progress of the student towards the master's degree. Non-matriculated students should direct their questions to either the department head or the chairperson of the department's Graduate Committee.

Course descriptions

For a complete outline of courses, refer to the course description section.

Grade requirements

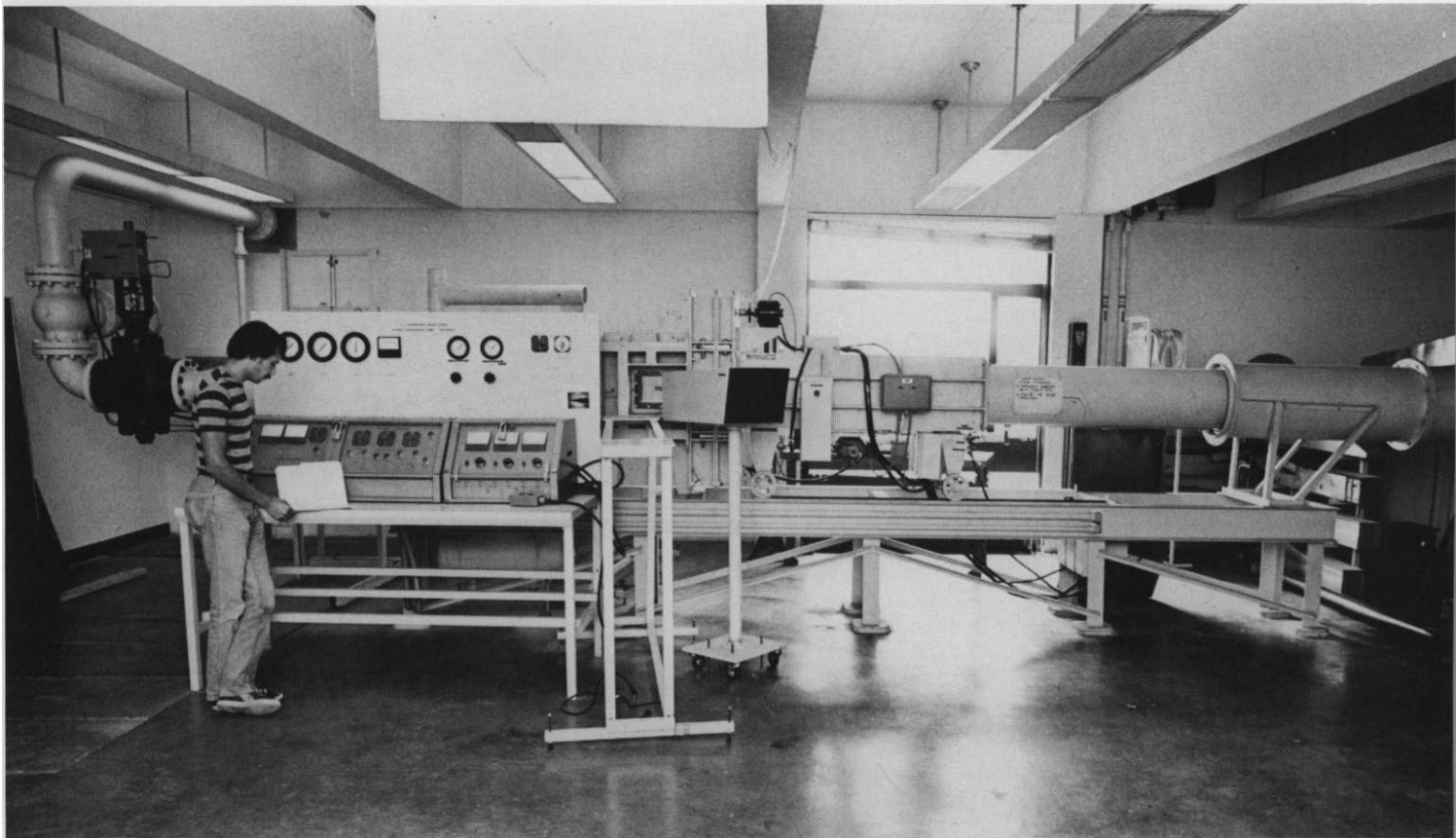
The average of the grades for all courses taken at the Institute and credited toward the master's degree must be at least a "B" (3.0). Transfer credits from other institutions and internship credits are not included in the computation of the cumulative grade point average. The policy on probation and suspension is explained in the section "Steps Toward Degree" in this Bulletin. The student must pay careful attention to that policy. If a student fails any required examination, the student's advisor may recommend to the dean that the student's performance be reviewed and appropriate action taken.

Thesis

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

The thesis must comply with the following regulations:

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 a degree. The original and two copies of the thesis must be submitted to the departmental office before the above deadline. These copies are for transmittal to the Institute library, the departmental office, and the student's thesis advisor. For detailed instructions about the organization of the thesis, the student should consult the brochure "Thesis Format," available at the departmental office.



Maximum limit on time

The required credits for the master's degree must be completed within **seven** years after the student's initial registration in graduate courses at the Institute as a regular or non-matriculated student.

Courses of instruction

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

Master of Engineering Degree Program

This is a post-baccalaureate internship program leading to the professional degree of master of engineering. The objective of the program is to provide the engineering BS graduate the means for earning a terminal master's degree, substituting a well organized industrial internship for the conventional thesis or equivalent requirement for an MS degree.

Special features of the program

An industrial internship of duration equivalent to two academic quarters in a full-time engineering position is an integral part of the program. A minimum of eight and a maximum of 16 credits may be earned by the student's internship experience. The internship is selected to reflect each student's primary professional interest and is integrated with his or her curriculum.

In a limited number of cases, where a regular internship is not practical due to extraordinary circumstances, case studies may be substituted for internship. Such a substitution has to have the prior approval of the department head and the director of graduate programs.

The program, although rooted in engineering, will be significantly interdisciplinary. By design, a student's program may range over several colleges of the Institute in assembling courses which will best help the student meet professional objectives. A maximum of 16 credits can be taken by the student in courses outside the traditional area of engineering and the sciences, subject to advisor approval.

Admission requirements

The requirements and general standards for admission and the selection

procedure will be essentially similar to those for the MS degree programs.

Degree requirements

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

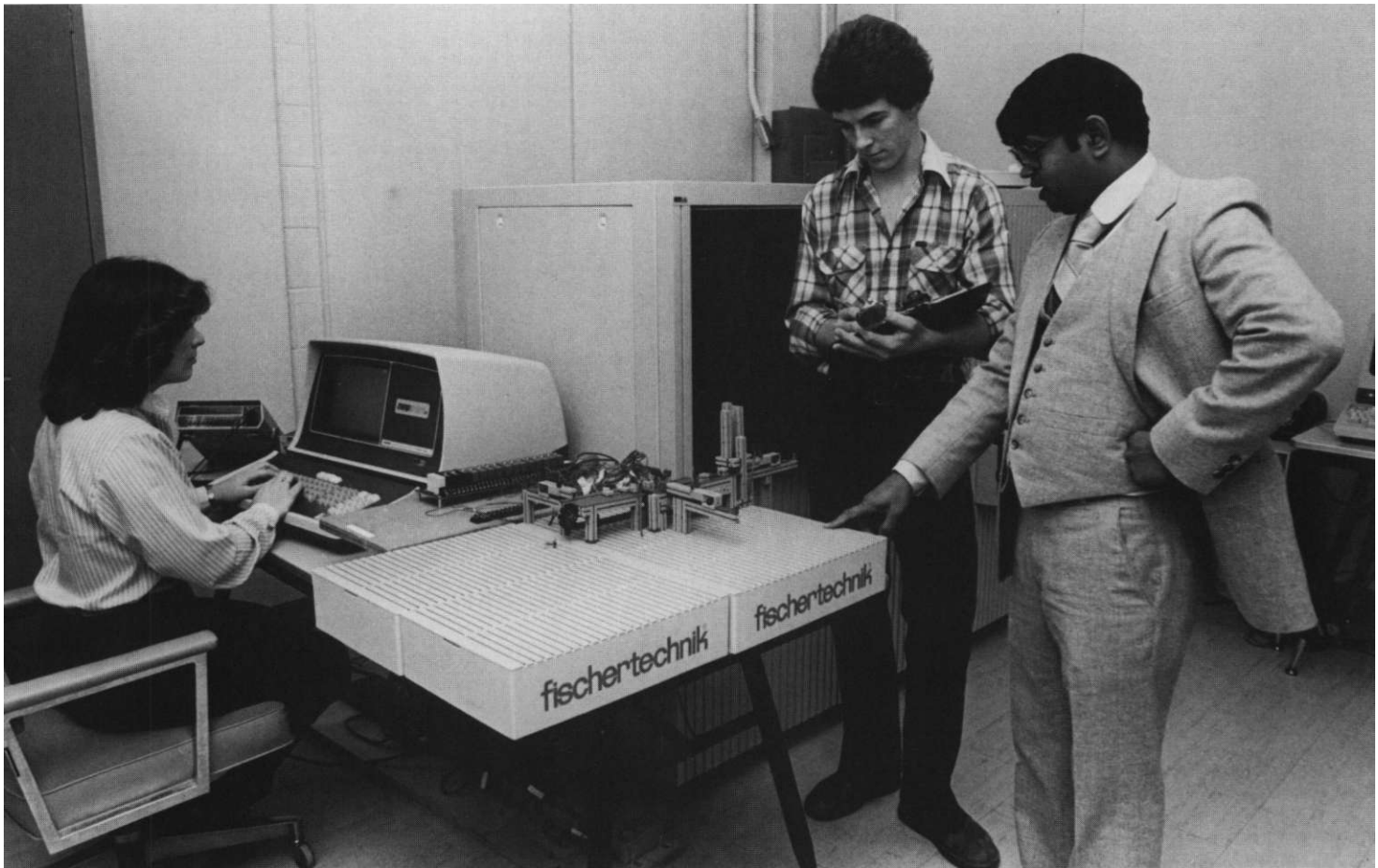
Faculty advisor

Each student will be assigned a faculty advisor as soon as he or she is formally admitted to the program.

In cases where the student's background warrants it, a committee of two advisors will be assigned. The faculty advisor will assist the student in preparing a meaningful plan of study. The advisor will also monitor and evaluate the student's internship experience (in cooperation with the student's industrial supervisor) and recommend to the Graduate Committee of the College of Engineering the number of academic credits to be awarded for the internship experience.

Master of Science Degree in Materials Science and Engineering

A degree program leading to the master of science degree in materials science and engineering is offered jointly by the Colleges of Engineering and Science. A detailed description of this program is contained in the College of Science section of this bulletin.



Roy Czernikowski,
Department Head

The Computer Engineering Department offers several graduate courses which are open as electives to graduate

Swaminathan Madhu,
Department Head

Master of Science degree program

The master of science degree in electrical engineering is awarded upon the successful completion of an approved graduate program consisting of a minimum of 45 credit hours. Under certain circumstances, a student may be required to complete more than the minimum number of credits.

Core Courses

Three courses are required of all candidates for the MS degree in Electrical

Engineering: EEEE-754, -755, -756 Analytical Techniques I, II, III. A waiver of any of the above courses can be granted to a student who can clearly demonstrate to a designated faculty member that he or she has a solid background in the topics covered in them.

In addition to the above three courses, students with a baccalaureate degree in electrical technology will also be required to take EEEE-757 (Network Theory).

A graduate student will be expected to take the required core courses during the first year of his or her program, since they are prerequisites for many of the other graduate courses.

Elective Courses

A maximum of 12 credits can be chosen from graduate or advanced undergraduate courses offered by any department of RIT with the *prior approval* of the faculty advisor. The remaining credits for the degree must be earned from graduate courses in electrical engineering.

Thesis

The inclusion of a thesis as a formal part of the master of science degree program in electrical engineering is

optional. Students who decide to write a thesis can earn a minimum of six credits and a maximum of 12 credits toward their degree from the thesis.

Non-thesis options

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

Option 1

A student with significant industrial experience of at least six years after earning the baccalaureate degree may be permitted to make an oral technical presentation on an engineering project the student has worked on. The technical presentation carries no academic credits and the student will earn all the required credits for the degree in course work. Proposals for such a technical presentation must be submitted to the chairperson of the Graduate Committee on or before January 21 of the academic year in which the presentation is to be made.

Option 2

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

(See table—page 63)

Industrial Engineering Department

N. Richard Reeve, Department Head

Although there is no master of science degree in industrial engineering at present, the master of engineering

degree can be earned with specialization in the following fields: industrial engineering; systems engineering; engineering management. Close cooperation with the College of Business and the School of Computer Science assures the master of engineering candidate of a wide selection of courses and a unique opportunity to build a program tailored to her or his professional interests and goals. The practice of emphasizing computer methods to realistic problem solving is employed in all the above specialties.

Admission Requirements

Admission into the graduate ME program within industrial engineering requires a BS degree in an engineering discipline. Exceptions are made for the related fields of math and physics. Students with other backgrounds are considered for admission only after completing significant undergraduate course work in the engineering sciences. All applicants should have a fundamental knowledge of computers (FORTRAN), and Probability/Statistics.

Program of Study

The student, in conjunction with his/her advisor formulates a program of study based on the individuals academic background, professional goals, master of engineering degree requirements, and the schedule of course offerings.

Mechanical Engineering Department

Bhalchandra V. Karlekar,
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 45 quarter credit hours. A minimum of 33 credits are to be earned in course work, while the thesis as independent work carries a minimum of four credits and a maximum of 12 credits.

Independent Work

There are four options offered by the department with regard to completing the requirements of the master of science degree. Each student is free to select a design project, literature

search, a research thesis, or additional work with a comprehensive examination. A minimum of five credits is to be earned by doing an independent piece of work if a student does not elect to take a comprehensive examination.

Each student completing an independent work will be required to make a successful oral presentation of the work. The comprehensive examination when elected by a student, will be based on the core subjects and it will be taken near the end of the formal program of study, but in any case no earlier than the completion of at least 32 graduate credits.

Core Courses

All graduate students are required to complete the following:

Course Number and Title	Credits
EMEM-871 Mathematics for Engineers	4
EMEM-872 Mechanics	4
EMEM-873 Heat Transfer	4
EMEM-874 Numerical Methods	4
EMEM-875 Instrumentation and Experimental 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 or award transfer credit for the appropriate course. The maximum number of transfer credits permitted is nine.

Students changing their major discipline to mechanical engineering from another field, or having graduated from a non-accredited undergraduate program, should anticipate additional core requirements.

Elective Courses

The following elective courses are available to the student for graduate credit.

Course Number and title	Credits
EMEM-812 Theory of Plates and Shells	4
EMEM-815 Experimental Stress Analysis	4
EMEM-816 Finite Elements	4
EMEM-820 Advanced Optimal Design	4
EMEM-821 Vibration Theory and Applications	4
EMEM-833 Heat Exchanger Design	4
EMEM-845 Turbomachinery	4
SESM-701 Introduction to Materials Science	4



Students with a background deficient in engineering materials are strongly advised to take SESM-701 as an elective. Also, special courses listed later may be offered as electives in the event of sufficient demand.

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. Graduate students are allowed to take those upper level undergraduate electives in mechanical engineering specified in the course description catalog as EMEM-6XX (for example, Advanced Strength of Materials, Fluid Mechanics of Turbomachinery, and Stress Analysis). However a maximum of two such courses is allowed for graduate credit.

A student also may earn a limited number of credits by doing an independent study with guidance from a member of the graduate faculty. Some of the areas for independent study are selected topics in applied mathematics,

theory of elasticity, energy methods in mechanics, analytical mechanics, lubrication, convective and radiative heat transfer, thermodynamics, fluid mechanics, wind and solar energy, and control systems.

All graduate student programs must be submitted to and approved by the Departmental Graduate Committee. Any inquiries may be directed to Dr. Ray Johnson, chairman of the Graduate Committee.

Course descriptions

For a complete outline of graduate courses offered, please consult the course description section.

Assistantships and fellowships

Some assistantships and fellowships may be available for full-time students. Appointment as a teaching assistant carries a 12-hour per week commitment to a teaching function, and permits a student to take graduate work at the rate of 12 credits per quarter. Appointment as a research assistant also per-

mits 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 \$4000 per academic year. Applicants for financial aid should write directly to the department head for details.

Course calendar

The core courses are offered every quarter so that, in a given academic year, a student can fulfill the core requirements. The elective courses are generally given at least every other year. For further information on current course offerings, the student should contact the office of the Mechanical Engineering Department (716-475-2163).

Graduate Courses Computer Engineering

EECC-620 Design Automation of Digital Systems

Registration #0306-620

Design automation deals with the use of computers as a tool or aid in the design and manufacturing of digital systems. Topics covered will include methods for digital design, hardware description languages, simulation techniques at system level, register-transfer level, and logic element level, partitioning of digital systems, placement, routing, and fault test generation. (EECC-550 or ICSS-520, or ICSS 720)

Class 4, Credit 4 (S)

EECC-630 VLSI Design

Registration #0306-630

An introduction to the design and implementation of Very Large Scale (VLSI) systems. Basic NMOS devices and circuits are described. From this base, a variety of methods for designing both combinational logic and state machines are developed, with emphasis on the use of regular structures such as programmed logic arrays. System architecture and use of Computer Aided Design (CAD) tools will be stressed. (5th year status in Computer Engineering, Computer Science, Electrical Engineering or Microelectronic Engineering)

Class 4, Credit 4 (W,S)

EECC-722 Advanced Computer Architecture

Registration #0306-722

This course will emphasize the impact of VLSI and communication issues on computer architecture. Topics covered will include highly concurrent, multi-processor and fault-tolerant computer systems as well as data flow architectures. Modeling Techniques for system verification will also be included. (EECC 551 or ICSS 720)

Class 4, Credit 4 (S)

EECC-758 Fault Tolerant Digital Systems

Registration #0306-758

Formal models and concepts in fault diagnosis. Test generation and minimization redundant and self-checking systems. Fault tolerant hardware and software based computer systems. (ICSS 400 or EEEE 650 or EEEE 750; or EECC 550 or ICSS 720)

Class 4, Credit 4 (S)

EECC-759 Digital Interface Circuits

Registration #0306-759

Standard bus interfaces—parallel and serial. LSI interface devices. Interface design—peripherals and memory. Data acquisition—A/D & D/A converters, multiplexing. Logic—PIA, ROM based designs, spectral techniques. Error detection and correction. (EECC 560 or permission of instructor)

Class 4, Credit 4 (W)

Department of Electrical Engineering

The courses listed below are normally open to students who have been formally admitted into the graduate electrical engineering programs. Students with a baccalaureate degree in engineering or science may be permitted to enroll in any of these courses as non-matriculated students if they have already completed the stated prerequisites for a particular course. Undergraduate students may be permitted to take some of these courses as undergraduate technical electives provided they are fifth year students and have already completed the prerequisites. The permission of the director of graduate programs is required for enrolling in these courses except in the case of matriculated graduate students.

EEEE-723 Semiconductor Physics

Registration #0301-723

An introductory course in semiconductor physics for engineering students. The emphasis in this course is semiconductor materials rather than semiconductor devices. Topics include band gap theory, equilibrium carrier concentrations, transport mechanisms, deep and shallow impurities and properties of silicon, GaAs, Ge and other semiconductors.

Credit 4

EEEE-725 Physics of Semiconductor Devices II

Registration #0301-725

An intermediate level course in semiconductor device physics for engineering students. Limitations of bipolar and field effect transistors are studied. The physics of npn devices, solid state optical devices, interface devices, and others are also discussed. (EEEE-724)

Credit 4

EEEE-726 Analog IC Circuits

Registration #0301-726

A course in the analysis and design of bipolar and MOS analog integrated circuits. Topics include device models, amplifiers, current sources and active loads, output stages, operational amplifiers, and analog circuit design in MOS-LSI. Course will involve circuit design and computer simulation projects.

Credit 4

EEEE-727 VLSI Design

Registration #0301-727

Design of very large scale integrated circuits at the level of Mead and Conway's *VLSI Design*. Topics include MOS devices and circuits, n-channel MOS process, data and control flow in systematic structures, implementing integrated system design, system timing, and examples of LSI computer systems. (EEEE-724, -670, and a course in computer architecture)

Credit 4

EEEE-728 IC Operational Amplifiers

Registration #0301-728

Analysis of operational amplifier circuits using the ideal op amp; development of circuit models to predict non-ideal op amp characteristics; study of feedback systems, stability (using Bode plots), and compensation; direct coupled amplifiers and operational amplifier design; interpretation of manufacturers' specifications and basic applications with emphasis on practical aspects. (EEEE-442, -754, -755)

Credit 4

EEEE-730 Advanced Analog I.C. Design

Registration #0301-730

An advanced course in analog integrated circuit design. Students will study Bipolar and MOS realization of Op Amps, Analog multipliers, A to D and D to A converters, and more. The students will participate in design projects including circuit design, layout, and SPICE simulation. (EEEE-726)

Class 4, Credit 4, Lab 0

EEEE-744 Advanced Microprocessor Systems Design

Registration #0301-744

The effective application of microprocessors in the design of digital systems requires a knowledge of both hardware and software. This course will develop an understanding of assembly language programming and hardware design techniques. The role of macro-assemblers, editors, linking loaders, and other system software aids used in microcomputer development systems to produce efficient modular code will be covered. Several aspects of hardware/software organization of input/output programs will be considered including interrupts and direct memory access. The use of special LSI interface devices to allow a microcomputer to operate with peripheral devices such as A/D and D/A converters, CRT terminals, floppy disks, etc., will be studied. Laboratory sessions will be used to provide experience in the use of software development systems, and logic analyzers in developing and testing a microcomputer system design. (EEEE-665)

Credit 4

EEEE-745, 746 Topics in Digital Systems Design I, II

Registration #0301-745, -746

Topics will be selected on different aspects of digital systems design. Some of the proposed topics are signature analysis, bit slice processors, timing problems, reliable systems design, and designing for maintainability. (EEEE-650)

Credit 4

EEEE-747**Topics in Switching Theory****Registration #0301-747**

A selection of topics on various theoretical aspects of switching circuits will be presented. Topics such as decomposition of combinational switching functions, experiments on sequential circuits, and regular expressions will be covered. (EEEE-650)

Credit 4

EEEE-748**Microcomputers in Control and Instrumentation****Registration #0301-748**

The use of microcomputers in process control and instrumentation to achieve intelligent industrial operations will be discussed. Topics include concepts of control, analog vs. digital controllers, sensors, A/D and D/A converters, dc motor and stepper motor controllers, real-time systems, microcomputer bus standards, and the local networks. Lab work may include temperature, pressure, and optical controllers, stepper motor controllers, and robotics control. Intel 8086 is used. (EEEE-744)

Credit 4

EEEE-754**Analytical Techniques I****Registration #0301-754**

Complex variable theory including conformal mapping; the Laurent expansion; residues; and the evaluation of contour integrals. The Nyquist stability criterion. The LaPlace transform, its existence and convergence; use in the solution of differential equations; the transfer function and its properties.

The Z transform and the solution of difference equations. Relationship between the LaPlace and the Z transforms.

Credit 4 (Offered every fall)

EEEE-755**Analytical Techniques II****Registration #0301-755**

Fourier analysis. Signal and power spectra; the Fourier transform related to the LaPlace transform. The convolution integral.

Determinants and matrices; linear transformations; eigenvalues and eigenvectors; the solution of matrix differential equations; introduction to state variable approach for continuous and discrete systems.

Credit 4 (Offered every winter)

EEEE-756**Analytical Techniques III****Registration #0301-756**

Vector Analysis; Gauss's law and Stoke's theorem; curvilinear coordinates.

Random variables. Probability densities and distributions; functions of random variables; moments; parameter estimation; statistical decision theory.

Credit 4 (Offered every spring)

EEEE-757**Network Theory****Registration #0301-757**

Classification of networks, network topology, equilibrium equations, network theorems. Properties of one-port and two-port networks. Stability and passivity of two-port networks. Scattering matrix, Gain-phase analysis. The treatment will be on a formal and rigorous level. (EEEE-754, 755)

Credit 4

EEEE-760**Practical R&D Management****Registration #0301-760**

The course is intended to help engineers currently in industrial R&D management careers understand the concepts and practical aspects of project and organizational management and planning in RD&E environment. Topics to be discussed will include: objectives of industrial R&D, types of R&D organizations, selection of new products for development, long- and short-range planning, methods of project scheduling and control, communication within R&D, financial controls and budget preparation, proposal and report writing. The participants will be expected to carry out planning, organization and control of a simulated R&D project.

Credit 4 (Offered upon sufficient demand)

EEEE-761**Modern Control Theory****Registration #0301-761**

Review of state-space formulation of SISO systems; solution of state equations; STM and its properties. Applications of state-space concepts; state variable design. Multivariate systems: preliminaries; systems of least order; stability and control. (EEEE-754, -755, -613)

Credit 4

EEEE-762**Nonlinear Control Systems****Registration #0301-762**

An introduction to the physical nature and mathematical theory of nonlinear control systems' behavior using phase plane techniques. Liapunov theory (including Aizerman's method, variable gradient methods, and the Lure forms), perturbation methods, describing function techniques, and Popov's criterion. Analysis of switching and relays. These are applied to both piecewise-linear and analytical nonlinear systems. (EEEE-761)

Credit 4

EEEE-763**Stochastic Estimation and Control****Registration #0301-763**

Stochastic control and optimization; estimation and filtering techniques such as Wiener filtering and Kalman filtering; stochastic stability; applications. (EEEE-756, -761)

Credit 4

EEEE-764**Digital Control Systems Design****Registration #0301-764**

Introduction to the analysis and design of control systems in which micro-controller plays a principal role. Topics include: sampled data systems, Z and W-plane analysis and design, algorithm generation, and the effect of computer word length on noise and stability. The student will be expected to make use of the digital computer in the implementation of design procedures. (EEEE-754, -755)

Credit 4

EEEE-765**Optimal Control****Registration #0301-765**

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. (EEEE-761)

Credit 4

EEEE-767**Thyristor Power Control and Conversion****Registration #0301-767**

The objective of this course is to provide an adequate, application-oriented knowledge to those interested in the areas of control, power, and power electronics. Topics to be discussed: preliminaries, basic principles of static switching, thyristor theory, triggering, commutations; rectifiers; principles of controlled rectification, analysis of single and three-phase controlled rectifiers; inverters; series and parallel SCR inverters, design of inverters, sine wave filters, forced commutated inverter, McMurray inverter; DC systems; principles of DC-DC conversion, choppers, DC motor control, single phase DC motor drives, three phase DC motor drives, dual converter; cyclo-converter; frequency conversion using SCR's phase-controlled cyclo-converters; cyclo-converter controls. Modeling and simulation of thyristor circuits; thyristor models; approximations, digital simulation of choppers, inverters and cyclo-converters, areas of further research.

Demonstration experiments will be set up. Also individual projects by interested students will be encouraged.

Credit 4

EEEE-772, -773, -774**Special Topics in Electrical Engineering****Registration #0301-772, -773, -774**

Topics and subject areas that are not among the courses listed here are frequently offered under the title of Special Topics. Such courses are offered in a normal format, that is, regularly scheduled class sessions with an instructor.

Credit 4 per course (No regular course schedule)

EEEE-775**Optical Engineering I****Registration #0301-775**

An introduction to the properties of optical components and their combination into systems, primarily from a geometrical optics point of view, but with reference to the wave nature of light where appropriate. Refracting and reflecting components. Radiation sources. Object-image relations. Stops and energy Ray tracing and matrix methods of analysis and design. Discussion of common optical devices and instruments.

Credit 4

EEEE-776 Electro-optics**Registration #0301-776**

An advanced treatment of optical systems through the use of Maxwell's equations describing light interaction will be considered. Lens systems, optical modulation, laser operation, optical detection and associated noise problems will be discussed. Classroom work will be complemented by demonstrations. (EEEE-775, -771)

Credit 4

EEEE-777 Optical Engineering II**Registration #0301-777**

A continuation of EEEEE-776, Electro-optics, that emphasizes the application of wave optics to optical systems. Interference and interferometers. Thin films. Diffraction. Partial coherence. Fourier optics. Discussion of holography, optical data processing, imaging and other topics of current interest. (EEEE-776)

Credit 4

EEEE-778 Fiber Optics**Registration #0301-778**

The objective of this course is to educate the engineer in the applied optics field. Fundamentals of the fiber waveguide are treated using geometrical optics and Maxwell's equations. Other topics include design criteria, practical coupling techniques, discussion of optical sources and detectors used in fiber optical systems. Applications to communications and other areas will be discussed. (EEEE-775, -776, -777)

Credit 4

EEEE-779 Digital Image Processing**Registration #0301-779**

Introduction to digital image processing concepts, image digitization, 2D discrete Fourier transforms; topics on image enhancement including contrast equalization, false color displays, and edge enhancement techniques; topics in image reconstruction to include causes of image degradation, deblurring procedures, and homomorphic filters; 3D image reconstruction from 2D projections. (EEEE-754, -755, 677)

Credit 4

EEEE-780 Independent Study**Registration #0301-780**

This course number should be used by students who plan to study a topic on an independent study basis. The student *must* obtain the permission of the appropriate faculty member *before* registering for the course.

Credit 4

EEEE-781 Electromagnetic Fields**Registration #0301-781**

Development of electromagnetic theory from basic postulated leading to Maxwell's equations in differential and integral forms. Solution of Maxwell's equations for the plane waves, transmission lines, waveguides, and antennas.

Credit 4

EEEE-782 Boundary Value Problems**Registration #0301-782**

Techniques for solving boundary value problems. Numerical methods, analog and relaxation methods, Green's function, special methods making use of symmetries, images, inversion, and conformal mapping; introduction to integral equations. Wiener-Hopf and Watson transformations. Saddlepoint integration. Variational techniques. (EEEE-754, -755, -756)

Credit 4

EEEE-783 Antennas and Antenna Systems**Registration #0301-783**

Theoretical and practical characteristics of electromagnetic radiators. Equivalent circuits and radiating properties of antenna elements. Dipoles, slots, small loops, helical and dielectric radiators. Pattern analysis, primary and secondary patterns. Theory of phased antenna arrays, reflectors, and horns. (EEEE-781)

Credit 4

EEEE-784 Advanced Electromagnetic Engineering**Registration #0301-784**

Time varying electromagnetic fields. Field theorems, propagation and reflection of plane waves, transmission theory, waveguides, resonators, radiation and diffraction. Microwave networks. (EEEE-781)

Credit 4

EEEE-785 Special Topics in Electromagnetic Theory**Registration #0301-785**

Advanced and current topics in electromagnetic theory. Topics vary each time and may include: array theory, electromagnetic compatibility, numerical methods, propagation and radiation in ionized media, moving media, and random media. May be repeated for additional credit. (Permission of the instructor)

Credit 4

EEEE-786 Microwave Devices**Registration #0301-786**

Theory of interaction between electron beams and electromagnetic waves. Microwave tubes: klystron, magnetron, traveling-wave tubes. Solid state devices: microwave transistors, tunnel diodes, Gunn diodes. IMPATT diodes. LSA diodes.

Credit 4

EEEE-787 Radar Engineering**Registration #0301-787**

Radar system and radar equations; electronic scanning radar systems, microwave radar antennas. Atmospheric effects in radio wave propagation, synthetic aperture radar. Signal detection and parameter estimation for radar applications. (EEEE-754, -755, -756)

Credit 4

EEEE-790 Random Signals and Noise**Registration #0301-790**

Functions of two random variables. Mean square estimation. Orthogonality principle. Sequences of random variables. Central limit theorem. Random processes; correlation functions; spectrum of periodic functions and periodic random processes; spectral densities; the Gaussian random process; noise through linear systems. (EEEE-755, -756)

Credit 4

EEEE-791 Topics in Signal Analysis and Processing**Registration #0301-791**

Signal representation of orthogonal functions; analytic signals and Hilbert transforms; optimum filters (matched, maximum fidelity, Wiener); discrete representation of continuous signals (sampling theorems); the discrete Fourier transform; linear discrete filters; introduction to homomorphic signal processing. (EEEE-

Credit 4

EEEE-792 Advanced Topics in Signal Analysis**Registration #0301-792**

A continuation of EEEEE-791. Topics chosen from: signal and system parameter estimation pole-zero modeling; maximum likelihood methods, maximum entropy methods; Prony's method; pencil of functions method; quantization effect in discrete processing techniques; spectral estimation; windowing; generalized transforms including Walsh-Hadamard. (EEEE-791)

Credit 4

EEEE-793 Error Detecting and Error Correction**Registration #0301-793**

This course covers linear block codes and convolutional codes. The major linear block codes to be covered are Hamming, BCH, Golay, and Reed-Solomon codes. The fundamental structure of linear block codes will be developed and applied to performance calculations. The structure of cyclic codes will be developed and applied to encoders and decoders. The major error correction methods, including error trapping, majority logic decoding and the BCH algorithm will be developed and the Viterbi and sequential decoding algorithms will be studied. Questions of system performance, speed, and complexity will be examined. (EEEE-756)

Credit 4

EEEE-794 Information Theory**Registration #0301-794**

An introduction to the fundamental concepts of information theory; entropy, equivocation, transinformation, and redundancy; coding for binary channels; measurement of signal parameters in the presence of noise; band-width vs. accuracy. (EEEE-756)

Credit 4

EEEE-800**Graduate Paper****Registration #0301-800**

This course number is used to fulfill the graduate paper requirement under the non-thesis option for the MS degree in electrical engineering. The student *must* obtain the approval of an appropriate faculty member to supervise the paper *before* registering for this course.

Credit 5

EEEE-890**Master's Thesis****Registration #0301-890**

An independent engineering project or research problem to demonstrate professional maturity, preferably involving the reduction of theory to practice. A formal written thesis and an oral defense are required. The student *must* obtain the approval of an appropriate faculty member to guide the thesis *before* registering for the thesis. A thesis may be used to earn a minimum of 6 credits and a maximum of 12 credits. The usual number is 9 credits.

Credit variable

Department of Industrial Engineering

The following courses are recommended as part of the Master of Engineering program in Industrial Engineering and Engineering Management. They are offered on sufficient demand.

EIEI-620**Engineering Economy****Registration #0303-620**

Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting.

Credit 4

EIEI-715, 716**Statistical Analysis for Engineers I & II****Registration #0303-715, -716**

A basic two-quarter course in probability and statistics designed to give the student a foundation for further study in areas such as design of experiments, stochastic systems, and simulation.

Credit 4

The following courses can be used as part of the Master of Engineering program in Industrial Engineering and Engineering Management. The courses are generally offered in alternating years and/or as demand dictates.

EIEI-601**Value Analysis****Registration #0303-601**

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

Credit 4

EIEI-701**Principles of Operations Research I****Registration #0303-701**

Applied linear programming. Computational techniques for solving constrained optimization problems. Linear programming, the Simplex method and variations, duality and sensitivity testing.

Credit 4

EIEI-702**Mathematical Programming****Registration #0303-702**

Application of non-linear programming techniques. Classical optimization techniques; quadratic, stochastic, integer programming and dynamic programming. Applications to industry. (EIEI-701)

Credit 4

EIEI-705**Survey of Operations Research****Registration #0303-705**

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

Credit 4

EIEI-710**Systems Simulation****Registration #0303-710**

Methods of modeling and simulating man-machine systems. Model validation, design of simulation experiments, variance reduction techniques, random number generation and distribution generation are discussed. However, emphasis is placed on the G.P.S.S. simulation language.

Credit 4

EIEI-718**Inventory Design****Registration #0303-718**

Overview of inventory problems. Single period models under risk and uncertainty, dynamic models under certainty, dynamic models under risk and uncertainty. Forecasting, inventory system analysis.

Credit 4

EIEI-720**Production Control****Registration #0303-720**

A systems approach to the design of production control operations. Investigation of forecasting, operations planning, inventory control, and scheduling. Case studies and the design of actual production systems is encouraged.

Credit 4

EIEI-723**Facilities Planning****Registration #0303-723**

Principles of plant layout and material handling. Topics covered include criterion selection, cost elements, the layout design process, SLP, computerized plant layout and quantitative plant layout and material handling techniques relating to operations research.

Credit 4

EIEI-725**Technological Forecasting****Registration #0303-725**

Technological forecasting is concerned with the Delphi method, SOON charts, trend extrapolation, relevancy trees, cross input analysis, internally consistent scenarios, and decision matrices. The course will provide a thorough introduction to the basic concepts and techniques of technological forecasting.

Credit 4

EIEI-730**Biotechnology and Human Factors I****Registration #0303-730**

Basic functional anatomy and physiology. Human body systems. Anthropometry. Applications on the design for man and man-machine systems. Work physiology. Industrial biomechanics.

Credit 4

EIEI-731**Biotechnology and Human Factors II****Registration #0303-731**

Effect of mechanical and physical environment on: physiology, behavior, performance of man. Design considerations to protect man against environmental effects (thermal environment, noise, vibration, acceleration, light, altitude).

Credit 4

EIEI-732**Biotechnology and Human Factors III****Registration #0303-732**

Theoretical fundamentals of human body mechanics. Development and applications of biomechanics and biomechanical models. Kinematics of the link system of the body and extremity joints.

Credit 4

EIEI-733**Biotechnology and Human Factors IV****Registration #0303-733**

Measurements of human performance. Functions that man performs in man-machine systems. Techniques to quantify man's behavior at work.

Credit 4

EIEI-734**Systems Safety Engineering****Registration #0303-734**

Accident study of the human component in occupational systems. Product systems safety analysis. Approaches in accident prevention.

Credit 4

Special courses related to a particular student's interest can be arranged via the following course:

EIEI-771, 772, 773, 774

**Special Topics in
Industrial Engineering****Registration #0303-771, -772, -773, -774**

This is a variable credit, variable topics course which can be in the form of regular courses or independent study under faculty supervision.

Credit variable (maximum 4 per course number)

Department of Mechanical Engineering

EMEM-693***Thermo Fluid System Analysis****Registration #0304-693***

Thermodynamic properties and processes, ideal and real gas, vapors and gases; laws of thermodynamics and selected power cycles; fluid statics; control volume and conservation of mass, momentum and energy; Bernoulli's equation; viscosity, loss of heat due to friction (flow through pipes), concept of boundary layer; basic law of conduction; convection; radiation.

Credit 4 (T.B.A.)

EMEM-697***Applied Mechanics System Analysis****Registration #0304-697***

Methods currently employed in component and system analysis of the static and dynamic behavior of rigid and elastic bodies. The topics will include a review and advanced studies of vector statics and dynamics of rigid and elastic bodies and systems.

Credit 4 (T.B.A.)

EMEM-810**Introduction to Continuum Mechanics****Registration #0304-810**

A rigorous basis for the study of advanced fluid mechanics and theory of elasticity is presented. Cartesian tensors. Analysis of stress and deformation. Motion of a continuous medium. Applications to theory of elasticity, thermo-elasticity, viscoelasticity, and fluid mechanics. (EMEM-871)

Credit 4 (T.B.A.)

EMEM-811**Theory of Elasticity****Registration #0304-811**

Stress-strain relations and formulation of boundary value problems. State of plane strain, state of plane stress. Solutions by potentials, Airy stress function. Torsion of bars with circular, elliptic, rectangular cross-sections. Stresses and displacements in thick cylinders, disks, and spheres. Contact stress problems. (EMEM-810)

Credit 4 (T.B.A.)

EMEM-812**Theory of Plates and Shells****Registration #0304-812**

Theory of thin plates for small deflections. Rectangular and circular plates with various boundary conditions, elliptic and triangular plates. Navier and Levy solutions. Thermal stresses in plates. Membrane theory of shells, cylindrical shells, pressure vessels, and shells of revolution. (EMEM-685 or equivalent)

Credit 4 (T.B.A.)

*Offered upon sufficient demand

EMEM-815**Experimental Stress Analysis****Registration #0304-815**

Experimental methods of analysis of structural machine members, including strain gages and instrumentation, photoelastic methods, brittle coating, Moire fringe method, holographic techniques; and the hydrodynamic, electrical, and membrane analogs. Laboratory tests of models. (EMEM-694 or equivalent)

Credit 4 (T.B.A.)

EMEM-816**Finite Elements****Registration #0304-816**

Development of theory from variational principles. Two-dimensional applications to elastic continua, considering plane stress, plane strain, and axisymmetric loading examples. Problem-solving sessions using RIT computer. Applications in structural mechanics, considering beam elements, plate elements, and shell elements. Utilization of these elements in solving specific structural problems. Introduction to three-dimensional stress analysis. Features of large general-purpose computer programs. (EMEM-694 or equivalent)

Credit 4 (T.B.A.)

EMEM-820**Advanced Optimal Design****Registration #0304-820**

Topics from nonlinear programming as applied to automated optimal design. Use of penalty functions for the transformation of constrained nonlinear optimization problems. Multivariate pattern and gradient based algorithms, such as the method of steepest descent, Newton's method, quasi-Newton methods, and generalized conjugate gradient techniques. Algorithms for the univariate subproblem of the line search. Applications to the solution of practical nonlinear optimization problems using the digital computer. Decomposition strategies for improving efficiency in the search process. (EMEM-871 and EMEM-874)

Class 4, Credit 4 (T.B.A.)

EMEM-821**Vibration Theory and Applications****Registration #0304-821**

Vibration of discrete multi-mass systems using matrix methods. Normal mode theory, and matrix eigenvalue extraction procedures. Matrix forced response. Practical examples using two-and-three degrees of freedom. Vibration of continuous systems. Computer simulations. (EMEM-871, EMEM-874)

Credit 4 (T.B.A.)

EMEM-828, 829**Special Topics in Applied Mechanics****Registration #0304-828, -829**

An opportunity for the advanced student to undertake an independent investigation in the area of applied mechanics. Assistance will be given only when the student requests it. The project may be a comprehensive literature investigation, theoretical study, or an investigation involving laboratory experiment.

Credit variable (maximum of 4 credits/quarter)

EMEM-833**Heat Exchanger Design****Registration #0304-833**

The course covers analytical models for forced convection through tubes and over surfaces, experimental correlations for the Nusselt number and pressure drop; design of single and multiple pass shell and tube heat exchangers; compact, baffled, direct contact, plate, and fluidized bed heat exchangers; radiators, recuperators, and regenerators. (EMEM-514)

Credit 4 (T.B.A.)

EMEM-838**Ideal Flows****Registration #0304-838**

This graduate course introduces the students to the modern analysis of ideal flows. The approach is based on advanced mathematical as well as engineering viewpoint. The applications will be restricted to aerodynamics such as design of airfoils, wings, etc. (EMEM-871)

Credit 4 (T.B.A.)

EMEM-845**Turbomachinery****Registration #0304-845**

One-dimensional analysis of centrifugal pumps, water turbines, and axial flow turbines and compressors. Emphasis on blending the application of physical principles, dimensional analysis, and empirical data to design turbomachines. (EMEM-516)

Credit 4 (T.B.A.)

EMEM-848, 849**Special Topics in Thermo Fluid Systems****Registration #0304-848, -849**

An opportunity for the advanced student to undertake an independent investigation in the area of thermo fluid systems. Assistance will be given only when the student requests it. The project may be a comprehensive literature investigation, a theoretical study, or an investigation involving laboratory experiment.

Credit variable (maximum of 4 credits/quarter) (T.B.A.)

EMEM-871**Mathematics for Engineers****Registration #0304-871**

Vector calculus, directional derivative, gradient, divergence, curl, Gauss, Green and Stokes Theorem, solutions to ordinary differential equations using the method of Frobenius, and LaPlace transforms, and an introduction to complex numbers. (SMAM-308, EMEM-692, or equivalent)

Credit 4 (T.B.A.)

EMEM-872**Mechanics****Registration #0304-872**

Advanced dynamics and vibrations are emphasized. Newtonian vector mechanics and energy formulations are applied to two- and three-dimensional problems of single and multi-degree of freedom. The concepts of Virtual Work, Hamilton's Principle, and Lagrange's equations are covered. (EMEM-871)

Credit 4 (T.B.A.)



EMEM-873 **Heat Transfer**

Registration #0304-873

Formulation of the heat conduction equation, solution of the one-dimensional, unsteady heat conduction equation by separation of variables; Sturm-Liouville system, orthogonal functions, generalized Fourier series, Bessel functions. Solution of the two-dimensional, steady heat conduction equation; Cartesian and cylindrical geometry. Solution of some three-dimensional problems, unsteady problems. (SMAM-308, EMEM-514, EMEM-871)

EMEM-874 **Numerical Methods**

Registration #0304-874

The course emphasizes the use of digital computers for obtaining solutions to practical engineering problems through numerical techniques. Algebraic and transcendental equations, systems of linear algebraic equations using matrix manipulations and iterative methods, numerical integration and differentiation, ordinary differential equations including initial value and boundary value problems, partial differential equations including elliptic, parabolic, and hyperbolic with stability analysis. Extensive use of the computer will be required. (Graduate standing and experience in the use of digital computers.)

Credit 4 (T.B.A.)

EMEM-875 **Instrumentation and Experimental Analysis**

Registration #0304-875

Various displacement, strain, velocity, acceleration, pressure transducers will be discussed along with the associated electronic equipment and recorders to measure and record the variables. A laboratory session will be substituted in place of class when experiments are assigned. The static and dynamic characteristics of the instruments will be obtained as these instruments are mathematically modeled and subjected to impulse, step and ramp frequency functions of time. (Graduate standing)

Credit 4 (T.B.A.)

EMEM-880 **Independent Study**

Registration #0304-880

An opportunity for the advanced student to undertake an independent investigation in a special area under the guidance of a faculty member. A written proposal is to be forwarded to the sponsoring faculty member and approved by the department head prior to the commencement of work.

EMEM-890 **Research and Thesis Guidance**

Registration #0304-890

In conference with a thesis advisor, a topic is decided on, and either a theoretical or laboratory type research program is carried out. Periodic progress reports and final written thesis with oral examination.

Credit variable (maximum 12 credits total) (F, W, Sp, Su)

Special topics courses will be offered in the following areas if there is a sufficient demand.

- Continuum Mechanics
- Theory of Elasticity
- Energy Methods in Mechanics
- Advanced Vibration Theory
- Lubrication
- Advanced Heat Transfer
- Advanced Thermodynamics
- Advanced Fluid Dynamics
- Control Systems
- Thermal Stresses

Schedule of Graduate Courses in Electrical Engineering

	1983-84			1984-85		
	Fall	Winter	Spring	Fall	Winter	Spring
REQUIRED COURSES	754 Analytical Tech. I *757 Network Theory	755 Analytical Tech. II	756 Analytical Tech. III	754 Analytical Tech. I	755 Analytical Tech. II	756 Analytical Tech. III
INTEGRATED ELECTRONICS	726 Analog IC Circuits	*727 VLSI Design	*728 IC Op Amps	723 Semicond. Physics	724 Phys. of Semicond. Devices I	725 Phys. of Semicond. Devices II
DIGITAL SYSTEMS		745 Topics in Digital Sys. I	746 Topics in Digital Sys. II	*747 Topics in Switching Theory	744 Adv. Micro. Systems Design	748 Microproc. in Instrum. & Control
CONTROL SYSTEMS	764 Digital Control Systems	*762 Nonlinear Control	761 Modern Control Theory	763 Stochastic Estim. & Control	765 Optimal Control	*767 Thyristor Power Control & Conv.
OPTICAL ENGINEERING	*778 Fiber Optics	779 Digital Image Proc.		775 Optical Engg. I	776 Electro Optics	777 Optical Engg. II
ELECTRO MAGNETICS	786 Microwave Devices	787 Radar Engg.	781 Electro-mag Fields	783 Antennas & Ant. Sys.	*784 Adv. Elec. Theory	*782 Boundary Value Probs.
COMMUNICATIONS	790 Random Sig. and Noise	791 Topics in Sig. Analy.	792 Adv. Topics in Signal Analysis	*794 Inform. Theory		793 Error Det. & Correc. Codes

These courses are scheduled as shown here, but may not be offered unless certain conditions (such as minimum enrollment) are met. It is expected that the decision on the offering of these courses will be announced sufficiently early so that the student can make other plans.

Courses not marked with an asterisk will be offered on a guaranteed basis as scheduled.

The course 757: Network Theory is required of only those entering with a degree in Engineering Technology.

The above two-year cycle will be repeated on a regular basis (at least for the foreseeable future) so that the student can use it to plan his or her degree program.

GRADUATE COURSE OFFERINGS DEPARTMENT OF INDUSTRIAL ENGINEERING ROCHESTER INSTITUTE OF TECHNOLOGY

Even Years (Eg. 84/85, 86/87, etc.)

FALL	WINTER	SPRING
EIEI 715- Statistical Analysis	EIEI 716- Registration	EIEI 630- Comp. Aided Mfg
*EIEI625 Comp. Aided Mfg. I	EIEI 730 Human Factors I	EIEI 734 Safety Engrg.
EIEI 7XX Special Topics/ Reliability	EIEI 7XX Special Topics/ SLAM	EIEI 720 Production Control
EIEI 7XX Special Topics/ Decision Analysis	EIEI 7XX Special Topics/ Multiobjective Analysis	EIEI 7XX Special Topics/ Case Studies
		EIEI 725 Technological Forecasting

Odd Years (Eg. 85/86, 87/88, etc.)

FALL	WINTER	SPRING
EIEI 715 Statistical Analysis	EIEI 716 Regression	EIEI 630 Comp. Aided Mfg.
*EIEI 625 Comp. Aided Mfg. I	EIEI 620 Engrg. Economy	EIEI 734 Safety Engrg.
EIEI 701 Linear Programming	EIEI 731 Human Factors II	EIEI 702 Non-Linear Prog
EIEI 7XX Special Topics/ Design of Experiments	EIEI 710 Simulation (GPSS)	EIEI 601 Value Analysis
		EIEI 7XX Special Topics/ Advanced Engrg Economy

The following courses are offered upon demand:

EIEI 732, 733	Human Factors III, IV
EIEI 723	Facilities Planning
EIEI 718	Inventory Design

*If the 5th year class is B block, this course is shifted to the Winter Quarter (85/86, 88/89, etc.)

Graduate Faculty College of Engineering

Richard A. Kenyon, Ph.D., P.E.,
Syracuse—Dean, Professor,
Mechanical Engineering

Charles W. Haines, Ph.D., Rensselaer
Polytechnic Institute—Associate Dean;
Associate Professor, Mechanical
Engineering

Computer Engineering Department

Tong-han Chang, Ph.D., Chinese
Academy of Science, Beijing-
Associate Professor

Roy Czernikowski, Ph.D., RPI—
Professor

John L. Ellis, Ph.D., University of
Toledo—Associate Professor

Electrical Engineering Department

Swaminathan Madhu, Ph.D., University of Washington—Professor, Communication Theory, Logic Design, Department Head

George Brown, MSEE, University of Rochester—Professor, Systems and Control

John F. Carson, MS, MIT—Associate Professor, Optical Engineering

Roy S. Czernikowski, Ph.D., Rensselaer Polytechnic Institute—Professor, Computer Engineering

Soheil A. Dianat, Ph.D., George Washington University—Assistant Professor, Control Systems

Lynn Fuller, Ph.D., Buffalo—Associate Professor, Solid State Devices and Microelectronics

Roger Heintz, Ph.D., Syracuse—Associate Professor, Solid State Devices

Robert Houde, Ph.D., University of Michigan—Visiting Associate Professor, Communication Systems

Kenneth Hsu, Ph.D., Marquette—Assistant Professor, Microcomputers and Control Systems

Aziz Inan, Ph.D., Stanford—Visiting Assistant Professor

Robert E. Lee, Ph.D., University of Rochester—Associate Professor, Systems and Control

A. V. Mathew, Ph.D., Queens University (Ontario)—Associate Professor, Control Systems

James E. Palmer, Ph.D., Case Institute of Technology—Professor, Digital Systems

David Perlman, MS, Cornell University—Associate Professor, Electronics

Pratapa Reddy, Ph.D., Indian Institute of Technology—Assistant Professor, Digital Systems

Harvey E. Rhody, Ph.D., Syracuse—Professor, Communication Theory

Alton Riethmeier, M.S., Rochester—Associate Professor, Digital Systems

Edward R. Salem, Ph.D., Buffalo—Professor, Digital Processing, Microcomputers

Tapan K. Sarkar, Ph.D., Syracuse—Associate Professor, E. M. Fields, Antenna Theory

David Sumberg, Ph.D., Michigan State—Associate Professor, Optics
Fung-I Tseng, Ph.D., Syracuse—Associate Professor, Electromagnetic Theory

Renan Turkman, Ph.D., Paris—Visiting Assistant Professor, Solid state devices

Raman M. Unnikrishnan, Ph.D., Missouri—Associate Department Head; Associate Professor, Power Electronics, Control Systems

Jayanthi Venkataraman, Ph.D., Indian Institute of Science—Visiting Assistant Professor, Electromagnetic Theory

Watson F. Walker, Ph.D., Syracuse—Professor, Communication Theory

Adjunct Faculty in Electrical Engineering

Louis Gabello, MS, RIT—Eastman Kodak Company, Filter Design

James Schueckler, MS, RIT—Eastman Kodak Company, Microcomputers

Industrial Engineering Department

Richard Reeve, Ph.D., Buffalo—Professor, Applied Operations Research; Department Head

Barbara J. Brenner, MSIE, Purdue University—Instructor, Simulation, Organizational Behavior, Work Measurement

Rajendra B. Nalavade, Ph.D., Ohio State University—Assistant Professor, Statistics, Man-Machine Systems

Sudhakar R. Paidy, Ph.D., Kansas State University—Associate Professor, Statistics, Reliability, and Operations Research

Jasper E. Shealy, Ph.D., SUNY at Buffalo—Professor, Human Factors

Kai Sung, Ph.D., Case Western Reserve—Distinguished Visiting Professor, Systems Engineering, Operations Research

Mechanical Engineering Department

Bhalchandra V. Karlekar, Ph.D., P.E., University of Illinois—Professor and Department Head, Heat Transfer, Applied Mathematics, Energy

William Bober, Ph.D., P.E., Purdue—Associate Professor, Fluid Mechanics, Heat Transfer, Applied Mathematics

Richard G. Budynas, Ph.D., P.E., Massachusetts—Professor, Applied Mechanics

Robert A. Ellson, Ph.D., P.E., University of Rochester—Associate Professor, Energy Conversion, Fluid Mechanics

Amitabha Ghosh, Ph.D., Mississippi State University—Assistant Professor

Charles W. Haines, Ph.D., Rensselaer Polytechnic Institute—Associate Professor, Applied Mathematics

William F. Halbleib, Ph.D., P.E., Cornell—Professor, Stress Analysis, Vibrations

Robert Hefner, Ph.D., Georgia Inst. of Tech.—Associate Professor, Systems Analysis, Heat Transfer

Richard B. Hetnarski, Dr. Tech. Sci., P.E., Polish Academy of Sciences—Professor, Thermoelasticity

Ray C. Johnson, MS, University of Rochester—James E. Gleason Professor, Optimal Design

Satish G. Kandlikar, Ph.D., Indian Institute of Technology—Assistant Professor, Thermal Systems and Energy

Richard Kenyon, Ph.D., P.E., Syracuse—Professor, Thermodynamics and Fluid Mechanics

Raj Khanwalkar, Ph.D., Johns Hopkins—Visiting Assistant Professor, Wave Propagation, Elasticity

Chris Nilsen, Ph.D., P.E., Michigan State—Associate Professor, Metallurgy and Materials Science

Alan H. Nye, Ph.D., University of Rochester—Assistant Professor, Fluid Mechanics

Frank Sciremammano, Jr., Ph.D., University of Rochester—Assistant Professor, Geophysical Fluid Dynamics and Environmental Control

Robert L. Snyder, Ph.D., P.E., Iowa State—Professor, Materials Science, Chemistry

Wayne W. Walter, Ph.D., P.E., Rensselaer Polytechnic Institute—Associate Professor, Applied Mechanics

Paul Wojciechowski, Ph.D., University of Rochester—Associate Professor, Systems Analysis, Environmental Studies, Energy

College of Fine & Applied Arts

Robert H. Johnston, Dean
Peter Giopulos, Associate Dean
 (475-2634)

Master of Fine Arts Master of Science for Teachers

The College of Fine and Applied Arts, in its School for American Craftsmen, and in the industrial and interior design, graphic design, medical illustration*, painting, printmaking, and computer graphics design programs of the School of Art and Design, prepares 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 prepares graduates to teach at colleges and at secondary levels through a concentration in art education.

The College of Fine and Applied Arts provides a center for advanced study in the graphic, plastic and the fine arts in which the student has the opportunity to work in a professional environment; it stimulates and encourages work of the highest quality. Students of superior ability who possess a baccalaureate degree in art, crafts or design 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, industrial and interior design, painting, sculpture, printmaking, illustration, computers or one of the five craft areas, there is opportunity to develop new areas of competence. The master's programs are also designed to enable students to broaden their experience in the practice of art in areas other than their majors and to increase their understanding of the arts in the humanistic sense. Students are expected to participate in the planned non-credit program of assemblies, seminars, and exhibits as well as their formal class requirements.



*Only MFA in Medical illustration and Computer Graphics Design.



Graduate degrees

The College of Fine and Applied Arts offers two graduate degrees. The master of science for teachers may be taken in nine studio areas and in art education. The art education concentration leads toward permanent art N-12 certification to teach in the public schools of the State of New York and involves pedagogical studies and student teaching. The master of science for teachers may also be pursued in the studio areas of graphic design, industrial and interior design, painting, print-making, ceramics and ceramic sculpture, glass, metalcrafts and jewelry, weaving and textile design and wood-working and furniture design. This MST in studio may also lead to certification if provisional or temporary certification has been previously earned as an undergraduate. Students may select the summer option or one year full-time study for this studio concentration.

The second graduate degree is the master of fine arts, considered the highest degree of study in the studio arts. This involves the presentation of a thesis and usually requires two years of full-time study.

Objectives

The MFA and MST programs are constituted to reflect the goals of Rochester Institute of Technology.

They are designed to graduate artists, designers, craftsmen and teachers who can meet the needs of the environmental condition through high standards of personal discipline.

Requirements for admission to the MST degree programs

The applicant should have received the baccalaureate degree in a field of the arts from a regionally accredited college or university in the United States or Canada with a major concentration in art, art education, or industrial arts education. Applicants with different backgrounds should refer to the section on non-matriculated students. The undergraduate studies should include a minimum of 54 quarter credit hours (36 semester hours) in drawing, painting, design, or the crafts. If the applicant for admission holds the BA or BFA degree and seeks the MST 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 BS degree in art education and the provisional certification, the graduate concentration should be in the studio area, and the program must include a minimum of 10 quarter credit hours in liberal studies or humanities.

A student is accepted into the program with the understanding of full-time status unless granted part-time status at admission.

Requirements for admission to the MFA degree programs

The applicant should hold the baccalaureate degree in a field of the arts, science or education from a regionally accredited college in the United States or Canada and demonstrate, in the quality of the undergraduate record and creative production, a genuine, professional potential. (See also non-matriculated students.) The undergraduate degree should include 75 quarter credit hours (50 semester hours) in studio courses.

Acceptance for graduate study

Students are admitted to graduate study 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 12 quarter credit hours.

A student may be admitted who needs additional undergraduate study

requirements. This study will be structured for breadth or increased performance in areas designated and will be determined at the time of acceptance.

Such prerequisites must be satisfied as defined in the letter of acceptance which students will receive prior to admission as a graduate student. Extended study may require additional time on campus.

Human Gross Anatomy and biology or equivalent content is necessary for the MFA in medical illustration. Human Gross Anatomy is taught by the University of Rochester, and a surcharge for tuition is required.

Upon full acceptance into any of the graduate programs the student is considered qualified to pursue the degree. This status would be changed by evidence of poor performance in the program. A 3.0 grade point average must be maintained. A student is accepted into the program with the understanding of full-time status unless granted part-time status at admission.

Teacher education 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 program a way of extending and improving the 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 structuring of the master of science for teachers program (studio concentration) or the master of fine arts.

Admission as non-matriculated students

Students who have a baccalaureate degree and who wish to take particular courses may be admitted as non-matriculated 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 undergraduate courses, as advised 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 BFA, BA, or BS 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 or her baccalaureate degree, a portfolio of 20-24 slides or other evidence of creative work, a statement of purpose, and references.



All correspondence concerning applications, catalogs and portfolios should be addressed to Director of Admissions, Rochester Institute of Technology. Program inquiries should be addressed to Graduate Programs, College of Fine and Applied Arts.

Transfer of credit

Graduate work pursued to the extent of 12 quarter hours (nine semester hours) may be applied at the discretion of the Graduate Committee to specific course requirements, depending on the nature of the student's program and major, if completed within the five preceding years. This evaluation will be made after one quarter of full-time study.



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.

Bevier Gallery

During the year, the Bevier Gallery presents a continuing series of important exhibitions planned to present new directions in the fields of the arts, design, and the crafts, as well as to do honor to the works of the past. The gallery, architecturally impressive, and a part of the college, serves to enrich the cultural life of the community, the Institute at large, and to inform and inspire the college's graduate body.

The Faculty Show, Graduate Thesis Show, and Student Honors Show are annual events on the gallery calendar.

The MFA and MST degrees

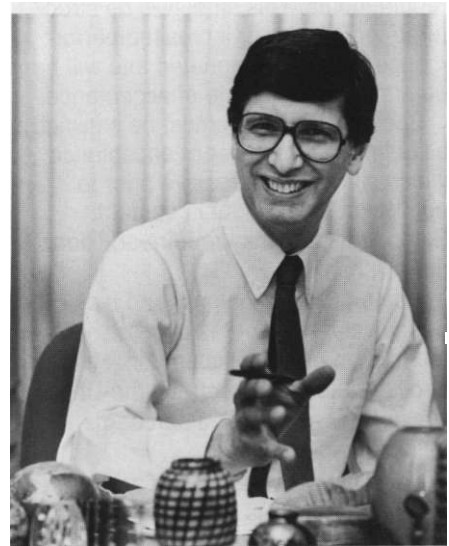
The MFA degree is designed as a professional degree for the practicing

artist, craftsman, or designer, and for those wishing to teach at the college or university level. This is earned normally in two years of full-time study and the completion of a minimum of 90 credit hours including the presentation of an acceptable thesis. Those who have entered the MST program and who may wish to change to the MFA program must petition the graduate faculty for permission to change the degree objective. In view of the pronounced difference in entrance requirements, students requesting a transfer from MST to the MFA program may be required to take additional undergraduate or graduate courses. Such students must also have demonstrated their professional potential by establishing a "B" average (3.0) in at least one quarter (or one summer session) of the MST course of study.

The MST degree may be earned normally in one academic year or in summer sessions through the satisfactory completion of a minimum of 48 credit hours in course work. It is arranged for the student holding the BFA degree (or a BA degree with an art major) who wishes to earn teacher certification (with a BS or BA degree in art or industrial arts education) and seeks permanent certification. The MST degree may also be taken as a concentration in the studio areas with supporting courses on the basis of need and interest from graduate offerings in other schools and departments of the Institute. This major in art education integrates public school teaching, social sciences and studio classes. In contrast, the studio MST candidate selects one of the nine art areas: graphic design, industrial and interior design, painting, printmaking, ceramics, metals, textiles, wood or glass. Summer sessions can accommodate teachers seeking permanent certification through study in an art area. The art education concentration has a September start, and is earned in one academic year.

Attendance regulations

The programs of the college utilize the studios and shop experiences as an essential part of the educational program; therefore it is imperative that the student regularly attend all classes unless specifically excused for special projects or activities by the instructors. Failure to attend classes, and to complete assignments, will be taken into consideration in grading.



Peter Giopulos

Graduate art students 'usually know where they're going'

"Today's art student is not just interested in courses, but in a program of study that's well planned," says Peter Giopulos, coordinator of graduate programs in the College of Fine and Applied Arts.

"Most of our graduate students have been through an experimental stage, both in their lives and in their creative work. They've learned how to bring that experimentation into focus, whether personally or artistically. And they usually know where they're going."

RIT offers a variety of graduate programs through the School for American Craftsmen and the School of Art and Design, but all of them, Giopulos says, have "depth within the major and allow for a minor sequence and electives, which are available from many other programs."

In the graduate program, study is geared to the person "who has gained a marketable skill as an undergraduate or in other previous experience," Giopulos says. "These are people with very definite ideas about where they're going artistically."

Giopulos is a graduate of Syracuse University (BFA), and Pennsylvania State University (M.Ed., Ph.D.). He has been on the faculty of the College of Fine and Applied Arts for 16 years, and has been named associate dean of that college and coordinator of graduate programs.

The programs

The **Master of Fine Arts** program includes six categories of study:

1. Major concentration 30 cr.

Designed to give depth of experience in the area of the student's major interest and chosen from one of the eleven areas: ceramics and ceramic sculpture, metalcrafts and jewelry, woodworking and furniture design, weaving and textile design, glass, industrial and interior design, graphic design, fine art (painting), fine art (printmaking), medical illustration, computer graphic design.

2. Minor Concentration* 15

From the above, to consist of studio and related electives, or internship, other than major.

3. Electives 18

4. Graduate Forum 3

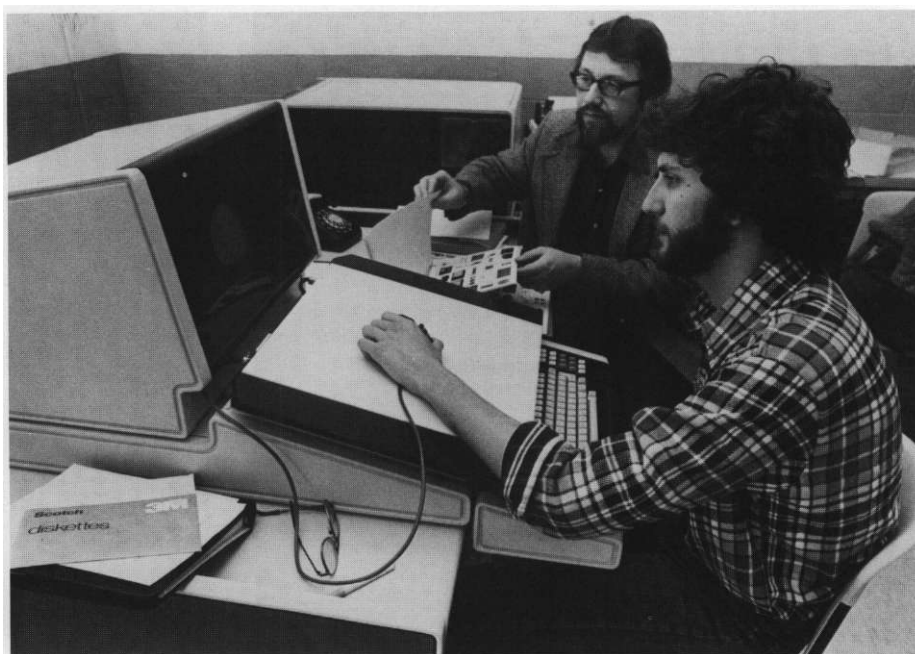
5. Humanities, art history 10

6. Thesis 14

Total 90 cr.

Another minor concentration can be arranged for those interested in teaching at a two-year college. The three required courses concern: 1) the student; 2) the institution; and 3) methods, along with 9 weeks of teaching in an area community college.

*In certain cases the minor concentration or courses may be taken elsewhere in the Institute (photography, printing, etc.) when related to the objectives of the student. Such courses must be approved in advance, normally after arrival on campus, by the advisor and the deans of the colleges involved. The minor supports the spirit of the MFA degree.



The **Master of Science for Teachers** program requirements include two categories of studies:

MST ART EDUCATION

1. Master of Science for Teachers in *art education* for those holding the BFA or BA (art major) degree and seeking permanent certification for teaching in the public schools.

The degree offers a concentration consisting of background courses in Education, Psychology 20 cr. and Sociology

Art Education Concentration: 22

Methods and Materials in Art

Education, Seminar in Art

Education, Practice Teaching

Studio elective _6

Total 48 cr.

MST STUDIO

2. Master of Science for Teachers in *studio art* (for those holding the BS degree in art education or industrial arts education, who desire permanent certificates, or for the BA or BFA 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 peittrern of studies covers requirements for the degree.

Major Concentration:

Studio art, or crafts 24 cr.

Humanities, art history 10

Minor Concentration 9

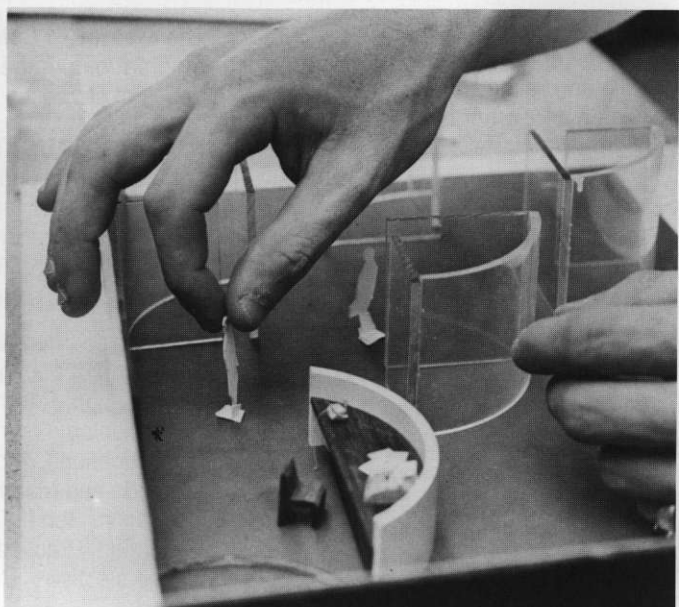
Electives 5

Total 48 cr.

The City Center

The College of Fine and Applied Arts graduate painting and art education programs are housed in downtown Rochester's historic area, within its cultural, education, and business center, at 50 West Main Street.

This provides students who enroll in these programs with stimulating surroundings, city resources, and ample work space.



Portfolio Guidelines For Graduate Applicants

The following guidelines are presented for all graduate students applying to the College of Fine and Applied Arts.* Presentation of the portfolio is one of the requirements used in totally assessing the performance and academic capabilities of the applicant.

- 1-The portfolio should contain examples of at least 20-24 pieces of the applicant's best work—35mm slides are preferred, displayed in an 8½" x 11" vinyl slide protector page.
2. Slides will be returned by the College of Fine and Applied Arts only when return postage is enclosed.
3. While every precaution will be taken to insure proper care and handling, the Institute assumes no responsibility for loss or damage to slides.
4. Identify slides by name and address. Please send portfolio and all other application materials to:

Rochester Institute of Technology
Office of Admissions
One Lomb Memorial Drive
Box 9887
Rochester, New York 14623
Telephone: (716) 475-6631

**Industrial and interior design and art education majors are offered only during Fall, Winter and Spring Quarters. Art education applicants should arrange a personal interview with Dr. Peter Giopulos, associate dean, College of Fine and Applied Arts (716) 475-2634.*

School of Art and Design

Courses for the education concentration of the MST program are offered through the College of Liberal Arts, and college of Applied Science & Technology.

Art Education

FADA-701, 702 (MST) Methods and Materials in Art Education

Registration #0401-701, -702 (Major)
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.

Class 2, Lab. 9, Credit 5 (offered every year—Fall, Winter)

FADA-820 (MST) Seminar in Art Education

Registration #0401-820 (Major)
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.

Lab. 25, Credit 3 (offered every year—Spring)

FADA-860(MST) Practice Teaching in Art

Registration #0401-860 (Major)
A seven-week, full-time practice teaching experience in secondary school, including professional duties of the art teacher in humanities courses, publication advising, audiovisual work, and supervision. Supplements the studio-theoretical education. Meets the state education requirements.

Credit 9 (offered every year—Spring)

Graphic Design

FADC-750 Graphic Design

Registration #0402-750 (elective, minor)
Advanced creative problem solving experiences in graphic design imagery. Professional problems in visual techniques for communication media. Media Center facility available for extension of studio problems.
Lab. 6, Credit 3 (offered every quarter)

FADA-780 Graphic Design

Registration #0402-780 (Major)
Advanced creative problem-solving experiences relating to graphic design imagery. Formal design values are emphasized and utilized in communications applications. Studio involvement is directed toward the solution of individual, group and assigned graphic design problems. Specification of the program is developed in accordance with the professional goal of the individual student and work leading toward the master's thesis. Media Center facilities are available for application of studio imagery.
Lab. 9-27, Credit 3-9 (offered every quarter)

Industrial and Interior Design

FADD-750 Industrial and Interior Design

Registration #0403-750 (elective, minor)
The reasoned application of theoretical and practical background to advanced projects in industrial and interior design.
Lab. 6, Credit 3 (offered every quarter)

FADD-780 Industrial and Interior Design

Registration #0403-780 (Major)
Selected projects in industrial or interior design which allow individual application of design methodology and technical skills toward professional goals. Selection of the projects is directed at providing an adequate background for development of the master's thesis.
Lab. 9-27, Credit 3-9 (offered every quarter)

Painting

FADP-750 Painting

Registration #0405-750 (elective, minor)
The study of the techniques and concepts of present day painting and its relation to the great sweep of the painting of the past for those who intend to paint and to teach.
Lab. 6, Credit 3 (offered every quarter)

FADP-780 Painting

Registration #0405-780 (Major)
The pursuit of the pertinent, the ecstatic, the beautiful, by a small group of those dedicated to the art. The student will become familiar with the trends and questings of modern painting, and by strengthening both intellectual and technical facilities, be prepared for a career as a professional painter. The work leads toward the master's thesis.
Lab. 9-27, Credit 3-9 (offered every quarter)

FADP-751 Drawing Problems

Registration #0405-751 (elective painting minor)
Individual drawing projects related to graduate students' major area of study. Opportunity to refine drawing skills on the graduate level.
Lab. 6, Credit 3 (offered each year)

Printmaking

FADR-750 Printmaking

Registration #0406-750 (elective, minor)

Advanced techniques in etching, lithography and woodcutting, as well as in many experimental areas including color processes, photo-etching, photo-lithography, paper making and combination printing. Students are expected to develop along independent lines, and direction is offered in contemporary thought and concept. The emphasis is toward developing a complete respect for the printmaking craft and profession.

Lab. 6, Credit 3 (offered every quarter)

FADR-780 Printmaking

Registration #0406-780 (Major)

Contemporary and historical printmaking concepts are presented as stimulant and provocation for the development of an individual approach to expression. Advanced techniques are demonstrated in intaglio, relief and lithography with resources available in non-silver photo processes, paper making and combinations. A complete understanding of the development and maintenance of the print studio is supportive for the professional artist. The work leads toward the master's thesis.

Lab. 9-27, Credit 3-9 (offered every quarter)

Sculpture

FADS-750 Sculpture

Registration #0407-750 (Elective)

Sculptural concepts are approached through a variety of processes and materials. The studio work is executed in paper, wood, fabrics, metal, stone, clay and plastics.

Lab. 6, Credit 3 (offered each year)

Medical Illustration

FADM-781 Medical Illustration Topics

Registration #0408-781 (MFA Major)

This is an introductory course, designed to acquaint the illustration student with art techniques commonly used in medical illustration, and with the medical library and audio-visual television supporting milieu in which the medical illustrator works.

Lab. 6, Credit 3 (offered each year)

FADM-782 Medical Illustration Graphics

Registration #0408-782 (MFA Major)

A course emphasizing the use of titles, animation, charts and graphs, schematics, and illustrative procedures as vehicles for meeting instructional and communicative needs. Students will learn the various techniques available and will apply those techniques to needs presented, culminating in a personal project dealing with "real world" contingencies.

Lab. 6, Credit 3 (offered each year)

FADM-783 Medical Illustration Anatomical Studies

Registration #0408-783 (MFA Major)

A study of pathological specimens and human dissection using colored pencil, pen and ink, carbon dust, and airbrush. Emphasis will be on rapid but accurate sketching and observation in the laboratory with a representation of form and structure in living tissue for the preparation of surgical procedures.

FADM-784 Medical Illustration Operative Procedures

Registration #0408-784 (MFA Major)

The application of illustrating and photographing in the operating room. The student will become familiar with the organization of operations and with his or her role as a medical illustrator. Sketches are to be drawn directly from the observation of surgery, consulting with the surgeon for accuracy of detail and development. The final preparation of the art work will be submitted for publication or portfolio.

FADM-785 Medical Illustration Exhibits and Design

Registration #0408-785 (MFA Major)

Students will learn to plan, cost-analyze, and construct three dimensional illustrations for in-house presentation or for traveling displays. Practical experience will be given in the problems of collaborating with clients, selecting appropriate display techniques and modes, and developing a manageable display.

Lab. 6, Credit 3 (offered each year)

PPHB-781 Medical Illustration Photography

See description under School of Photography

Computer Graphics Design

FADG-780 Introduction to Computer Graphics Design

Registration #0432-780 (MFA Major)

An introduction to programming for the design of computer graphics. Basic familiarity with using the keyboard, CRT, disk drive, tablet, printer, plotter and image digitizer to create imagery. Emphasis on creating shape files, pictures and writing simple programs.

Lab. 9, Credit 3 (offered each year)

FADG-781 Two-Dimensional Computer Graphics Design

Registration #0432-781 (MFA Major)

Exposure to computer graphic algorithms, design heuristics, design methodology, language data structures, and program structures for two-dimensional imagery. Projects involve complex programming.

Lab. 9, Credit 3 (offered each year)

FADG-782 Three-Dimensional Computer Graphics Design

Registration #0432-782 (MFA Major)

Extension of previous experience to include three-dimensional objects, hidden lines and surfaces, solid modelling, perspective, etc. Projects involve complex programming.

Lab. 9, Credit 3 (offered each year)

FADG-783 Visual Semiotics/Graphic Design

Registration #0432-783 (MFA Major)

The application of syntactic, semantic and pragmatic levels of visual design activities. These concepts will be applied to creative projects utilizing the computer as the primary tool.

Lab. 9, Credit 3 (offered each year)

FADG-784 Digital Typography

Registration #0432-784 (MFA Major)

A study of the evolution of typography, typesetting and typesetting systems from metal type through photo typesetting to today's digital typesetting. Hands-on experiences in production typesetting including photo typesetting, digital typesetting, word processing and prepress planning for accurate typographic reproduction.

Lab. 9, Credit 3 (offered each year)

FADG-785 Computer-Generated Slide Design

Registration #0432-785 (MFA Major)

The design of slides for business graphics and audio-visual presentations. Hands-on experience with a sophisticated computer graphics system for the generation of high resolution slides. Emphasis on both commercial production concerns and creative problem solving.

Lab. 9, Credit 3 (offered each year)

FADG-786 Computer-Generated Animation

Registration #0432-786 (MFA Major)

Extension of computer generated slide design using keyframe animation techniques to automatically create frames for film, video or multi-image slide presentations.

Lab. 9, Credit 3 (offered each year)

FADG-787 Advanced Computer Graphics Design

Registration #0432-787 (MFA Major)

Advanced explorations of computer graphic applications. Projects include such topics as computer generated layout, digital type development, computer-aided instruction lessons, TV and electronic mail promotions and computerized animation.

Lab. 18, Credit 6 (offered each year)

Thesis

FAD (C, D, P, R, M, or G)-890 **Research and Thesis Guidance**
Registration #040(2, 3, 5, 6, 8, 32)-890 **(Major MFA only)**
 The development of a thesis project instigated by the student and approved by a faculty committee and the Special Assistant to the Dean for Graduate Affairs. Primarily a creative production, the thesis must also include a written report.
 Lab. 27, Credit 3-14 (offered every quarter)

FASA-790 **Graduate Forum**
Registration #0420-790 **(Required for MFA)**
 The presentation and discussion of issues in aesthetics, criticism, creativity and perception as they relate to art, design and craft. Points of view will be clarified through critical writing and class presentation. Required for MFA; to be taken prior to Thesis.
 Class 2, Credit 3

School for American Craftsmen

Ceramics and Ceramic Sculpture

FSCC-750 **Ceramics and Ceramic Sculpture**
Registration #0409-750 **(elective, minor)**
 Basic instruction and experience in ceramic design, fabrication and production of ceramic forms. This study provides ceramic technology and terminology and gives experience with clays along with fundamental forming techniques. The development of design awareness is encouraged through lectures and critiques.
 Lab. 6, Credit 3 (offered every quarter)

FSCC-780 **Ceramics and Ceramic Sculpture**
Registration #0409-780 **(Major)**
 A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. There will be a strengthening of ceramic techniques, design fundamentals and encouragement of personal ceramic expression. The student will be encouraged to evaluate new techniques, materials and concepts. This sequence leads to the master's thesis, inaugurated by the student and overseen by the faculty.
 Lab. 9-27, Credit 3 (offered every quarter)

Glass

FSCG-720 **Stained Glass**
Registration #0411-720 **(elective, minor)**
 This elective explores stained glass designing, cutting, soldering, foiling, leading, glazing, and other fabrication techniques.
 Lab. 6, Credit 3 (offered each year)

FSCG-750 **Glass**
Registration #0411-750
 Various techniques in both cold and hot glass will be considered: casting, slumping, faceting, blowing, cutting, electroplating, lamp working, enameling, and sculptural construction.
 Lab. 6, Credit 3 (offered every quarter)

FSCG-780 **Glass**
Registration #0411-780 **(Major)**
 The study and manipulation of hot glass, including refinement of traditional and innovation of new techniques will be undertaken: design, cold glass, sagging, slumping, casting, industrial and studio glass lines, copper wheel and stone engraving along with glass technology and history. The program is structured on individual needs, interests and background preparation as they may be determined through faculty counseling. This sequence leads to the master's thesis, inaugurated by the student and overseen by the faculty.
 Lab. 9-27, Credit 3-9 (offered every quarter)

Metalcrafts and Jewelry

FSCM-750 **Metalcrafts and Jewelry**
Registration #0412-750 **(elective, minor)**
 This is the study and manipulation of metals for hollow ware/jewelry. Design sensitivity and concepts are approached through the raising, forming and planing or casting, forging, and fabricating techniques.
 Lab. 6, Credit 3 (offered every quarter)

FSCM-780 **Metalcrafts and Jewelry**
Registration #0412-780 **(Major)**
 A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. Both hollow ware and jewelry areas will be explored. It is designed to give the student a broad exposure to metal working techniques, expand the student's knowledge of applied design, strengthen perceptual and philosophical concepts and develop an individual mode of expression. This sequence leads to the master's thesis, inaugurated by the student and overseen by the faculty.
 Lab. 9-27, Credit 3-9 (offered every quarter)

Weaving and Textile Design

F SCT-750 **Weaving and Textile Design**
Registration #0413-750 **(elective, minor)**
 This is the study and appreciation of weaving and textile techniques, soft sculpture, off loom weaving and printing. Design approaches are stressed.
 Lab. 6, Credit 3 (offered every quarter)

F SCT-780 **Weaving and Textile Design**
Registration #0413-780 **(Major)**
 A program structured on the basis of individual needs, interests and background preparation as they are determined through faculty counseling. Techniques offered are combination weaves and pattern design, double weave, embroidery and stitchery, finn-weave, ikat, multiple layer, dyeing, non-loom, pile rug, printed surface, silkscreen, tapestry, and soft sculpture. Design concepts are integrated with the techniques. This sequence leads to the master's thesis, inaugurated by the student and overseen by the faculty.
 Lab. 9-27, Credit 3-9 (offered every quarter)

Woodworking and Furniture Design

FSCW-750 **Woodworking and Furniture Design**
Registration #0414-750 **(elective, minor)**
 A course in woodworking techniques and procedures. It enables the student to gain design and technical competency and develop individual and creative furnishings.
 Lab. 6, Credit 3 (offered every quarter)

FSCW-780 **Woodworking and Furniture Design**
Registration #0414-780 **(Major)**
 A program structured on the basis of individual needs, interests and background preparation as they are determined through faculty counseling. An opportunity for technical, aesthetic and design competency to grow through the exploration of hand and machine tools; solid wood theory, joinery and practice; veneer theory and practice; production theory; chair, table, cabinet design and construction. This sequence leads to the master's thesis, inaugurated by the student and overseen by the faculty.
 Lab. 9-27, Credit 3-9 (offered every quarter)

Thesis

FSC (C, G, M, T, or W)-890 **Research and Thesis Guidance**
Registration #04 (09, 11, 12, 13 or 14)-890 **(Major MFA only)**
 Research and presentation of an acceptable thesis with a focus on technique, design, and/or production, by the faculty thesis committee. 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 participation in the Graduate thesis show.
 Lab. 27, Credit 3-14 (offered every quarter)



Robert H. Johnston, Ph.D., Pennsylvania State University—Dean

Peter Giopulos, Ph.D., Pennsylvania State University—Associate Dean

Philip W. Bornarth, MAE School of the Art Institute—Professor, Painting, School of Art and Design

Donald G. Bujnowski, MA, University of Minnesota—Professor, Weaving and Textile Design, School for American Craftsmen

David Dickinson, MFA, Rochester Institute of Technology—Assistant Professor, Printmaking, School of Art and Design

Robert Heischman, U.C.F.A., Ruskin School of Drawing and Fine Art, Oxford University—Associate Professor, Painting, School of Art and Design

Robert K. Keough, MFA, Rochester Institute of Technology—Assistant Professor, Computer Graphics Design, School of Art and Design

William Keyser, MFA, Rochester Institute of Technology—Professor, Woodworking and Furniture Design, School for American Craftsmen

Max Lenderman, MFA, University of Kansas; MS, Indiana State University—Associate Professor, Weaving and Textile Design, School for American Craftsmen

Graham Marks, MFA, Alfred University—Assistant Professor, Ceramics, School for American Craftsmen

Craig McArt, MFA, Rochester Institute of Technology—Professor, Industrial and Interior Design, School of Art and Design

Fred Meyer, MFA, Cranbrook Academy of Art—Professor, Painting, School of Art and Design

R. Roger Remington, MS, University of Wisconsin—Professor, Graphic Design, School of Art and Design

Robert Schmitz, MFA, University of Wisconsin; MS, Alfred University—Professor, Ceramics, School for American Craftsmen

Douglas Sigler, MFA, Rochester Institute of Technology—Associate Professor, Woodworking and Furniture Design, School for American Craftsmen

Michael Taylor, MFA, East Tennessee State University—Assistant Professor, Glass, School for American Craftsmen

Toby Thompson, MFA, Rochester Institute of Technology—Professor, Industrial and Interior Design, School of Art and Design

Leonard A. Urso, MFA, State University of New York at New Paltz—Assistant Professor, Metalcrafts and Jewelry, School for American Craftsmen

James C. Ver Hague, Jr. MFA, State University of New York at Buffalo; MS, Rensselaer Polytechnic Institute—Associate Professor, Computer Graphics Design, School of Art and Design

Robert Wabnitz, Diploma, Rochester Institute of Technology—Assistant Professor, Medical Illustration, School of Art and Design

Lawrence Williams, MFA, University of Illinois—Professor, Printmaking, School of Art and Design

Norman Williams, MS, Syracuse University—Associate Professor, Art Education, School of Art and Design



College of Graphic Arts and Photography



Master of Science Degree in Printing Technology

Mark F. Guldin, Dean

Technology in the printing industry continues to evolve rapidly with the incorporation of innovative materials and concepts from other disciplines. This evolution covers all aspects of graphic communication as well as such non-communicative graphics as circuit printing and textile decorating. The graduate program is designed to help the student remain current after leaving RIT.

The graduate program is specifically arranged for students so that completion prepares them for participation in a volatile industry whether in production, research or other functions, as well as for the possibility of a career in teaching. In this regard, the program rests on theory and the applications of basic theory along with training in the use of modern equipment. The student must complete a thesis allowing him or her to bring to bear acquired knowledge on a specific problem. Thesis work affords the student the opportunity to contribute to the knowledge of the printing technologies. This work is done under the guidance of faculty experienced in that area of printing on which the student has chosen to focus.

The graduate program recognizes the value of aesthetics in the graphic arts and allows opportunity for the student to bring technology to bear on design and attractive form. Those students whose interests run heavily to this aspect of printing, such as book design, are encouraged to master the technology so that thesis work can apply technology to aesthetic goals. The program remains a technical one, however, with strongest attraction for the students primarily interested in technology.

The Program

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



Joseph Noga (center)

for students whose undergraduate majors were in the arts, sciences, education, or other non-printing areas, as well as for graduates with a major in printing. Candidates who do not have adequate undergraduate work in printing must make up foundation courses prior to matriculating into the program.

The printing technology major provides graduate level study in printing technology and in research methods. The program is not intended to give a broad exposure of the printing field, but to provide the student an opportunity to specialize in a particular area, and to develop research skills useful to the graphic arts. This objective is accomplished through the program's core courses, selection of electives, and the development of the thesis. The goal of the program is to educate students who will have, in addition to an understanding of the procedures and theoretical concepts in printing processes, an appreciation of particular problems in special areas at an advanced level. The students wishing to take additional course work to explore areas beyond the course requirements of the program are encouraged to take additional course work to broaden their experience in the printing field.

The printing technology major is a full-time master's degree program. The length of time required to earn a degree varies according to the student's undergraduate preparation in printing, mathematics, and science. All students must earn 48 credits as a graduate student, 36 of which must be taken at RIT, to earn the master of science degree. The program generally requires one academic year at the graduate level. Candidates who wish to enter the program, but lack adequate preparation, must take as many as 30 credits of foundation courses in printing, mathematics and science prior to matriculation. Foundation courses can be accomplished in two quarters, or one quarter and the Summer Session. With foundation course work completed, the candidate will normally start the graduate program sequence with the Fall Quarter. Some flexibility in the program does allow candidates to enter at other times during the school year.

Program Objectives

The goal of the technology major is to graduate well-educated students in both the theoretical and practical aspects of graphic arts technology. The program will provide graduates with the necessary education to approach solutions to printing problems by an orientation to processes and materials based on systematic analysis.

Preparation in the technology major provides entry as a professional into the printing field in areas such as production management, research and development, technical sales representative, quality assurance, administration, marketing, etc. Because the printing industry is large and extremely varied, the student's overall preparation, interest and background would allow for entry level positions in these and in a number of other areas in the printing industry.

The Foundation Program

The technology major is designed for the candidate with an undergraduate degree in printing, or for the candidate who has an undergraduate degree in a discipline other than printing. The program offers an excellent opportunity for the individual who wishes to change his or her career goals, by preparing them for entry level positions in the printing field. Candidates with the necessary undergraduate course work will start the program as a matriculated graduate student.

Candidates without adequate undergraduate work in printing must take foundation courses *prior* to matriculation into the graduate program. These students will enter the School of Printing as "Special Students." This will help identify the candidate in foundation courses, and allow for guidance from the program coordinator.

In addition to basic printing courses, course work in mathematics and science is expected if these courses are not indicated on the candidate's transcript. A technology degree requires entering students to have a minimum level of competency in mathematics and science. This will be helpful in the program and in the student's research activities. Basic knowledge of printing before matriculation will be helpful in giving the student more direction in terms of career goals, and assist in the development of a thesis topic at an early stage in the graduate program. Students who require foundation courses must take as many as 30 credits in printing, mathematics, and science. In the process of creating a foundation, however, they may find it desirable to draw upon the rich array of undergraduate offerings at the School of Printing by taking more courses than the minimum requirements. Six basic undergraduate printing courses, two in mathematics and one course in the physical sciences, are required.

Because foundation course work can be made up in two quarters or one

quarter plus the Summer Session, most of the foundation courses are offered each quarter. To aid the candidate with the science requirement, a special chemistry course is offered in the School of Printing's Summer Session program, Chemistry Preparation for Printing Graduate Study.

Foundation courses must be completed before a student can matriculate into the graduate program, and the student must earn an overall B average in these undergraduate foundation courses to be matriculated. As students approach completion of the foundation course work, they will each petition for matriculation. Only under unusual circumstances will a student be allowed to combine a foundation course with the program core courses in order to maintain a full schedule. This will require approval of the program coordinator.

Foundation Courses

The courses listed below represent the graphic arts areas required to meet foundation course requirements.

Printing (Six Courses)

PPRT-200 Introduction To Printing
OR

PPRT-207 Printing Plates

PPRT-206 Reproduction

Photography

PPRT-208 Lithographic Press

PPRT-311 Planning and Finishing

PPRM-301 Application of

Computers To The Graphic Arts

PPRT-201 Typography I

NOTE: These are the only printing subject areas acceptable to meet the foundation course requirements. Printing courses in other subject areas will not be accepted.

Mathematics (Select Two Courses)

SMAM-204 College Algebra

SMAM-214 Introductory Calculus

PPRM-210 Financial Controls I

BBUA-210 Financial Accounting

BBUA-215 Survey of Accounting Concepts

Physical Science (Select One Course)

General College Chemistry

General College Physics

PPRT-560 Chemistry Preparation for Printing Graduate Study

Program Requirements

The master of science degree program in printing technology requires the completion of 48 quarter credit hours of study including eight hours for the

thesis. If foundation courses are not required, the program can be completed in one academic year. Students who are qualified in one or more of the required courses may substitute other course work with the permission of the program coordinator.

Technology Major

Required Courses	Credits
701-Research Methods	4
709-Trends in Printing Technology	4
702-Graphic Reproduction Theory	4
703-Statistical Inference	4
713-Photo Typography Procedures	4
711-Tone and Color Analysis	4
754-Ink, Color and Substrates	4
-Electives	12
890-Thesis	8
Total	48

A Typical Schedule of Courses

Fall

702-Graphic Reproduction Theory	4
703-Statistical Inference	4
713-Photo Typography Procedures	4
-Elective	4
Total	16

Winter

701-Research Methods	4
709-Trends in Printing Technology	4
-Electives	8
Total	16

Spring

711-Tone and Color Analysis	4
754-Ink, Color and Substrates	4
890-Thesis	8
Total	16

Admission Requirements

Prior to being admitted to the master of science degree program, applicants must satisfy the Graduate Admission 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 (3.0) level or higher. Applicants are also encouraged to take the Graduate Record Examination (GRE) as an aid in counseling during the development of the individual's program of studies.

Requirements are:

Written RIT application

Earned baccalaureate degree

Official undergraduate transcript

Two recommendations

An on-campus interview when possible

Undergraduate GPA of 3.0 or higher
Foundation course work 3.0 or higher, if required
TOEFL score of at least 525
(international students)

If the applicant's credentials are in order, except for the necessity to take foundation courses, the candidate will be accepted as a Special Student. The applicant will be notified as to which courses will be needed to meet foundation requirements. When all of the required foundation courses have been completed (with an overall B average), the student will petition for matriculation as a graduate student.

Summer Session

The School of Printing operates a unique Summer Session program that offers undergraduate course work in two-week, concentrated sessions. This allows the candidate for the graduate program to take several foundation courses, including the special foundation course in chemistry. It also provides an opportunity for the student to take part in a wide assortment of the school's undergraduate course offerings, beyond the required foundation courses. There are no graduate courses offered during the Summer Session.

Special Libraries

Students may use two special libraries related to the school. The Technical and Education Center of the Graphic Arts maintains a library of current printing-related information. Some students find employment in the center writing abstracts for its publications. The School of Printing has the Melbert B. Cary, Jr. Graphic Arts Collection, composed of more than 9,000 volumes including many rare books and other materials illustrating past and present fine printing, book design and illustrations, papermaking, binding, and other aspects of the graphic arts. The Frederick W. Goudy-Howard W. Coggeshall Memorial Workshop contains letters, papers and memorabilia of Mr. Goudy along with cases of Goudy types that can be seen only at RIT, because matrices for their manufacture were destroyed by fire in 1939.

Additional information

Joseph L. Noga

Graduate Program Coordinator

School of Printing

(716)475-2849 "

Printing Courses

Foundation Printing Courses

PPRT-200 Introduction to Printing

Registration #0911-200

For packaging science students; study of different printing processes; analysis of process advantages and disadvantages relative to a variety of applications; examination of procedures for each process, from design through finished product; practice of basic operations necessary for the production of a simple package printing job.

Class 2, Lab. 3, Credit 3

PPRT-201 Typography I

Registration #0911-201

Conventional rules of good traditional typography are reviewed through familiarization with basic terminology, type classification and typeface recognition; course includes lectures and laboratory exercises.

Class 2, Lab. 3, Credit 3

PPRT-207 Printing Plates

Registration #0911-207

An introductory course in the principles and practices of platemaking for letterpress, flexographic, planographic, and gravure printing processes. It covers a survey of major printing processes with emphasis on their plate characteristics and platemaking requirements; important physical as well as chemical principles that are applicable to the plate image-forming process; laboratory work that deals with plate processing variables; also an introduction to recent development in printing plate technology.

Class 2, Lab. 3, Credit 3

PPRT-206 Reproduction Photography

Registration #0911-206

A basic course in the fundamental principles, procedures, techniques, and applications of the photographic process as it is related to the production of film negatives or film positives for the major printing processes.

Class 2, Lab. 3, Credit 3

PPRT-208 Lithographic Press

Registration #0911-208

An introductory study of the principles and methods of offset presswork; press functions; operations and care of presses; exercise in running simple jobs.

Class 2, Lab. 3, Credit 3

PPRT-311 Planning and Finishing

Registration #0911-311

Printing production planning to correlate pre-press and post-press operations. Topics include preparing layouts, forms and a study of how they are affected by various bindery operations. Laboratory experiments include the operation of modern bindery equipment, evaluation and application of adhesives, binding materials and book performance testing. Several projects are followed through from design, signature layout to a finished product, including a gold stamped, hardcover bound book.

Class 2, Lab. 3, Credit 3

PPRT-301 Application of Computers to the Graphic Arts

Registration #0911-301

A study of the applications of electronic computer systems to the graphic arts industry. Topics include fundamental data processing concepts, software development, and technical and managerial graphic arts applications.

Class 4, Credit 3

Foundation Math Courses

SMAM-204 College Algebra

Registration #1016-204

Topics include a review of the fundamentals of algebra; solution of linear, fractional and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic and trigonometric functions; systems of linear equations.

Class 4, Credit 4 (offered every year) (F,S)

SMAM-214 Introductory Calculus

Registration #1016-214

A non-rigorous introduction to the study of differential calculus. The following topics will be covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, maxima and minima. (SMAM-204 or equivalent)

Class 3, Credit 3 (offered every year) (F, W)

PPRM-210 Financial Controls I

Registration #0910-210

Gives the line manager an understanding of the firm's financial accounting system so that he or she can work with the accountant to use that system effectively. Includes balance sheet, income, funds and cash statements, ratio analysis and asset vs. expense decisions.

Class 4, Credit 3

BBUA-210 Financial Accounting

Registration #0101-210

Basic accounting principles and techniques within a framework of sound modern theory. Methods of accounting for revenues, costs, property and debt. Typical records for various types of business enterprise. Preparation and use of classified financial statements.

Class 4, Credit 4

BBUA-215 Survey of Accounting Concepts

Registration #0101-215

A course for non-business majors. An introduction to the purposes and functions of accounting in a dynamic society. Emphasis is placed upon essential financial and managerial accounting concepts necessary for management planning and control.

Class 4, Credit 4 (offered upon demand)

Foundation Science Course

PPRT-560 Chemical Preparation for Printing

Registration #0911-560

Graduate Study

A study of the fundamentals of chemistry with emphasis on its relationship to printing sciences and technology. An emphasis on the role of material properties in printing processes with regard as to how chemistry determines such properties.

Class 4, Credit 4 (Summer Session Only)

Course only for Graduate Program Candidates

Printing Technology

PPRT-701 Research Methods in Graphic Arts

Registration #0911-701

Theory and application of principles of laboratory oriented research in the graphic arts, analysis of research techniques, interdisciplinary relationships, conditions for technology transfer and synergism; status of research in the graphic arts including organization, basic vs. applied research and organization of literature including patents, illustrations of techniques and research programs and methods followed in various research situations; systematic study theory of scientific methods including induction, deduction, hypothetico-deduction, hypothesis formation, theory development, etc.

Credit 4

PPRT-702 Graphic Reproduction Theory

Registration #0911-702

Analysis of the basic theories of graphic reproduction and study of the principles underlying prevalent and proposed printing processes; special topics such as classification and description of the various light-sensitive systems as applied to the graphic arts, ink transfer theory, present and proposed systems of printing based on electrostatics, electrolysis, magnetism and lasers; study of hybrid systems and the significance and application of interdisciplinary methods.

Credit 4

PPRT-703 Statistical Inference

Registration #0911-703

Descriptive statistics, patterns of variability, measures of variability, working with the normal curve, tests of hypotheses for means, tests of hypotheses for variance, internal estimates for means, internal estimates for variance, sample size for variables, introduction to analysis of variance, and applications of applied statistics to graphic arts.

Credit 4

PPRT-709 Trends In Printing Technology**Registration #0911-709**

A study of the forces which have influenced the development of printing with emphasis upon the technological factors involved; examinations of the relationships of aesthetics and craft concepts to modern industrial techniques.

Credit 4

PPRT-711 Tone and Color Analysis**Registration #0911-711**

Methods of instrumentation necessary for the evaluation and process control of printed tone and color and the photographic intermediate images required for the photomechanical reproduction of tone and color.

Credit 4

PPRT-713 Photo Typography Procedures**Registration #0911-713**

An introductory course in the basic tenets of traditional typography. Areas that will be covered are: terminology, style, copyfitting, point systems, legibility, initials and typeface recognition. Laboratory demonstrations will be given to illustrate the theoretical areas covered in the lectures. Emphasis is placed on photo composition and the systems approach.

Credit 4

PPRT-890 Research and Thesis Guidance**Registration #0911-890**

An experimental survey of a problem area in the graphic arts.

Credit 8

PPRT-722 Ink, Color and Substrates**Registration #0911-722**

A study of the physics of light and color, basic color theory, color measurements and color systems. Included are applications of color theory to the graphic arts. The chemistry and physics of ink and substrates and their interaction will be covered. Emphasis is given to the problems of color, ink, and substrates in each printing process.

Credit 4

Elective Graduate Courses**PPRT-704****Design of Experiments****Registration #0911-704**

Analysis of variance, components of variance, crossed vs. nested experiments, studying individual effects, introduction to matrix algebra, regression analysis, planning experiments from a statistical point of view, basic experimental designs, factorial experiments, fractional factorials, determination of optimum conditions, introduction to nonparametrics and quality control concepts (as time allows).

Credit 4

PPRT-708 Introduction to Systems Analysis**Registration #0911-708**

Problems of systems analysis in printing operations for the highest quality product at the minimal cost including optimal floor designs and methods of study. (PPRM-301)

Credit 4

PPRT-850 Research Projects**Registration #0911-850**

Individualized research projects in which independent data is collected by the student, followed by analysis and evaluation. A comprehensive written report is required. Consent of advisor required.

Credit 1 to 4

PPRM-702 Computers in Management**Registration #0910-702**

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. (PPRM-301)

Credit 4

Additional Electives

Electives may be selected either from the graduate course listings or from advanced undergraduate course listings in the School of Printing. The student can select up to 12 undergraduate elective credits to meet degree requirements. Graduate elective courses can also be taken in the other schools of the Institute. This allows a student to concentrate in a special area of interest. Electives must be approved by the Graduate Program Coordinator as being an integral part of the student's program at the time of matriculation.



Graduate Faculty School of Printing

Mark F. Guldin, Ph.D., University of Iowa—Dean; Professor, School of Printing

Sven Ahrenkilde, MS, Polytechnic University, Denmark—Research Associate, Technical and Education Center of the Graphic Arts

William H. Birkett, MBA, University of Michigan, C.M.A.—Associate Professor, Printing Management

Joseph E. Brown, Jr., MS, Kansas State—Associate Professor, Paper Technology

Walter A. Campbell, M. Ed., MBA, University of Rochester—Professor, Printing Management

Robert Y. Chung, MS, Rochester Institute of Technology—Assistant Professor, Computer Technology

W. Frederick Craig, M. Ed., University of Rochester—Associate Professor, Newspaper Production Management

Chester J. Daniels, MS, Rochester Institute of Technology—Senior Technologist, Technical and Education Center of the Graphic Arts

Hugh R. Fox, Ph.D., Rutgers University—Assistant Professor, Printing Management

Clifton T. Frazier, M. Ed., University of Rochester—Associate Professor, Photo-Lithography Technology

Robert G. Hacker, Ph.D., University of Iowa—Paul and Louise Miller Professor in Newspaper Management, Computer Applications

Walter G. Home, M. Ed., University of Rochester—Professor, Printing Plate Technology

James I. Horton, M. Ed., University of Rochester—Associate Professor, Layout and Design

Joseph L. Noga, MS, University of Bridgeport—Associate Professor, Reproduction Photography, Graduate Program Coordinator

Archibald D. Provan, M. Ed., University of Rochester—Associate Professor, Typography

Harry Rab, MSME, Newark College of Engineering—Assistant Professor, Electro-Mechanics of Printing

Emery E. Schneider, M. Ed., University of Rochester—Associate Professor, Phototypesetting

Franz Sigg, MS, Rochester Institute of Technology—Research Associate, Technical and Education Center of the Graphic Arts

Julius L. Silver, Ph.D., Connecticut—Professor, Ink Technology, Graphic Theory

Miles F. Southworth, M. Ed., University of Rochester—Professor, Reproduction Photography

Robert J. Webster, MS, Ball State—Associate Professor, Screen Printing Technology

Charles J. Weigand, MS, SUNY at Oswego—Associate Professor, Flexographic Technology

Associates of the Graduate Faculty

Bekir E. Arpag, BS, Rochester Institute of Technology—Associate Professor, Photo-Mechanical Reproduction Processes

Edward A. Brabant, BS, Rochester Institute of Technology—Professor, Gravure Technology

Zenon A. Elyjiw, Senior Technologist—Technical and Education Center of the Graphic Arts

Alfred F. Horton, AAS, Rochester Institute of Technology—Associate Professor, Layout and Design

Jack D. Jenkins, BS, Rochester Institute of Technology—Assistant Professor, Newspaper Production Management

Herbert H. Johnson, BS, Rochester Institute of Technology—Melbert B. Cary, Jr., Professor in Graphic Arts, Book Design

James V. Mannino, BS, Rochester Institute of Technology—Instructor, Typography

Werner Rebsamen, Diploma, Academy of Fine Arts, Zurich—Associate Professor, Planning and Finishing

Anthony R. Sears, BS, Rochester Institute of Technology—Professor, Photo-Lithography Technology

Robert S. Tompkins—Assistant Professor, Composition Specialist



Master of Science Degree in Imaging and Photographic Science

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 imaging sciences 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 imaging and photographic science. A thesis is required.

Faculty members within the department supervise research in areas of the chemistry and physics of radiation-sensitive materials and processes, color science, digital image processing, remote sensing, photo-optical instrumentation, and objective and subjective image evaluation. Thesis work may be done in the field of graphic arts in conjunction with the Technical and Educational Center of the Graphic Arts. Other interdisciplinary efforts are possible with the colleges of Engineering and Science. Opportunities also exist to perform thesis work under the direction of selected scientists and engineers in local industries who act as adjunct faculty.

The department offers three programs of study leading to the master of science degree in imaging and photographic science:

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

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 must be requested by the student at the end of the third year, at which time permission may be granted to replace



Thermal infrared photograph of Lake Ontario from the LANDSAT 4 satellite. The image was digitally enhanced in the Imaging and Photographic Sciences laboratory. This procedure accentuates the temperature differences in the water, which can be seen as lighter tones in the image.

the normal fourth year departmental required courses and thesis by technical electives. If qualified, the student will be formally admitted to the graduate program. 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 bulletin. Persons interested in this program should request information through the coordinator of the graduate program.

2. Master of Science in Imaging and Photographic Science (Full-time)

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

Before admission to candidacy and beginning in the graduate level courses in imaging and photographic science, the student must have an adequate foundation in principles of imaging science. This knowledge may be acquired by enrolling in the full-time summer course, Principles of Photographic Science, PPHS-600. This course begins in June and runs for 10 weeks.

Although the 45 graduate credits required can be accumulated in three quarters, it has been found that only in

exceptional cases is this time sufficient for successful completion of the experimental work in the thesis and for the preparation of the report. Hence full-time students should plan on at least five quarters of residence, beginning with the Summer Quarter.

3. Master of Science in Imaging and Photographic Science (Part-time)

This program is identical to the full-time program except that the requirements can be met on a part-time basis. The necessary knowledge in the principles of photographic science may be obtained by taking Principles of Photographic Science, PPHS-601, 602, 603 which is equivalent to PPHS-600 in content. This sequence is offered during the evening, with Saturday laboratory sessions. Part-time students must plan to complete the graduate requirements within seven years. 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 Graduate Program coordinator.

Admission

Admission to the full-time or part-time programs will be granted to graduates of accredited degree granting institutions whose undergraduate studies have included at least the following courses in the major areas of study: mathematics through calculus; a full-year, college-level course in physics, with laboratory; a similar course in chemistry.

Applicants must demonstrate to the Graduate Committee (MS) 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. Of this total, 36 credits must be in courses other than Research and Thesis Guidance and must include the courses shown in the following table, the submission of an acceptable thesis, and an oral examination.

Course title and number	Quarter Credit Hours		
	Fall	Winter	Spring
Principles of Photographic Science—PPHS-600 or PPHS-601, 602, 603	No Graduate Credit ⁽¹⁾		
Theory of the Photographic Process—PPHS-711, 712, 713	3	3	3
Mathematics and Statistics for Photographic Systems—PPHS-721, 722 ⁽²⁾	4	4	
Instrumental and Photographic Optics—PPHS-731, 732, 733	3	3	3
Analysis and Evaluation of Imaging Systems—PPHS-741, 742, 743	3	4	3
Research and Thesis Guidance—PPHS-890 ⁽³⁾	1	1	

(1) The three quarters cover photographic chemistry, radiometry, sensitometry, tone reproduction, and color. Courses PPHS-600, 601, 602 and 603 are intended for students who previously received acceptance into the MS program in photographic science. Other students are welcome if they have the necessary background in physics, mathematics, and chemistry. Consent of the Graduate Coordinator is necessary for registration. Each quarter of PPHS-601, 602, 603 carries 5 undergraduate quarter credits. PPHS-600 carries 15 quarter credits.

(2) Students in the part-time program may substitute College of Continuing Education courses CTAM-711, CTAM-712, and CTAM-801. PPHS-721, 722 is not offered during the evening hours.

(3) The remaining 7 credits are distributed as required by project work.

Certain upper class elective courses in supporting areas may be accepted toward the degree requirements in imaging and photographic science, provided they were agreed to in writing by the Graduate Program coordinator prior to the beginning of the course.*

The thesis

The thesis is to be based on experimental evidence obtained by the candidate in an appropriate field as arranged between the candidate and his or her advisor. The minimum number of thesis credits required is nine. The thesis requirement may be fulfilled by experiments in Institute laboratories. In some cases, the requirement may be fulfilled by work done in other laboratories. An example might be the candidate's place of employment, under the following conditions: 1. The results must be fully publishable. 2. The candidate shall have an advisor assigned by the Department. 3. The thesis must be based on the candidate's independent, original work, as it would be if the work were done in Institute laboratories. The work shall not have started prior to the assignment of the advisor. 4. In exceptional cases, it may be possible that the candidate is able to present published results of original work or non-classified work done outside of RIT which can be accepted in lieu of a thesis, and essentially fulfills the requirements for a

completed thesis. Then, the thesis requirements may be substituted by elective courses.

Grades

The average of the grades for all courses taken at the Institute and credited toward a master's degree must be at least a "B" (3.0). Research and Thesis Guidance does not carry a letter grade and, hence, is not included in the average.

"One of the most interesting courses in the program is PPHS-600 Principles of Photographic Science, our summer transfer course. It presents an enormous amount of very basic information and provides access to an astonishing number of fields that use photography in some way, such as microelectronics, remote sensing, micrographics, graphic arts, photographic manufacturing, and many others. We are always delighted to have students from other disciplines take the course and apply the information to other fields."

Master of Fine Arts Degree in Photography

The master of fine arts program in photography emphasizes photography as an art form, with the intention of inspiring and nurturing the individuality of each student as a creative, productive person. It is rooted in the belief that the study of photography as a fine art can be enhanced by the study of photography as an applied art, as a liberal art and as a technical art. The program provides each student an opportunity to pursue graduate study in photography as a means to personal, aesthetic, intellectual and career development.

The MFA curriculum is not based on a fixed pattern of study, but rather on a flexible one which is continually sensitive to the needs of each student and builds upon the strengths that he or she brings to the program. Flexibility extends beyond what is to be learned to *where* it can be learned and *how* it can be learned and validated.

*All graduate courses applied toward the degree, including Research and Thesis, must be completed within seven years.

Photography is offered as a major with minor concentrations in printmaking, film making, printing, and museum practice. Successful completion of the program enables a student to pursue careers in education, museums, business and as self-employed professionals.

The broad goals of the program are to:

1. Provide students with the opportunity to use photography as a means to pursuing a career and earning a livelihood.
2. Provide students with the opportunity to use photography as a means of enriching their personal lives and the lives of society.
3. Provide an environment that encourages a sense of community, creativity, scholarship and purpose.

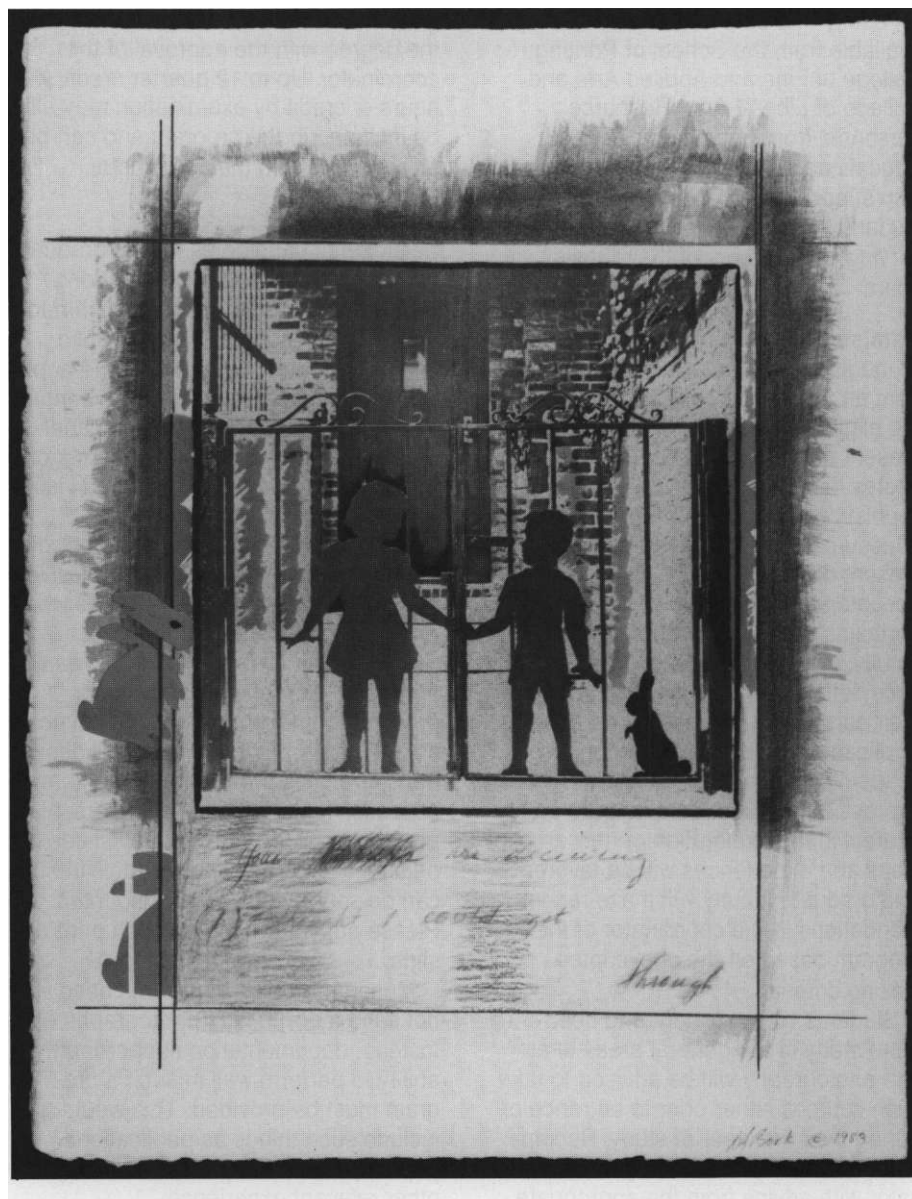
Electives and minors

No minor concentration is required, but a grouping of electives in a particular area of interest is available. Minors can be pursued in printmaking, film making, museum practice and printing. Minor concentration must be planned with and approved by the coordinator. Elective courses are available in film making, television, animation, printmaking, painting, communications design, museum studies, crafts, bookbinding, typography, color photography, mixed media, studio photography, advertising photography, perception, sensitometry, computer graphics, and materials and processes of photography. There are also opportunities for independent studies and experiential study.

Museum Studies

This is a two and one half year program that awards a master of fine arts degree and is designed to train individuals in the care, management and interpretation of photographic collections. Theoretical training, which takes place in seminars at Rochester Institute of Technology and the Visual Studies Workshop, is complemented by experiential learning at the Visual Studies Workshop and the International Museum of Photography at the George Eastman House.

The program is coordinated by Nathan Lyons, director, Visual Studies Workshop.



The faculty

The MFA photography program is supported by a staff of 50 faculty members within the School of Photographic Arts and Sciences and adjunct faculty members at the International Museum of Photography, George Eastman House and the Visual Studies Workshop.

*"Your Barriers Are Deceiving; (I)
Thought I Could Get Through";
© Debora J. Bork, 1983*

Faculty and course work are also available from the School of Printing, College of Fine and Applied Arts and College of Liberal Arts. Resource personnel from RIT's Technical and Educational Center for the Graphic Arts also support the program by providing students with technical advice and by serving as members of their thesis board.

Admission requirements

Students with a baccalaureate degree from an accredited college or university are eligible for admission provided they present a portfolio of work that demonstrates their photographic skills, visual sophistication and aesthetic awareness. (Museum Studies applicants will present different documentation.) Acceptance is on the strength of their portfolios as judged by the graduate faculty, on their past academic performance, letters of recommendation and their personal statements of purpose. Applicants who are capable of good academic work as well as artistic visual expression and who demonstrate an interest in the exploration of new artistic ideas and experiences will be favored. The graduate faculty will make recommendations to the coordinator of the program based on the above interlocking criteria.

Students who are judged to need more study in the general areas of art and photography will be advised to take such courses either prior to entrance or during their first year of study. Recommendations will be made by the coordinator with advice from the appropriate faculty member. Areas of art and photography include art history, photographic history, aesthetics, criticism, and general studio work (painting, sculpture, crafts, printmaking, photography, photographic printing, any form of image making).

Transfer credit

Course work taken prior to admission to the program should be submitted for approval upon entrance into the program. Up to 12 quarter credit hours of B or better (nine semester hours) of

graduate work is transferable toward the degree with the approval of the coordinator. Up to 12 quarter credit hours of credit by examination may also be included in the program and can be arranged for with the coordinator.

Portfolio

Selection of candidates for the graduate program is a difficult process. Along with written records of accomplishment and recommendations, the portfolio serves to inform the faculty of the applicant's photographic accomplishments. It is a pictorial statement of the candidate's performance to date in terms of her or his photographic skills and visual sophistication.

About 15 black-and-white and/or color photographs that represent a cohesive body of work should be sent. (The word *photograph* includes such photo-related media as printmaking, screen printing, electrophotography, color proofing, gum bichromate, cyanotype and albumen.) *Original* prints, slides or transparencies provide the best means of assessment. Slides should be sent in pocketed plastic sheets. Copy slides of original work are discouraged. Prints can be sent mounted or unmounted. Please put your name on each print or slide.

Museum Studies applicants need not send a portfolio of photographs. Instead, documentation supporting the ability to perform well in such a program must be provided. This would include such things as publications, papers presented, curated shows and other relevant experience.

The portfolio should be packaged in such a way as to facilitate handling (unpacking, viewing, repacking and shipping). A label with a return address would be helpful. Be sure to include a check or money order sufficient to cover return postage or shipping. The portfolio or Museum Studies documentation should reach the Coordinator of the MFA photography program the first week in February. Applicants will be notified of their status in March.

Advisors

The MFA coordinator is the advisor for all candidates.

Degree requirements

The MFA degree in photography normally requires a minimum of two years of full-time resident graduate study. A minimum of 85 quarter credit hours of graduate work is outlined below. These minimums may be exceeded through the intent of the candidate or as a result of necessity to cover certain areas of study.

The 85 hours do not include undergraduate work required by action of the MFA admission committee in accepting a particular applicant, or undergraduate course prerequisite for graduate courses.

	Quarter Credit Hours
Major	
Designed to give depth of experience to photography	36
Electives	
Designed to broaden the student's interests and experience in the arts and related areas and to provide an opportunity to pursue a specific area in depth	29
Humanities	8
Research and Thesis	<u>12</u>
Total	85

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

Humanities

The required 8 quarter credit hours of humanities courses are usually taken in the College of Liberal Arts. Depending upon the student's academic background, part or all of this requirement can be waived (but need not be), and the credit hours can be used elsewhere. Should hours become available in this fashion, students can either explore an additional area, or can improve their

involvement in either their major or their minor field.

Grade and time limit

The average of all grades for graduate courses taken at the Institute must be at least a "B" (3.0) to qualify for the MFA Photography degree.

Thesis hours are usually taken over several quarters. Only the letter "R" is recorded, indicating a thesis in process. No letter grade is assigned. Acceptance or rejection of the thesis is made by the candidate's thesis board.

All course work, including an accepted thesis, must be completed within seven years of entrance into the program.

Photo Gallery

The gallery, which is part of the MFA Center, is used to exhibit graduate thesis work, student work and works of contemporary photographers. A conference telephone is available in the gallery area to conduct seminars with photographers whose work is being exhibited.

Visiting artists

Through the assistance of grants from the National Endowment for the Arts (NEA) prominent personalities in the field of photography are brought to campus to enrich the program. They usually give a lecture on campus Wednesday evening, which is open to the public, and then meet on Thursday morning in a two-hour seminar with MFA students.

Thesis

The thesis should be an original body of work appropriate to the major commitment of the degree candidate. A thesis of record will be prepared for inclusion in the library. Specific directions are available in the MFA handbook, which is given to the student upon entrance into the program.

Richard D. Zakia, Coordinator,
MFA Program (475-2616)

Rochester is a unique place for anyone seriously interested in a broad pursuit of photographic studies. Photography touches upon many other disciplines, and the opportunities for study are limited only by the student's interest. The Rochester area is blessed with outstanding physical and human resources. In addition to those located in the College of Graphic Arts and Photography at RIT, there are resources to be found in two major additional institutions heavily involved in photographic education and innovation: the International Museum of Photography at the George Eastman House and the Visual Studies Workshop.

The MFA program in photography at RIT is unique in that it is the only such program housed in a School of Photographic Arts and Sciences with a

support faculty of 50 highly specialized and diverse instructors. The program is designed to reflect this diversity. A student has a wonderful opportunity to study photography as a fine art and as a visual probe to human expression and understanding.

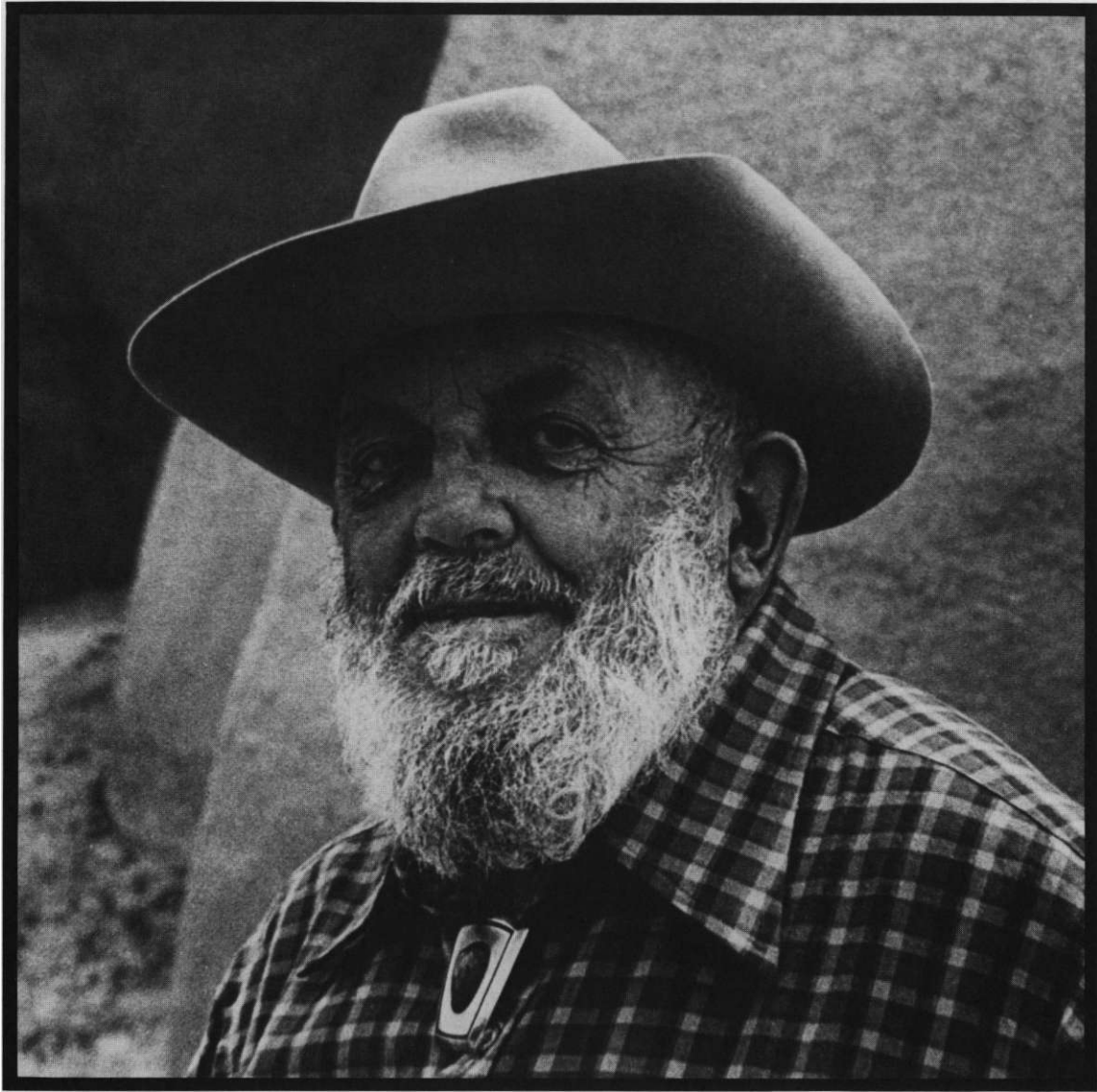
The student is encouraged to make the most of the resources at RIT as well as those in the community and is reminded that a camera and film no more make a photographer than a paint brush and canvas make an artist.

Zakia is a native of Rochester and holds a BS degree in photographic science from RIT and a Ed.D. in educational psychology from the University of Rochester. Prior to joining RIT in 1959 he was employed as a photographic engineer with Eastman Kodak. He has also served as director of Instructional Research and Development at RIT.



Dr. Richard D. Zakia

Photograph by Thomas J. Shillea © 1984



"Art," said Alfred Steiglitz, "is the affirmation of life. And life, or its eternal evidence, is everywhere."

Ansel Adams
1902-1984

Photograph by Beaumont Newhall

Master of Fine Arts in Photography

PPHG-701, 702 History and Aesthetics of Photography

Registration #0903-701, 702

The course will survey the major issues throughout the development of the medium: (1st quarter) pre-history up to the 19th century; (2nd quarter) *fin de siècle* to present.

Credit 3/Qtr.

PPHG-704 Minor White Seminar

Registration #0903-704

A study of the Photography and philosophy of Minor White and his contribution to photographic publications, photographic education and photography as an art form.

Credit 3/Qtr.

PPHG-705, 706 Graduate Seminar

Registration #0903-705, 706

The seminar provides an opportunity for all MFA students to develop a sense of community and to openly discuss matters of concern, to discuss each others' photographs, to meet with visiting artists on campus and to participate in a thesis sharing from time to time.

Credit 2/Qtr.

PPHG-707, 708, 709 Film History and Aesthetics

Registration #0903-707, 708, 709

An extended comparative survey of the History & Aesthetics of Film that will explore the four basic forms of the medium: Fiction, Documentary, Animated and Experimental. Emphasis is on determining the unique characteristics of the medium and how those characteristics are used as a means of interpretation and expression.

Credit 4/Qtr.

PPHG-719 Early Photographic Processes

Registration #0903-719

This is a non-laboratory technical course which surveys the structure and deterioration mechanisms of major historical photographic processes. It examines the technical basis of preservation strategies within a museum or archive, and presents an approach to preservation which is integral with collection management and curatorial functions.

Credit 3/Qtr.

PPHG-720, 721, 722 Photographic Workshop

Registration #0903-720, 721, 722

Each faculty member offers a different opportunity for students to explore the multiplicity of ways that photography can be used as a vehicle for expression and for communication. Visual research, group critiques, seminars, field trips, studio and laboratory practice are used.

Credit 4/Qtr.

PPHG-725, 726, 727 Photographic Core

Registration #0903-725, 726, 727

Major emphasis is placed on the individual's learning to generate and intensify his or her personal statement through photography. Some of the projects are assigned while others are selected by the candidate.

Credit 4/Qtr.

PPHG-730, 731, 732 Cinematography

Registration #0903-730, 731, 732

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

Credit 3-9/Qtr.

PPHG-740, 741, 742 Photographic Museum Practice

Registration #0903-740, 741, 742

Museum internship workshop, still or motion picture; research, assigned projects, seminars in history, function and administration of museums, with emphasis on photographic curatorial duties; practice in exhibition planning and development; field trips. This cannot be selected as a minor concentration.

Credit 3-9/Qtr.

PPHG-750, 751, 752 Special Topics Workshop

Registration #0903-750, 751, 752

Advanced topics of current or special interest designed to broaden and intensify the student's ability to use photography as a means of communication and expression.

Credit 3-9/Qtr.

PPHG-753 Photographic Workshop for Teachers

Registration #0903-753

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 method concepts and development of visual aids are discussed, and ideas in visual communications are examined. Career opportunities in professional photography will be explored.

Credit 9

PPHG-755 Applied Sensitometry

Registration #0903-755

This course presents relevant sensitometry and photographic theory, principles and practices in a manner sensitive to the background and needs of a fine art photographer.

Credit 4/Qtr.

PPHG-756 Zone System Principles

Registration #0903-756

An applied course of selected sensitometric, statistical and perceptual principles to the understanding and practice of the Zone System. The principles are taught so that they can be generalized and transferred to the understanding and practice of other image-forming systems such as film making, video, graphic arts printing, screen printing, etc.

Credit 4

PPHG-760 Perception & Photography

Registration #0903-760

An advanced course which provides an applied psychological framework for the ways we select, code, organize, store, retrieve and interpret visual images and explores how photographs relate to art and perception.

Credit 4 (offered on sufficient demand)

PPHG-762, 763, 764 Alternative Processes

Registration #0903-762, 763, 764

An advanced course in the production and presentation of images using historical and contemporary visual imaging processes. Emphasis is on extending the students' experience in image making by incorporating alternatives to conventional photography into their work. Processes to be covered include various light sensitive emulsions, the production of visual books, and generative systems such as electrostatics and offset lithography.

Credit 4

PPHG-767, 768, 769 Contemporary Issues**Registration #0903-767, 768, 769**

A study of current issues relevant to fine art photography, how they relate to broader historical/cultural issues, and how they might suggest future directions. (Graduate Status)

Credit 2/Qtr.

PPHG-799 Independent Project**Registration #0903-799**

The student proposes an advanced project to an individual instructor. The student and the instructor are jointly responsible that the material to be covered is appropriate to the student's program and that the number of credits proposed are justified. Both will sign the proposal which must also be approved by the graduate coordinator and the director of the school.

Credit 1-10/Qtr.

PPHG-877 Museum Internship**Registration #0903-877**

Experiential learning is provided in collection management, cataloguing and classification, exhibition preparation and exhibitions, research and critical writing.

Credit 1-8/Qtr.

PPHG-889 Research Seminar**Registration #0903-889**

The seminar serves as a basis for exchanging ideas for research work and for a general orientation of the procedures and requirements for the completion of a successful thesis.

Credit 2 (Spring only)

PPHG-890 Research and Thesis**Registration #0903-890**

The thesis is designed and proposed by the candidate. It is considered his culminating experience in the program, involving research, a creative body of work, an exhibition or suitable presentation, and a written illustrated report.

Credit 1-12

Master of Science in Imaging and Photographic Science

PPHS-711, 712, 713 Theory of the Photographic Process**Registration #0907-711, 712, 713**

Physical structure and optical properties of the silver halide emulsion and their relations to the characteristic curve; chemistry and preparation of emulsions; treatment of theory of sensitivity and latent image formation; chemistry and kinetics of processing; chemistry and physics of selected non-silver processes.

Class 3, Credit 3/Qtr.

PPHS-721, 722 Statistics & Computer Techniques for Photographic Systems**Registration #0907-721, 722**

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

Credit 4/Qtr.

PPHS-731, 732, 733 Instrumental and Photographic Optics**Registration #0907-731, 732, 733**

The principles of geometrical and physical optics with application to photographic instrumentation systems. First-order imaging, aberrations and geometrical image evaluation, mirror and prism systems, basic instrument systems, electromagnetic waves, polarization, interference and function description of imaging performance.

Class 3, Credit 3/Qtr.

PPHS-741, 742, 743 Analysis and Evaluation of Imaging Systems**Registration #0907-741, 742, 743**

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.

Class 2, Lab 6, Credit 4 (Winter)

Class 3, Credit 3 (Fall and Spring)

PPHS-751, 752, 753 Special Topics in Photographic Science**Registration #0907-751, 752, 753**

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 coordinator of the photographic science graduate program.)

Credit varies

PPHS-761, 762, 763 Principles of Remote Sensing & Image Analysis**Registration #0907-761, 762, 763**

The principles of electromagnetic imaging, image processing and image analysis as they apply to remotely sensed information. Photogrammetry aerial photography, aerial photometry, thermography, multispectral image analysis and satellite image analysis are treated. Overall emphasis is on extraction of quantitative information from remotely sensed data.

Class 3, Lab 3, Credit 4

Graduate Faculty School of Photographic Arts and Sciences

Charles Arnold, Jr., MFA Rochester Institute of Technology—Professor, Photography

Andrew Davidhazy, MFA, Rochester Institute of Technology—Associate Professor, Photography

Lothar K. Engelmann, Ph.D., J. W. Goethe University, Germany—Professor

Ronald Francis, Ph.D., Massachusetts Institute of Technology—Professor, Imaging and Photographic Science

Russell Kraus, Ed.D., Massachusetts—Associate Professor

Nathan Lyons, Director, Visual Studies Workshop; Lecturer, Photography

James E. McMillion, Jr., MFA, Ohio University—Professor, Photographic Management

Elliott Rubenstein, MFA, SUNY, Buffalo; MA, St. John's University—Assistant Professor, Photography

John R. Schott, Ph.D., Syracuse University—Assistant Professor, Photographic Science and Instrumentation

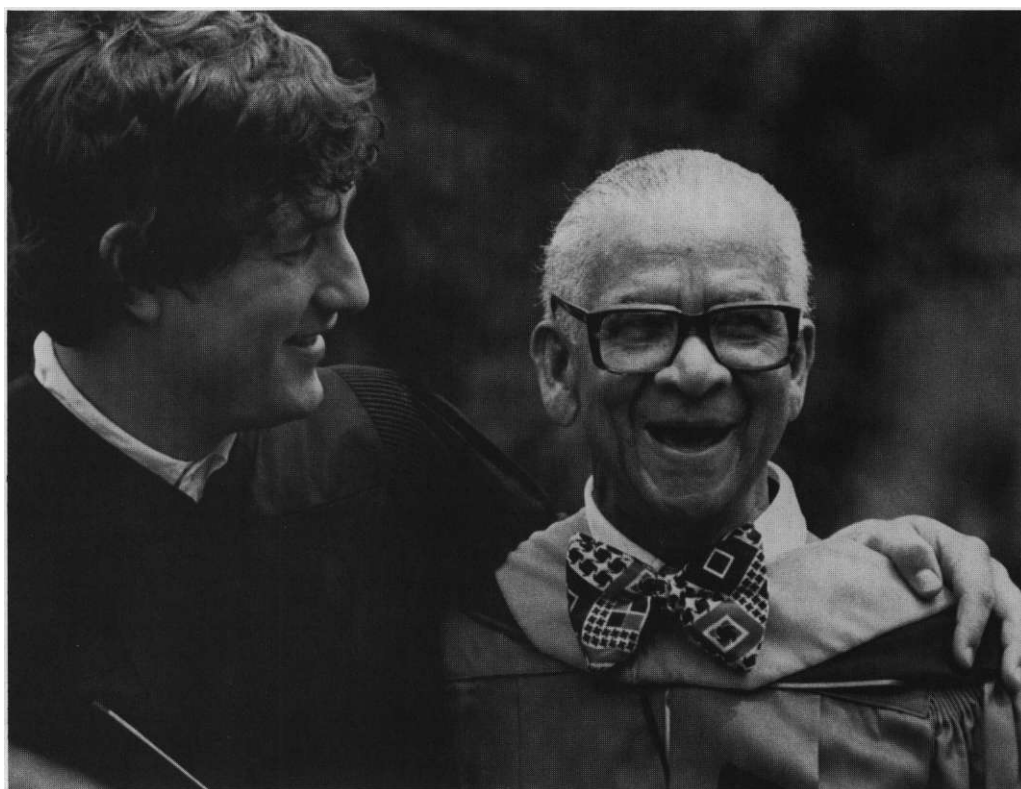
Leslie D. Stroebel, BS, Ed.D., University of Rochester—Professor, Photography

Charles C. Werberig, BFA, MS, Syracuse—Associate Professor, Photography

Richard D. Zakia, BS, Rochester Institute of Technology; Ed.D., University of Rochester—Professor, Photography

Associates of Graduate Faculty

Owen Butler, BFA, Rochester Institute of Technology—Assistant Professor, Photography



Associates of Graduate Faculty

Owen Butler, BFA, Rochester Institute of Technology—Assistant Professor, Photography

David A. Engdahl, M.Ed, University of Rochester—Director, College of Graphic Arts and Photography, Professor

Andrew H. Eskind, MS, Illinois Institute of Technology—Interdepartmental Services, George Eastman House; Lecturer, Photography

Richard Floberg, MS, Boston University—Associate Professor, Photography

Edward Granger, Ph.D., University of Rochester—Lecturer, Photographic Science and Instrumentation

Bradley T. Hindson, BA, Rutgers; MFA, Ohio University—Associate Professor

Robert Mayer, Director, International Museum of Photography at the George Eastman House; BA, Fairleigh Dickinson University; MA, New York University

Frank Moser, MS, Minnesota—Lecturer, Photographic Science and Instrumentation

Martin Rennalls, MS, Boston University—Associate Professor, Photography

David J. Robertson, MS, Columbia—Professor, Photography

William S. Shoemaker, MS, University of Miami—Professor, Photographic Science and Instrumentation

Robert A. Sobieszak, MA, Stanford—Director, Photographic Collections, International Museum of Photography, George Eastman House; Lecturer, Photography

Tom Muir Wilson, BFA, Cranbrook Academy of Art; MFA, Rochester Institute of Technology—Associate Professor

College of Liberal Arts

Liberal Arts

Graduate Courses

GLLL-702

Film and Society

Registration #0504-702

An inquiry concerning the relationship between motion pictures and society that will use historical, humanistic, and social science research to achieve an understanding of movies as a social force, industry, and art form.

Class 3, Credit 4 (offered occasionally)

GSHF-702

Film History and Criticism

Registration #0505-702

A critical examination of key aspects of film criticism and of the development of film as an art. The emphasis of the course will be historical, with the development of cinema being traced through major films by important directors. There will be an opportunity to pursue individual interests.

Class 3, Credit 4 (offered occasionally)

GSHF-703

American Architecture

Registration #0505-703

An examination of American architecture from the 17th century to the present designed for the graduate level of study. Emphasis will be placed on American building art in the late 19th and 20th centuries.

Class 3, Credit 4 (offered occasionally)

GSHF-705

Theories of Aesthetics and Art Criticism

Registration #0505-705

A course for the art-oriented graduate student centering on the student's search for a supportable and reliable basis for making value judgments about works of art as well as introducing the student to major concepts in aesthetics.

Class 3, Credit 4 (offered occasionally)

GSHF-707

Cubism to the Present

Registration #0505-707

Cubism as a way of seeing and as an expression of 20th century thinking. Differences and similarities with art forms of earlier eras and other cultures will be discussed.

Class 3, Credit 4 (offered occasionally)

GSHF-708

Oriental Art

Registration #0505-708

A seminar exploring the philosophical and cultural perspectives underlying traditional Far Eastern art as a prelude to examining selected topics in Indian, Chinese and Japanese art. Emphasis will be placed on the application of research techniques and critical methods to an individually selected area of interest which may serve as a foundation for continuing study.

Class 3, Credit 4 (offered occasionally)

GSHF-711

20th Century American Art

Registration #0505-711

An investigation of American art from the Civil War to the present. Emphasis will be placed on the visual arts but many references will be made to music and architecture.

Class 3, Credit 4 (offered occasionally)

GSHF-712

Arts and Crafts in Tribal Societies

Registration #0505-712

A study of the function of "primitive" art and the techniques of its production, including the use of clay, stone, fibers, bark, wood, bronze, gold, etc. Hair styling, body painting and scarification will also be discussed.

Class 3, Credit 4 (offered occasionally)

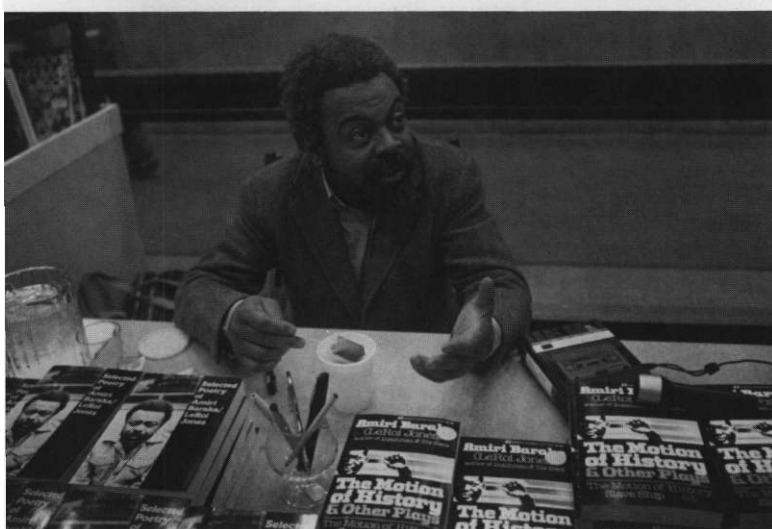
GSHF-713

Contemporary Issues in Art

Registration #0505-713

This course offers the graduate art student the opportunity to investigate those aspects of 20th century art that question the very nature of art and the role of the artist in today's and tomorrow's society.

Class 3, Credit 4 (offered occasionally)



Mary Sullivan, Dean

The college provides a number of graduate courses as part of some of the master's degree programs of Rochester Institute of Technology. A primary objective of the course offerings is to complement the professional emphasis of these programs by contributing humanistic perspectives; that is, by exploring the humanistic implications embodied in these programs. In this way these courses play an integral role in professional education by making a direct and distinctive contribution to the student's preparation for a specialized career.

GSHF-714**Art: Vision and Concept****Registration #0505-714**

Though the course will develop chronologically from the Renaissance to the present, emphasis will be placed on a close analysis of (1) selected works of art, including paintings, sculpture and architecture, and (2) the development of the unique oeuvre of selected artists. Topics chosen for study will be limited in number but treated in depth. Topical choices will be based on richness and import of the formal and/or conceptual content embodied therein. Some background in the history of art is helpful but not necessary.
Class 3, Credit 4 (offered occasionally)

GSHF-715**Picasso****Registration #0505-715**

The impact of Picasso and his circle on 20th century art. Their affinities with modern scientific and philosophical attitudes will also be discussed.
Class 3, Credit 4 (offered occasionally)

GSHF-716**Rembrandt****Registration #0505-716**

A detailed analysis of the art and times of the Baroque master. Emphasis will be placed on the development of his style and technique, on his and other artists' relationship to their society and to the character of the Baroque outlook.
Class 3, Credit 4 (offered occasionally)

GSHF-717**Music Literature****Registration #0505-717**

A comparison of various musical styles from the 17th to the 20th century with emphasis on music's relationship to the other fine arts and its socio-cultural environments. Representative composers include Bach, Beethoven, Chopin and Stravinsky.
Class 3, Credit 4 (offered on sufficient demand)

GSHP-705**Seminar in Aesthetics****Registration #0509-705**

A range of questions will be addressed in the seminar. What is it to perceive something aesthetically? Are there any essential or defining properties shared by all works of art? Are our evaluations and interpretations of art works objective or subjective? Are an artist's intentions relevant factors in critical arguments? Understanding how answers to these questions are constrained by features of actual art works will be an important part of discussion.
Class 3, Credit 4 (offered occasionally)

GSHP-706**The Philosophy of Mind****Registration #0509-706**

An investigation into concepts concerning mental experiences. The basic question is "What is consciousness?" The question hides some presuppositions and raises many further questions. Can we be conscious of consciousness? What does it mean to be conscious? Is there a mind-brain identity? Can we describe mental experience in non-mentalistic terms? Can computers think? It will be the business of this course to explore these and related questions and to see what progress has been made in attempting to answer them.
Class 3, Credit 4 (offered occasionally)

GSSM-701**Country Risk Assessment****Registration #0513-701**

An interdisciplinary introduction to the methods and procedures of country risk assessment. Practice in developing a country risk assessment will be offered in order to familiarize the student with the role of international environment analysis (political stability analysis) in the operations of business and financial institutions planning investments or operations abroad.
Class 3, Credit 4 (offered occasionally)

Graduate Faculty College of Liberal Arts

Mary Sullivan, Ph.D., Notre Dame—Dean, Professor

Robert Golden, Ph.D., Rochester—Associate Dean, Associate Professor

Dane Gordon, MA, Cambridge and Rochester—Associate Dean, Professor

Lars Aagaard-Morgensen, Lie. Theol., Aarhus University—Associate Professor

Bruce Austin, Ph.D., Temple University—Associate Professor, Communications

Kathleen Chen, Ph.D., Pennsylvania State—Professor, Psychology

Douglas Coffey, MA, Case Western Reserve—Associate Professor, Fine Arts

Charles Collins, Ph.D., University of Iowa—Visiting Assistant Professor, Fine Arts

Warren Hickman, Ph.D., University of Geneva, Switzerland—Professor, History

Morton Isaacs, Ph.D., Yeshiva—Professor, Psychology

Tina Lent, MA, University of California, Los Angeles—Instructor, Fine Arts

Salvatore Mondello, Ph.D., New York University—Professor, History

David B. Suits, Ph.D., University of Waterloo—Assistant Professor

Houghton Wetherald, MA, Oberlin—Professor, Fine Arts

Hans Zandvoort, MFA, Royal Academy of Fine Arts, The Hague—Professor, Fine Arts

College of Science

Master of Science in Chemistry

John D. Paliouras, Dean,
College of Science

Terence C. Morrill, Department Head,
Chemistry (475-2497)

Kay G. Turner, Graduate Advisor
(475-2077)

The Chemistry Department offers graduate programs leading to the master of science degree in chemistry on either a part-time or full-time basis with a variety of program options designed to fill the needs of both the practicing chemist in the greater Rochester industrial community and the full-time graduate student.

Objectives

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

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

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 MS degree, he or she must have experience equivalent to a full year's course in each of the following: analytical chemistry, organic chemistry, physical chemistry, physics, and calculus.

The student must further demonstrate mastery of analytical, organic, and physical chemistry in qualifying examinations administered by the RIT Chemistry Department.

An applicant is permitted to take graduate courses as a non-matriculated student if he or she has a bachelor's degree from an approved undergraduate school and the necessary background for the specific courses in which he or she wishes to enroll. The courses taken for credit can usually be applied toward the master's degree when the student is formally admitted to the graduate program at a later date. However, the number of credits that will be transferred to the degree program from courses taken at RIT as a non-matriculated student will be limited to a maximum of 12 credits.



It is required that any applicant who wishes to enroll in a graduate course as a non-matriculated student obtain permission from the person in charge of the graduate program plus the appropriate faculty member.

Full-time graduate work

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

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

Part-time study

The Department of Chemistry encourages practicing chemists in the Greater Rochester industrial community to pursue a program toward the master of science degree in chemistry without interrupting their employment. Consequently, most of the courses in the graduate programs in chemistry are scheduled in the late afternoons or early evenings.

Students employed full-time are normally limited to a maximum of two courses or eight credits each quarter.

The part-time MS program does not require a research thesis.

Internship option

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

Cooperative education option

The cooperative education option is to accommodate students at the master's level who have or are able to obtain industrial employment which allows for quarters of full-time academic work. If industrial employment permits



research, up to 16 of the 45 required credits may be obtained through the industrial internship option. If industrial employment does not permit research, research credits may be obtained within the Department of Chemistry.

Community college teacher option

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

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

Program

Each student, together with an advisor, will arrange a program best suited to the student's interests and needs. This program will be subject to the approval of the department head and the chairperson of the Graduate Committee.

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

In order to qualify for the MS degree, a candidate must satisfy the following requirements:

1. A minimum of 45 quarter credits beyond the bachelor's degree. Courses in chemistry will be chosen from those with SCH-700 and SCH-800 numbers and should include one or more representing each of the four fields: analytical, inorganic, organic and physical.

Each student must select courses (subject to approval by the student's adviser and the graduate committee) which include the following core: SCHA-711, either SCHI-762 or SCHI-763, either SCHO-737 or SCHO-739, and one of SCHP-744, SCHP-741 or SCHP-743. Demonstrated proficiency can supplant one of the core courses. As part of the required credits, each student must have one or two quarter credit hours in seminar SCHO-87C, and six quarter credit hours from outside of the Department of Chemistry.

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

3. Demonstrated competence in a foreign or computer language.

4. Pass an oral thesis defense or comprehensive examination.

Additional information

More information may be obtained by phoning the Graduate Advisor (716) 475-2077, or the Department of Chemistry (716) 475-2497.

Master of Science in Clinical Chemistry

John D. Paliouras, Dean,
College of Science

Alfred Bacharach, Clinical Sciences
Department Head (475-2978)

The clinical chemistry program is designed for either full-time or part-time graduate study. Required courses are offered during the late afternoon or evening on a regular basis in order to accommodate the work schedules of part-time students.

Objectives

The program is designed to provide formal educational background for individuals aspiring to careers in management in clinical chemistry laboratories.

Admission

Qualified graduates who hold a bachelor's degree in chemistry, biology, medical technology, nuclear medicine technology, or a related field from an accredited college or university are invited to apply.

Financial support

Teaching assistantship applications should be completed by March 15. Late applications may be considered under unusual circumstances. Information regarding other types of financial aid may be obtained from the RIT Student Aid office.

Program

Each student, together with the program director, will arrange a program that not only meets the minimum degree requirements but also considers educational and experiential backgrounds and the career goals of the student. Because of the diversity of backgrounds of applicants to the program, interested individuals are encouraged to write or phone the Clinical Sciences Department (716-475-2978) regarding program planning, prerequisites, transfer credits and course sequencing.



A minimum of 50 quarter credits beyond the bachelor's degree are required. Required courses include Biochemistry, SCHB-702; Biochemistry-Metabolism, SCHB-703; Advanced Clinical Chemistry, SCLC-820, 821, 822, 810, 811, 812; Organizational Behavior and Organization and Management, BBUB-740, 741; Statistics and Quality Control in the Clinical Laboratory, SCLC-712; Survey of Physical Chemistry, SCHP-742; Introduction to Electricity and Electronics, SPSP-331; Clinical Laboratory Computer Applications,

SCLC-722; Clinical Chemistry Research, SCLC-859 or 879; Mechanisms of Disease, SCLC-705.

In addition students are required to write a research proposal which is evaluated by committee. Subsequent to completion of the research project the student must orally defend his or her report or thesis.

Department of Chemistry

SCHA-711 Instrumental Analysis

Registration #1008-711

Theory, applications and limitations of selected instrumental methods in qualitative, quantitative, and structural analysis. Topics covered include mass spectrometry, nuclear magnetic resonance, electrochemistry, surface methods and new analytical methods. (SCHA-312)

Class 3, Credit 3 (offered every year) (F, W)

SCHA-720 Instrumental Analysis Lab

Registration #1008-720

Lab accompanying SCHA-711. Experiments include A.A., fluorimetry, coulometry, ^{13}C and ^1H NMR, polarography. Assignments depend on student background.

Lab. 6, Credit 2 (offered every year) (F, W)

SCHB-702 Biochemistry—Biomolecular Conformation & Dynamics

Registration #1009-702

Introduction to biological chemistry. Chemical structures, reactions, molecular organization and physiological functions of the molecular components of cells: amino acids, proteins, enzymes, enzyme kinetics, co-enzymes, biochemical thermodynamics, carbohydrates and lipids, membrane structure, and active transport. Emphasis is on the structure-function relationships of biomolecules, their solution behavior and dynamics. (SCHO-433 and SCHP-340 or SCHP-742)

Class 3, Credit 3 (offered every year) (F, W)

SCHB-703 Biochemistry—Metabolism

Registration #1009-703

Bioenergetics principles; catabolism of carbohydrates, fatty acids and amino acids; photosynthesis, biosynthesis of carbohydrates, lipids, and nitrogenous compounds; active transport; metabolic diseases. (SCHB-702)

Class 3, Credit 3 (offered every year) (F, W)

SCHB-704 Biochemistry—Nucleic Acids and Molecular Genetics

Registration #1009-704

The biochemistry of inheritance, expression of genetic information, protein biosynthesis, differentiation, viral and bacterial infection and the "origin of life." (SCHB-702)

Class 3, Credit 3 (offered every year) (S, SR)

SCHC-772 Special Topics

Registration #1010-772

Advanced courses which are of current interest and/or logical continuations of the course already being offered. These courses should be structured as ordinary courses and should have specified prerequisites, contact hours, and examination procedures.

Class variable, Credit variable (offered every year)

SCHC-859 External Research

Registration #1010-859

Industrial internship research.

Credit 1-16 (offered every year)

SCHC-870 Chemistry Seminar

Registration #1010-870

Credit 1 (offered every year)

SCHC-879 Research and Thesis Guidance

Registration #1010-879

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

Credit variable (offered every year)

SCHC-899 Independent Study—Chemistry

Registration #1010-899

Credit variable (offered every year)

SCHI-762 Inorganic Chemistry I Composition & Structure

Registration #1012-762

Techniques for determining composition and structure, nomenclature and symbolism of inorganic compounds, modern electronic theories of composition, bonding, geometry, magnetic, electrical, mechanical and spectral properties of inorganic compounds (main group and transition elements). (SCHO-433, SCHP-442)

Class 3, Credit 3 (offered every year) (S, SR)

SCHI-763 Inorganic Chemistry II Stability & Reactivity

Registration #1012-763

Acid-base and other classifications of inorganic reactions; thermodynamic and kinetic aspects of controlling inorganic reactivity at both the laboratory and industrial level; nonaqueous solvent systems; use of isoelectronic and pseudo-atom concepts in synthesis design. (SCHI-762, SCHP-442)

Class 3, Credit 3 (offered every year) (F, W)

SCHI-764 Inorganic Chemistry III Chemical Periodicity

Registration #1012-764

An integrated survey of descriptive inorganic chemistry (including industrial applications and geochemical origins) based on the periodic table and the structure and reactivity concepts developed in SCHI-762 and SCHI-763. (SCHI-762, -763).

Class 3, Credit 3 (offered every year) (S, SR)

SCHI-765 Preparative Inorganic Chemistry

Registration #1012-765

Laboratory oriented course designed to illustrate the characterization techniques presented in SCHI-762 and the various synthetic applications of thermodynamics and kinetics presented in SCHI-763. (SCHI-762; SCHI-763 may be taken concurrently)

Class 1, Lab 6, Credit 3 (offered every year) (F, W)

SCHQ-730 Chemical Toxicology

Registration #1013-730

Xenobiotic mechanism, chemical carcinogenesis, drug-induced toxicology, environmental and genetic toxicology, teratology and bioassay/biometrics. (SCHO-433)

Class 3, Credit 3 (offered upon sufficient request)

SCHO-736 Spectrometric Chemical Identification of Organic Compounds

Registration #1013-736

Theory and application of proton and carbon nuclear magnetic resonance, infrared, mass spectrometry, and ultraviolet spectra as applied to organic structure determination. (SCHO-433)

Class 3, Credit 3 (offered every year)

SCHQ-737 Advanced Organic Chemistry

Registration #1013-737

Several of the following advanced topics in organic chemistry are covered: polyfunctional compounds, modern synthetic methods, stereochemistry, conformational analysis, free radical reactions, natural products, new synthetic reagents. (SCHO-433)

Class 3, Credit 3 (offered every year)

SCHO-739 Advanced Organic Chemistry

Registration #1013-739

Selected topics in physical organic chemistry including; techniques for elucidation of mechanism (kinetic, linear free energy relationships, isotope effects), molecular orbital theory, electrocyclic reactions. (SCHO-433 and SCHP-443)

Class 3, Credit 3 (offered every year)

SCHO-832 Stereochemistry

Registration #1013-832

Advanced treatment of steric relationships and stereoisomerism in organic compounds. (SCHO-433, SCHP-443)

Class 3, Credit 3 (offered upon sufficient request)

SCHO-833 Heterocyclic Chemistry

Registration #1013-833

The preparation, properties, and reactions of heterocyclic systems, especially heteroaromatic rings. (SCHO-433)

Class 3, Credit 3 (offered upon sufficient request)

Credit 3 (W 1983-84)

Graduate Faculty College of Science

John D. Paliouras, Ph.D., University of Illinois—Professor and Dean

Department of Chemistry

Jerry M. Adduci, Ph.D., University of Pennsylvania—Professor, organic chemistry: organic mechanisms, polymer synthesis, and chemical technology.

B. Edward Cain, Ph.D., SUNY Binghamton—Professor, inorganic chemistry: chemical education, methodologies and adaptation for the handicapped student.

Robert E. Gilman, Ph.D., University of Michigan—Professor, organic chemistry: synthesis of novel hosts for cation complexation; cyclization via aryl-aryl coupling reactions.

William B. Jensen, Ph.D., University of Wisconsin—Assistant Professor, Inorganic Chemistry, Chemical education, solid state inorganic chemistry.

Earl Krakower, Ph.D., University of British Columbia—Professor, physical chemistry: nuclear magnetic resonance, structure, and properties of molecules, chemical education.

Terence C. Morrill, Ph.D., University of Colorado—Department Head, Professor, organic chemistry: stereochemistry and mechanism of organic reactions, and organic structure effects upon lanthanide-induced shifts in NMR spectrometry; C-13 NMR relaxation reagents.

Eric Moskala, Ph.D., The Penn State University—Assistant Professor, polymer chemistry materials science.

John P. Neenan, Ph.D., University of California, Santa Barbara—Assistant Professor, Co-chair, Graduate Committee, Biochemistry: design of active-site-directed irreversible enzyme inhibitors.

Christian G. Reinhardt, Ph.D., University of Rochester—Assistant Professor, Co-chair, Graduate Committee, Biophysical chemistry: biological drug-receptor recognition, binding and stereochemistry, mechanisms of interferon induction, nucleic acid structure.

L. Paul Rosenberg, Ph.D., University of New Hampshire—Assistant Professor, analytical chemistry: quantitative determination of metal and anion binding by computer-assisted EPR, spectroscopy and fluorescence; computer interfacing.

Gerald A. Takacs, Ph.D., University of Wisconsin—Professor, physical chemistry: chemical kinetics, chem luminescence, atmospheric chemistry, plasma chemistry and photochemistry.

Laura Ellen Tubbs, Ph.D., University of Rochester—Visiting Assistant Professor, physical chemistry: accelerator-based ultrasensitive mass spectroscopy, natural radioisotope dating, heavy ion fusion-fission reactions.

Kay G. Turner, Ph.D., Ohio State University—Graduate Advisor; Assistant Professor, synthetic organic chemistry: synthesis of natural products including fluorescent estradiol analogs; study of estrogen receptor mechanisms.

Vladimir Vukanovic, Ph.D., University of Belgrade—Visiting Professor, physical chemistry: plasma physical chemistry, atomic spectroscopy with arc plasma source.

Department of Clinical Sciences

James C. Aumer, MS, Michigan Technological University—Program Director, medical technology; Assistant Professor

Alfred Bacharach, Ph.D., UCLA—Professor and Department Head

William A. Burns, MS, Elmira—Associate Dean, medical technology; Professor

Judy Newell, Assistant Professor and Director Nuclear Medicine Technology

Roger I. Warner, BS, R.D.M.S., Seattle Pacific University—Assistant Professor and Program Director of Diagnostic Medical Sonography

Adjunct Faculty

Richard M. Bayer, Ph.D., Rutgers University—Rochester General Hospital, Adjunct Clinical Professor

Nathan Hamblin, BS, Rochester Institute of Technology—Rochester General Hospital, Adjunct Clinical Assistant Professor

Howard Harrison, Ph.D., Cornell University—Rochester General Hospital, Adjunct Clinical Associate Professor

Robert Kringle, MS, University of Wisconsin—Assistant Professor

Norman P. Kubasik, Ph.D., Syracuse University—Upstate Medical Center—The Genesee Hospital, Clinical Professor

William Lachenauer, BS, State University of New York—Rochester General Hospital, Adjunct Clinical Assistant Professor

Fred Lasky, Ph.D., SUNY at Buffalo—St. Mary's Hospital, Adjunct Clinical Associate Professor

Royden N. Rand, Ph.D., University of Buffalo—Health, Safety and Human Factors Laboratory, Eastman Kodak, Adjunct Professor

Harrison E. Sine, Jr., Ph.D., SUNY at Buffalo—The Genesee Hospital, Adjunct Clinical Professor

Materials Science and Engineering

Richard A. Kenyon, Dean, College of Engineering

John D. Paliouras, Dean, College of Science

Hrishikesh Banerjee, Director, Materials Science and Engineering program

For information call 475-2536
(Dr. Banerjee)

The program, under the joint auspices of the colleges of Engineering and Science, offers graduate studies leading to the master of science degree in materials science and engineering with a variety of options designed to satisfy individual and industry needs in the rapidly growing field of materials.

The objectives of the program are threefold:

- With the advent of whole new classes of materials and instruments in recent times, the traditional practice of empiricism in the search for and selection of materials is rapidly becoming obsolete. The program will offer, therefore, a serious interdisciplinary learning experience in materials studies, crossing over the traditional boundaries of such classical disciplines as chemistry, physics, electrical and mechanical engineering.
- The program will provide extensive experimental courses in diverse areas of materials-related studies.
- The program will explore avenues for introducing greater harmony between industrial expansion and academic training.

Special features of the program

A special feature of the program is the offering of five required core courses. The core courses are specially designed a) to establish a common base of materials-oriented knowledge for students with baccalaureate degrees in chemistry, chemical engineering, electrical engineering, mechanical engineering, and physics; and consequently, b) to provide a new intellectual identity to those involved in the study of materials.

Second, there is an emphasis on experimental techniques in the program. It offers one required experimental course and makes available additional optional experimental courses. These are organized into

appropriate units covering many aspects of analysis of materials. This aspect of the program should enhance student confidence when dealing with materials-related problems.

Finally, a large number of highly qualified scientists and engineers in the Rochester area are engaged in the research and development of materials. This reservoir of talent is utilized to ensure the breadth and quality of the program. The program offers an "industrial option" that allows participants to continue their studies in their work environment and thus enhance their job satisfaction.

The overall thrust of the program is to establish a positive relationship between academia and industry by building a sound academic base in the field of materials.

Governance of the program

A Program Council, consisting of 12 members, eight from the Institute and four from Rochester industries, is responsible for decisions on all academic aspects of the program. The program director serves as chairman of the council.

Admission

The program is open to individuals with a bachelor's degree in chemistry, physics, and chemical, electrical or mechanical engineering from an accredited college or university. Any student who wishes to study at the graduate level must first be admitted to the program. An applicant is permitted to take graduate courses as a non-matriculated student, however, if he or she meets the general requirements mentioned above.

A person not meeting the general requirements may petition for admission to the program. In such cases, the Program Council would decide on the necessary background courses to be taken at the undergraduate level. However, undergraduate credits that make up deficiencies may not be counted toward the master's degree.

To be considered for admission, it is necessary to file an application for admission to graduate study, accompanied by the appropriate transcripts of previous study and two letters of recommendation.

Degree requirements

A minimum of 45 quarter credit hours is required for the completion of the program.

A course unit will normally carry four quarter credit hours, with the exception of the seminar which will carry one quarter credit hour.

The five core courses and the seminar course are required for the completion of the program. Together, they carry a total of 21 quarter credit hours.

The remaining 24 quarter credit hours may be taken in a combination of advanced courses including "special topics," electives in courses currently available in other master's programs in the Institute, and the "research thesis" option, subject to prior approval. Also, the Program Council may award transfer credits based on academic background above and beyond the baccalaureate degree or credit by examination based on experience.

Part-time study

Because practicing scientists and engineers are encouraged to pursue the program on a part-time basis, most of the courses are scheduled in the late afternoon. (This may not apply to courses offered off campus at several industrial locations.)

Students employed full-time in industry are normally limited to a maximum of two courses, or eight credit hours, each quarter. A student who wishes to register for more than eight credit hours while employed full-time must obtain the permission of the Program Council.

Thesis option and the industrial internship option

The inclusion of a research thesis as a formal part of the master of science degree program in materials science and engineering is optional. The research thesis option would carry a minimum of eight and a maximum of 16 quarter credit hours, subject to review and approval of the project.

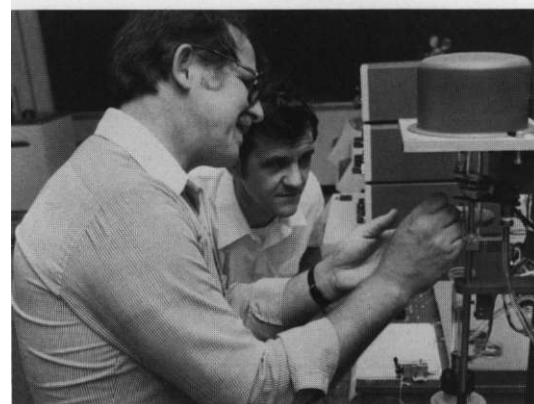
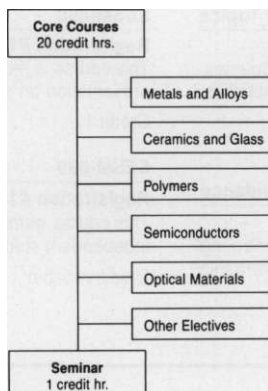
It is also recognized that in-plant work experience in the materials-related areas may include independent study and creative research. This industrial internship option may be applied, for a minimum of four and a maximum of 16 quarter credit hours, toward the completion of the master of science degree.

Curriculum

The core courses will be offered on the basis of a one-year cycle and the advanced courses will be scheduled on the basis of a two-year cycle. The final format will be announced after the Program Council is established.

Course number and title**core courses:**

SESM-701 Introduction to Materials Science
 SESM-702 Introduction to Polymer Science
 SESM-703 Introduction to Solid State Science
 SESM-704 Introductory Theoretical Methods
 SESM-705 Introductory Experimental Techniques



Materials Science and Engineering

SESM-701 Introduction to Materials Science

Registration #1028-701

Crystal structure and defects, strength of materials, metals, alloy principles, ferrous alloys.

Credit 4 (offered every year)

SESM-702 Introduction to Polymer Science

Registration #1028-702

Introduction to the physical chemistry and organic chemistry of polymers, structure, preparation and properties of polymers.

Credit 4 (offered every year)

SESM-703 Solid State Science

Registration #1028-703

Crystal structure and x-ray diffraction; lattice vibrations and thermal properties; electron band theory of insulators, metals, and semiconductors, junction diodes and transistors.

Credit 4 (offered every year)

SESM-704 Introductory Theoretical Methods

Registration #1028-704

Treatment of waves and fields; selected topics of interest in electrodynamics and fluid mechanics; statistical mechanics; Maxwell-Boltzmann, Bose Einstein, and Fermi-Dirac distributions and their applications.

Credit 4 (offered every year)

SESM-705 Introductory Experimental Techniques

Registration #1028-705

The list of laboratory projects includes the areas of:

- Microanalysis of materials; x-ray diffraction, scanning electron microscopy metallography, microelectronics, fluorescence, phosphorescence, etc.;
- Thermal systems: thermomechanical and thermogravimetric systems and differential scanning calorimetry;
- Thin films; thermal evaporation system, sputter coating system, phase contact microscopy, chemical vapor deposition system;
- Sonics and ultrasonics;
- Dielectrics: time domain reflectometry

Credit 4 (offered every year)

Elective Courses

SESM-706, 707, 708 Experimental Techniques

Registration #1028-706, 707, 708

The study of more topics listed in Introductory Experimental Techniques.

Credit 4 (offered every year)

SESM-710, 711 Material Properties and Selection I and II

Registration #1028-710, 711

Mechanical properties of metallic polymeric materials; application and selection of such materials based on strength, fatigue, impact, creep, processing, and economy.

Credit 4

SESM-714 Ceramics and Glass

Registration #1028-714

Nature of ceramics, nature of glass, processing of ceramics and glass materials, properties and application of ceramics and glass.

Credit 4

SESM-717 Materials Degradation Corrosion

Registration #1028-717

Electrochemical nature of corrosion, high-temperature corrosion, anticorrosion techniques, materials selection for corrosion services.

Credit 4

SESM-720 Organic Polymers

Registration #1028-720

This course is designed to meet the needs of students in the area of organic chemistry related to synthesis, polymerization mechanism, structures, stereochemistry and reactions of organic polymers and their industrial usage.

Credit 4

SESM-721 Physical Chemistry of Polymers

Registration #1028-721

This course is designed to meet the needs of students of materials science in the area of theoretical and experimental physical chemistry macromolecules.

Credit 4

SESM-722 Polymer Processing

Registration #1028-722

A study of the basic principles and methods involved in the technology of polymeric materials, including treatment of heat transfer, mass flow, mixing, shaping and moulding of polymeric materials.

Credit 4

SESM-730 Optical Properties of Materials

Registration #1028-730

Fundamentals of geometrical and physical optics; interaction of radiation with atoms, molecules, and matter; dielectrics; phenomenological considerations of electro-optics, acousto-optics, and lasers.

Credit 4

Electrical and Magnetic Properties of Materials

SESM-733**Registration #1028-733**

Band structures of pure and doped solids and solid compounds, transport phenomena, semiconduction, optical properties, galvanomagnetic and magneto-optic effects.

Credit 4

SESM-734 Advanced Optics

Registration #1028-734

Lasers: theory, types and construction; optical properties of various metals and alloys; thin films: multilayer dielectric coating; principles and applications of electro-optical and acousto-optical materials; shutters and modulators.

Credit 4

SESM-736 Amorphous and Semicrystalline Materials

Registration #1028-736

Electrical, thermal, and optical properties of amorphous materials; models of conduction.

Credit 4

SESM-740 Nuclear Science and Engineering

Registration #1028-740

Systematics of the atom nuclei; radioactivity; neutron induced reactions; fission; nuclear reactor principles, designs and materials.

Credit 4

SESM-800**Special Topics****Registration #1028-800**

In addition to in-depth study of any of the courses listed under Elective Courses, special topics may be selected from such areas as elastomers, organometallics, radiation damage, processing of materials, superconductivity, etc.

Credit 4

SESM-879**Research and Thesis Guidance****Registration #1028-879**

A project involving research on a topic in materials science and engineering carried out either on campus or off campus under the industrial internship option. An oral examination and written thesis are required.

Credit variable

SESM-890**Seminar****Registration #1028-890**

This course is required for completion of the program and will involve a one-hour presentation on some topic in materials science and engineering.

Credit 1

SESM-899**Independent Study****Registration #1028-899**

This course number should be used by students wishing to study a topic on an independent study basis. Permission to register required.

Credit variable

Graduate Faculty

Materials Science and Engineering

College of Engineering and College of Science

Richard A. Kenyon, Ph.D., P.E., Syracuse University—Dean, College of Engineering, Professor: Mechanical Engineering, Thermodynamics and Fluid Mechanics

John D. Paliouras, Ph.D., University of Illinois—Dean, College of Science, Professor: Mathematics, Analysis

Hrshikesh Banerjee, Ph.D., University of Calcutta—Director of Materials Science and Engineering, Professor: Physics, Nuclear Physics, Solid State and Semiconductor Physics

Swaminathan Madhu, Ph.D., University of Washington—Professor and Department Head: Communications Theory, Logic Design

Lynn Fuller, Ph.D., University of Buffalo—Associate Professor and Department Head: Microelectronic Engineering, Solid State Devices and Microelectronics

Bhalchandra V. Karlekar, Ph.D., P.E., University of Illinois—Professor and Department Head, Mechanical Engineering: Heat Transfer, Applied Mathematics

Arthur Z. Kovacs, Ph.D., Duke University—Professor and Department Head: Physics, High Energy Physics, Systems Engineering and Management Science

Terence C. Morrill, Ph.D., University of Colorado—Professor and Department Head: Chemistry, Organic Chemistry, Stereochemistry, NMR Spectrometry

Harvey E. Rhody, Ph.D., Syracuse University—Professor: Electrical Engineering, Communication Theory

Jerry M. Adduci, Ph.D., University of Pennsylvania—Associate Professor: Chemistry, Organic Mechanisms, Polymer Synthesis and Characterization

Robert A. Clark, Ph.D., University of Maryland—Dean, College of Continuing Education, Professor: Physical and Organic Chemistry, Polymers

G. Thomas Frederick, Ph.D., Ohio State University—Associate Professor and Department Head: Biology, Scanning Electron Microscopy, Energy Dispersive X-Ray Analysis

Surendra K. Gupta, MS, University of Notre Dame—Lecturer: Mechanical Engineering, X-ray Diffraction, Powder Metallurgy

William F. Halbleib, Ph.D., P.E., Cornell University—Professor: Mechanical Engineering, Stress Analysis, Vibrations

Roger E. Heintz, Ph.D., Syracuse University—Associate Professor: Electrical Engineering, Solid State Devices
Charles A. Hewett, Ph.D., University of Missouri—Professor: Physics, Solid State Physics, Fluorescence

Ronald E. Jodoin, Ph.D., University of Rochester—Associate Professor: Physics, Optics, Lasers and Digital Image Processing

Vern Lindberg, Ph.D., Case Western Reserve University—Assistant Professor: Physics, Thin Film Deposition and Analysis

Chris Nilsen, Ph.D., P.E., Michigan State—Associate Professor: Mechanical Engineering, Metallurgy and Materials Science

Tapan K. Sarkar, Ph.D., Syracuse University—Associate Professor: Electrical Engineering, E.M. Fields, Time Domain Studies

Akshay V. Shah, Ph.D., University of Georgia—Assistant Professor: Physics, Atomic Physics, Thin Film and Plasma Studies

Robert L. Snyder, Ph.D., P.E., Iowa State—Professor: Mechanical Engineering, Materials Science, Chemistry

David A. Sumberg, Ph.D., Michigan State University—Associate Professor: Electrical Engineering, Lasers and Optoelectronics

Gerald A. Takacs, Ph.D., University of Wisconsin—Associate Professor: Chemistry, Chemical Kinetics, Atmospheric and Photochemistry

Vladimir Vukanovic, Ph.D., University of Belgrade—Visiting Professor: Chemistry, Plasma Physical Chemistry, Atomic Spectroscopy with Arc Plasma Source.

Paul H. Wojciechowski, Ph.D., University of Rochester—Associate Professor: Mechanical Engineering, Thin Film Studies

Adjunct Faculty:

John F. Carson, MS, Massachusetts Institute of Technology—Eastman Kodak Company, Rochester, NY

Dennis H. Feduke, MS, P.E., Syracuse University—Manager, IBM, Endicott, NY

William G. Frizelle, MS, P.E., University of Rochester—Director, Technical Services, Schlegel Corporation, Rochester, NY

J. Raymond Hensler, Ph.D., Pennsylvania State University—Director of Manufacturing Technology, Bausch and Lomb, Inc., Rochester, NY

Merle N. Hirsh, Ph.D., The Johns Hopkins University—Plasma Resources Consultants, Rochester, NY

Richard W. Reynolds, B.M.E., Cornell University—Manager, Xerox Corporation, Rochester, NY

Tien-Kuei Su, Ph.D., University of Massachusetts—Supervisor, Mobil Chemical Corporation, Macedon, NY

E. Wayne Turnblom, Ph.D., Columbia University—Laboratory Head, Eastman Kodak Company, Rochester, NY

The National Technical Institute for the Deaf

William E. Castle, Director

The National Technical Institute for the Deaf (NTID) was created in 1965 to offer deaf students technical and professional education that can lead to meaningful employment in business, industry, government, and education. Rochester Institute of Technology (RIT) was chosen as NTID's sponsoring institution in late 1966 by the Department of Health, Education and Welfare. In the fall of 1968, the first group of deaf students began their studies at NTID. For more than 15 years, NTID at RIT has provided postsecondary education to deaf students from every state in the nation.

While it is a national institution, it also is one of the nine colleges of RIT. NTID is the world's only technological college serving deaf students in comprehensive career-oriented postsecondary programs.

Graduate programs for deaf students

NTID encourages qualified deaf students to pursue master's degree programs at RIT. Students who request them will receive appropriate support services, through NTID, including sign language interpreting, tutoring, note-taking, career counseling, personal/social counseling, and job placement assistance.

Many NTID faculty members teach in the RIT graduate programs and share a wide range of technical expertise as well as knowledge of both deafness and education of deaf people.

For more information, contact the RIT Office of Admissions or the NTID Office of Career Outreach and Admissions, One Lomb Memorial Drive, Post Office Box 9887, Rochester, New York 14623.



Joint Program to Prepare Educational Specialists for the Deaf at the Secondary Level

Co-Sponsors: University of Rochester through the Graduate School of Education and Human Development
Guilbert Hentschke, Acting Dean and

Rochester Institute of Technology through the National Technical Institute for the Deaf

William E. Castle, Director

A new type of professional

The University of Rochester's Graduate School of Education and Human Development and Rochester Institute of Technology through the National Technical Institute for the Deaf have jointly developed a graduate program designed to improve the quality of education and services for deaf people.

Graduates of the master's degree program will be qualified to work as professionals with deaf people at the secondary level in:

- teaching deaf and normally hearing secondary students in such areas as English, mathematics, science, and social studies;
- managing special educational support service systems such as tutoring, notetaking, and interpreting;
- serving as resources on deafness to schools involved in mainstreaming deaf students into regular school systems.

Graduates will work in secondary schools serving deaf students, or function as instructional leaders, working with colleagues to enrich and upgrade the quality of education for deaf people nationally.

Certification

Graduates of this program will be eligible for:

- provisional certification from New York State as an academic teacher of the normally hearing, for grades 7-12, in one or more of these areas: English, social studies, mathematics, biology, chemistry, physics, earth science, and general science;

- provisional certification from New York State as a teacher of deaf and hearing-impaired students, nursery school through grade 12;
- a master of science in education degree from the University of Rochester co-sponsored by Rochester Institute of Technology through the National Technical Institute for the Deaf.

To be certified to teach one or more of the broad fields listed below at the secondary level in New York State, applicants must satisfy the following minimum course work (undergraduate or graduate level) requirements in one of these areas:

English—36 semester hours including work in linguistics, literature, and writing;

Mathematics—36 semester hours

including a calculus sequence;

Science—44 semester hours in the natural sciences including a calculus sequence;

Social Studies—36 semester hours in history, geography, and the social sciences, with American studies and at least one course in the methods of inquiry in history, geography, or one of the social sciences.

The University of Rochester and the National Technical Institute for the Deaf: uniquely qualified to jointly prepare educational specialists

The University of Rochester, one of the smallest of the nation's distinguished universities, enrolls about 8,000 students, upwards of 3,000 of them at the graduate level. One of its eight colleges and schools, the Graduate School of Education and Human Development, offers doctor's and master's degrees in a variety of educational specialties. The school maintains long-established programs of teacher preparation for students in the university's departments of English, mathematics, social sciences, and natural sciences in the College of Arts and Science. Individuals and groups from the school's faculty have engaged in a number of joint activities with NTID personnel over the past 11 years. Members of the university's School of Medicine and Dentistry and Center for Visual Science have joined in similar collaborations.

NTID, an integral part of Rochester Institute of Technology, is the world's only technological college for deaf

students. It is renowned, both nationally and internationally, for its efforts to integrate deaf students onto a college campus planned primarily for hearing students. Today nearly 1,260 hearing-impaired students from 50 states, Puerto Rico, and the District of Columbia study and reside on the RIT campus with 9,500 hearing students.

RIT's students are enrolled in the colleges of Applied Science and Technology, Business, Continuing Education, Engineering, Fine and Applied Arts, Graphic Arts and Photography, Liberal Arts, Science and, of course, NTID.

RIT offers more than 200 individual career study areas leading to master's, bachelor's, and associate degrees.

About the program

This full-time master's degree program normally requires three to five semesters to complete, depending upon the applicant's entry-level qualifications. The program is designed for people who seek academic certification to teach both hearing and deaf students. It also serves those who are already certified to teach academic subjects to hearing students at the secondary level and who seek additional certification to teach deaf students.

Applicants must have at least an undergraduate major in an academic area normally taught at the secondary school level, such as English, literature, mathematics, chemistry, or history. Some applicants also may need more advanced work in their area of academic expertise, or may need to develop a broader perspective in several academic areas. For example, persons with an undergraduate degree in mathematics may need additional mathematics preparation to meet the University of Rochester's program requirements, or to attain an appropriate breadth of knowledge in that subject.

Sign language

Participants will be required to demonstrate basic skills in expressive and receptive sign language before their student teaching begins. Those without sign language skills will be encouraged to participate in sign language courses at NTID in the summer that precedes their first semester of graduate study.

Admission requirements

To gain admittance to this graduate program, applicants must:

- complete the equivalent of an undergraduate major in at least one academic area directly related to subjects normally taught at the secondary level.
- demonstrate an interest in serving the needs of deaf people.
- satisfy the University of Rochester admission requirements: solid undergraduate background in an academic area, good recommendations, and a successful on-campus interview.
- take the aptitude section of the Graduate Record Examination (GRE) prior to admission. Those who have not done so before admission will be required to take the GRE subsequent to admission.

Participants will determine their individual programs of study with the assistance of a faculty advisor. Among the major areas of study available to participants will be specialized courses that relate deafness to the communication sciences and disorders, instructional theories and techniques, educational goals and processes, and psycho-social-cultural development. Student teaching will provide exposure to the full range of educational environments available to deaf adolescents in the region.

How to apply

Admission is open without discrimination to hearing-impaired applicants. Enrollment will be limited to 15. Some financial aid may be available. For an application, please write to:

Associate Dean for Graduate Studies
Graduate School of Education and Human Development
304 Lattimore Hall
University of Rochester
Rochester, New York 14627

For additional information, please contact:

Dr. Kenneth R. Nash
Director, Joint Program to Prepare Educational Specialists for the Deaf at the Secondary Level
422 Lattimore Hall
University of Rochester
Rochester, New York 14627
Phone (716) 275-4009
(Voice or TDD)



NTID/RIT Graduate Internships

The purpose of the NTID Internship program is to provide opportunities for students at the master's or doctoral level to gain practical experience in the application of their discipline. Interns are usually graduate students or professionals who wish to gain advanced in-service training in their career areas and in education and services for deaf persons. The duration of the internship depends on individual needs and the calendar of the sponsoring institution. NTID offers graduate internships in:

Audiology
Career and Personal Counseling
Curriculum Planning and Evaluation
Educational Administration
Educational Research
Media Development
Speech Pathology
Teaching
Theatre

In 1983, 67 interns from 17 states and four foreign countries worked with NTID mentors in their career areas.

For more information, contact:

Rochester Institute of Technology
National Technical Institute for the Deaf
Coordinator of Internships
Post Office Box 9887
Rochester, New York 14623

Graduate Faculty

William E. Castle, Ph.D., Stanford University—Professor, Director and Vice President, NTID/RIT

Jack R. Clarcq, Ed.D., Syracuse University—Associate Professor, Associate Vice President, Technical Assistance Programs, NTID/RIT

Kenneth R. Nash, Ed.D., Columbia University—Associate Professor, Director, Joint Educational Specialist Program; Adjunct Associate Professor, Graduate School of Education and Human Development, University of Rochester

Frank C. Caccamise, Ph.D., University of Washington—Professor

Kathleen E. Crandali, Ph.D., Northwestern University—Associate Professor

Greg Emerton, Ph.D., Western Michigan University—Associate Professor

T. Alan Hurwitz, Ed.D., University of Rochester—Associate Professor

Donald D. Johnson, Ph.D., University of Illinois—Professor

Harry Lang, Ed.D., University of Rochester—Associate Professor

Charles A. Layne, Ph.D., Ohio State University—Associate Professor

Bonnie Meath-Lang, Ed.D., University of Rochester—Associate Professor

Robert F. Panara, MS, New York University—Professor

Donald G. Sims, Ph.D., University of Pittsburgh—Associate Professor

Joan B. Stone, Ed.D., University of Rochester—Assistant Professor

Ross E. Stuckless, Ph.D., University of Pittsburgh—Professor

Joanne D. Subteiny, Ph.D., Northwestern University—Professor

Officers

M. Richard Rose, BS, MS, Ph.D., President
Thomas R. Plough, BA, MA, Ph.D., Provost and Vice President, Academic Affairs
William E. Castle, BS, MA, Ph.D., Vice President, Government Relations, and Director, National Technical Institute for the Deaf
Alfred L. Davis, AB, MA, Vice President
Robert Frisina, BA, MA, Ph.D., Vice President and Secretary of the Institute
Fred W. Smith, BA, MA, Ph.D., Vice President, Student Affairs
C. J. Young, BA, MA, Ph.D., Vice President, Development

Deans

Donald D. Baker, BA, M. Ed., MBA, Ed. D. College of Continuing Education
Paul Bernstein, BS, MA, Ph.D., Graduate Studies
Mark F. Guldin, BS, MS, Ph.D., College of Graphic Arts and Photography
Robert H. Johnston, BS, MA, Ph.D., College of Fine and Applied Arts
Richard A. Kenyon, BME, MS, Ph.D., College of Engineering
Walter F. McCanna, BS, Ph.D., College of Business
Dennis C. Nystrom, BS, Ed.D., College of Applied Science and Technology
John D. Paliouras, BA, MA, Ph.D., College of Science
Mary Sullivan, BA, MA, Ph.D., College of Liberal Arts

Trustees

'Maurice I. Abrams, M.D., Honorary Director, American School for the Deaf, Inc.
'James R. Alsdorf, Former Vice President & General Counsel, Garlock Inc.
Theodore J. Altier, Chairman and Treasurer, Altier and Sons Shoes, Inc.
'Robert B. Anderson, Partner, Robert B. Anderson & Co., Ltd.
'Mrs. Marcus N. Barbour
Bruce B. Bates, Vice Chairman, Board of Trustees, Rochester Institute of Technology; Vice President, E.F. Hutton & Company, Inc.
'George S. Beinetti, Retired Chairman of the Board and Chief Executive Officer, Rochester Telephone Corporation
John L. Blake, President, John L. Blake Associates, Inc.
W. Frank Blount, Regional Vice President, AT&T
'Mrs. Clinton E. Braine, President, Rochester Institute of Technology's Women's Council
Paul W. Briggs, Chairman of the Board and Chief Executive Officer, Rochester Gas & Electric Corporation
'Theodore C. Briggs, Retired Chairman of the Board, Lawyers Cooperative Publishing Company

Mrs. David L. Brooke
William A. Buckingham, Senior Vice President and Deputy General Manager, Manufacturers Hanover Trust Co.

'Howard F. Carver, Former Chairman of the Board, The Gleason Works
Colby H. Chandler, Vice Chairman, Board of Trustees and Chairman of the Executive Committee, Rochester Institute of Technology; Chairman of the Board and Chief Executive Officer, Eastman Kodak Company
'Albert K. Chapman
'Brackett H. Clark, Honorary Vice Chairman, Board of Trustees, Rochester Institute of Technology; Chairman of the Board and Treasurer, Rapidac Machine Corporation
Hugh E. Cumming, Former President and Director, Curtice-Burns, Inc.
E. Kent Damon, Vice Chairman, Board of Trustees, Rochester Institute of Technology; Vice President and Secretary, Xerox Corporation
Robert H. Downie, President, International Imaging Materials, Inc.; President, R. H. Downie Holdings, Ltd.

Francis E. Drake, Jr., Retired Chairman of the Board, Rochester Gas & Electric Corporation
Mrs. James C. Duffus, Former President, Rochester Institute of Technology's Women's Council
Richard H. Eisenhart, Chairman Emeritus, Board of Trustees, Rochester Institute of Technology; Chairman, R. H. Eisenhart, Inc.
Walter A. Fallon, Retired Chairman of the Board and Chief Executive Officer, Eastman Kodak Company
Mrs. Julian M. Fitch, Former President, Rochester Institute of Technology's Women's Council
'Maurice R. Forman, Retired Chairman, B. Forman Company
'Karl F. Fuchs, President, Alliance Tool Corporation
Daniel E. Gill, Chairman of the Board and President, Bausch & Lomb, Incorporated
James S. Gleason, President and Chief Executive Officer, The Gleason Works

'Lawrence C. Gleason; Former Chairman of the Board, The Gleason Works
'Fred H. Gordon, Jr., Retired Chairman, Executive Committee, Mixing Equipment Co., Inc. (a unit of General Signal Corporation)
'Lucius R. Gordon, Retired Chairman of the Board, Mixing Equipment Co., Inc. (a unit of General Signal Corporation)
Thomas H. Gosnell, Chairman of the Board and Chief Executive Officer, Lawyers Co-operative Publishing Company
'Ezra A. Hale, Honorary Chairman, Board of Trustees, Rochester Institute of Technology; Honorary Chairman of the Board, Central Trust Company
Alfred M. Hallenbeck, Secretary and Counsel, Board of Trustees, Rochester Institute of Technology; Vice President & General Counsel, Sybron Corporation
Alexander D. Hargrave, Chairman of the Board, Lincoln First Banks Inc.
James C. Henderson, Chairman of the Board and Chief Executive Officer, Rochester Telephone Corporation

John E. Heselden, Deputy Chairman, Gannett Co., Inc.; Publisher, USA TODAY
John D. Hostutler, President, Industrial Management Council
Frank M. Hutchins, Chairman, Board of Trustees, Rochester Institute of Technology; Chairman of the Board, Hutchins/Young & Rubicam

'Stanley R. Jacobs, Former Member, New York Stock Exchange
Herbert W. Jarvis, President and Chief Executive Officer, Sybron Corporation

Paul C. Jenks, M.D., Physician
Byron Johnson, Senior Partner, Johnson, Mullan, Brundage & Keigher, P.C.
'John Wiley Jones, Chairman of the Board, Jones Chemicals, Inc.
Thomas F. Judson, Jr., President and Chief Executive Officer, John B. Pike & Son, Inc.
'Thomas F. Judson, Sr., Chairman of the Board, John B. Pike & Son, Inc.
'Arthur M. Lowenthal
William J. Maxlon, Member of the Board of Directors, Case-Hoyt Corporation

'Russell C. McCarthy, Retired Manager, Industrial Management Council
***J. Warren McClure**, President, McClure Media Marketing Motivation Co.
'C. Peter McColough, Chairman of the Board, Xerox Corporation
'Paul Miller, Former Chairman of the Board, Gannett Co., Inc.
Mrs. Edward T. Mulligan
Alfred J. Murrer, Chairman of the Board, The Gleason Works
'Raymond E. Olson, Retired Vice Chairman of the Board, Sybron Corporation

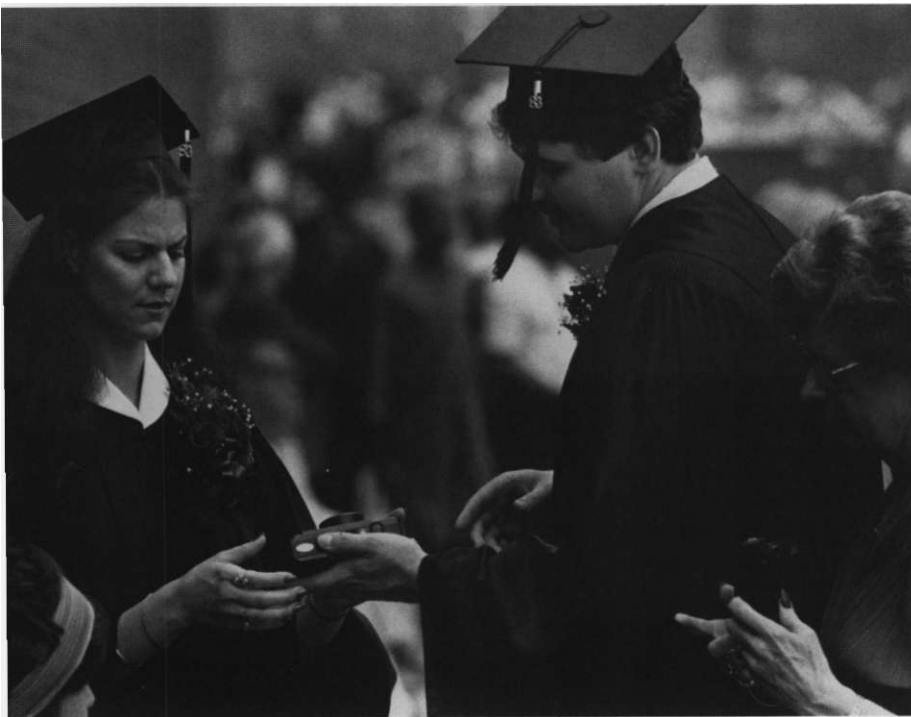
Frederick G. Ray, Chairman of the Board, Rochester Community Savings Bank
Ernest I. Reveal, Retired Chairman of the Board, R.T. French Company
Jorge A. G. Rivas, Presidente, Grupo RIMA, S.A. de C.V.
M. Richard Rose, President, Rochester Institute of Technology
Harris H. Rusitzky, Treasurer, Board of Trustees, Rochester Institute of Technology; President, Serv-Rite Food Service & Consulting Corporation

John E. Schubert, Former President, Chairman and Chief Executive Officer, The Community Savings Bank
James E. Shapiro, Vice President, Xerox Corporation
'F. Ritter Shumway, Honorary Member of the Board, Sybron Corporation
'Mrs. F. Ritter Shumway, Former President, Board of Health, County of Monroe

Robert J. Strassenburgh II, Former Chairman and President, Strassenburgh Laboratories

Robert L. Tarnow, Chairman of the Board, Goulds Pumps, Inc.
'Gaylord C. Whitaker, Chairman of the Board, Matrix Unlimited, Inc.
Ronald A. White, President, Graphic Systems Division, Rockwell International Corporation
'Wallace E. Wilson, Group Vice President (Retired), General Motors Corporation
Kenneth W. Woodward, M.D., Manager, Clinical Services, Xerox Corporation

'Member of Honorary Board



A			
About RIT.....	4	Art, Practice Teaching in.....	71
Academic Probation and Suspension.....	13	Art, Twentieth Century American.....	90
Accountancy Seminar.....	39	Art: Vision and Concept.....	91
Accounting and Theory, Advanced.....	39	Arts and Crafts in Tribal Societies.....	90
Accounting, Basic Taxation.....	39	Auditing.....	39
Accounting Concepts for Managers.....	39	Auditing Theory.....	39
Accounting Concepts, Survey of.....	78	Automobile Registration.....	16
Accounting Courses.....	39	B	
Accounting, Financial.....	78	Basic Taxation Accounting.....	39
Accounting Information Systems.....	39	Bayesian Statistics.....	49
Accounting Theory, Financial.....	39	Bevier Gallery.....	68
Accounting Theory I, II.....	39	Biochemistry.....	95
Accreditation.....	6	Biochemistry—Metabolism.....	95
Admission Requirements (General).....	8	Biochemistry—Nucleic Acids and Molecular Genetics.....	95
Advanced Accounting and Theory.....	39	Biomolecular Conformation and Dynamics.....	95
Advanced Analog I.C. Design.....	57	Biotechnology and Human Factors I, II, III, IV.....	60
Advanced Clinical Chemistry I, II, III.....	96	Boundary Value Problems.....	59
Advanced Clinical Chemistry Laboratory I, II, III.....	96	Bureaucracy in Modern Society.....	43
Advanced Computer Architecture.....	57	Business Administration, Master of.....	34, 37
Advanced Computer Utilization Techniques.....	29	Business Analysis, Integrated.....	41
Advanced Electromagnetic Engineering.....	59	Business and Society.....	40
Advanced Fluid Dynamics.....	62	Business, College of.....	33
Advanced Heat Transfer.....	62	Business Environment.....	40
Advanced Marketing Management.....	41	Business Forecasting Methods.....	43
Advanced Macroeconomic Theory.....	40	Business Graduate Courses.....	39
Advanced Microeconomic Theory.....	40	Business, Introduction to.....	39
Advanced Microprocessor Systems Design.....	57	Business Law.....	41
Advanced Optics.....	99	Business Management.....	40
Advanced Optimal Design.....	61	C	
Advanced Organic Chemistry.....	95	Calculus, Introductory.....	78
Advanced Package Design.....	31	Calendar.....	Inside front cover
Advanced Packaging Economics.....	31	Campus Map.....	Inside back cover
Advanced Taxation Accounting.....	39	Capital Markets.....	40
Advanced Thermodynamics.....	62	Career and Human Resources Development.....	26
Advanced Topics in Signal Analysis.....	59	Career Concepts: Commerce.....	26
Advanced Vibration Theory.....	62	Career Concepts: Production.....	26
Aesthetics of Photography, History and.....	87	Career Concepts: Services.....	26
Aesthetics, Theories of.....	90	Career Counseling Skills.....	27
Algebra, College.....	78	Career Decision Making Concepts.....	26
Algorithms and Data Structures.....	27	Career Development Project.....	27
Alternative Processes.....	87	Career Education in Colleges and Special Settings.....	26
American Architecture.....	90	Career Education Seminar—Handicapped.....	27
American Craftsmen, School for.....	72	Career Education Seminar—Women.....	27
Amorphous and Semicrystalline Materials.....	99	Career and Human Resource Development, Master of Science in.....	19, 26
Analog IC Circuits.....	57	Career Seminar I.....	39
Analog IC Design, Advanced.....	57	Career Seminar II.....	40
Analysis and Evaluation of Imaging Systems.....	88	Career Services.....	16
Analytical Techniques I, II, III.....	58	Cary Library.....	77
Antennas and Antenna Systems.....	59	Center for Quality and Applied Statistics.....	45
Appeals Process.....	11	Ceramics.....	72
Applications of Behavioral Psychology to Training and Adult Learning.....	30	Ceramics and Ceramic Sculpture.....	72
Application of Computers to Graphic Arts.....	78	Ceramics and Ceramic Sculpture, MFA Degree.....	65-70, 72
Applied and Mathematical Statistics, Master of Science in.....	45	Ceramics and Ceramic Sculpture, MST Degree.....	65-70, 72
Applied Mechanics Systems Analysis.....	61	Ceramics and Glass.....	99
Applied Regression Analysis.....	42	Chemical Kinetics.....	96
Applied Science and Technology, College of.....	18	Chemical Preparation for Printing.....	78
Applied Sensitometry.....	87	Chemical Thermodynamics.....	96
Applied Statistical Analysis.....	42	Chemical Toxicology.....	95
Applied Statistics, Center for Quality and.....	45	Chemistry, Clinical.....	94, 96
Applied Statistics, Special Topics in.....	49	Chemistry Courses.....	95
Architecture, American.....	90	Chemistry, Department of.....	95
Architecture, Computer.....	27	Chemistry, Heterocyclic.....	95
Architecture, Computer (Advanced).....	57	Chemistry, Inorganic.....	95
Art and Design, School of.....	71	Chemistry—Master of Science Degree.....	92, 94
Art Education.....	71	Chemistry, Organic (Advanced).....	95
Art Education, Master of Science for Teachers in.....	66, 69, 71	Chemistry Seminar.....	95
Art Education, Methods and Materials in.....	71	Chemistry, Special Topics.....	95
Art Education, Seminar in.....	71	Child Care.....	15
		Cinematography.....	87
		City Center.....	69
		Clinical Chemistry, Advanced.....	96
		Clinical Chemistry Laboratories, Advanced.....	96
		Clinical Chemistry, Master of Science.....	94
		Clinical Chemistry Research, External.....	96
		Clinical Chemistry Seminar.....	96
		Clinical Laboratory Computer Applications.....	96
		Clinical Science—Special Topics.....	96
		Clinical Science Courses.....	96
		Clinical Science, Department of.....	96
		Coding Theory.....	29
		College Algebra.....	78
		College of Applied Science and Technology.....	18
		College of Business.....	33
		College of Continuing Education.....	45
		College of Engineering.....	51
		College of Fine and Applied Arts.....	65
		College of Graphic Arts and Photography.....	75
		College of Liberal Arts.....	90
		College of Science.....	92
		Compensation and Performance Appraisal.....	40
		Compiler Construction.....	29
		Computability.....	28
		Computational Complexity.....	28
		Computer Applications.....	31
		Computer Applications (to Graphic Arts).....	78
		Computer Architecture.....	27
		Computer Architecture, Advanced.....	57
		Computer Assisted Instruction.....	29
		Computer Engineering Courses.....	57
		Computer Engineering Department.....	54
		Computer Facilities.....	21
		Computer Graphic Design.....	69
		Computer Graphics.....	28
		Computer Organization and Programming.....	27
		Computer Science, Master of Science in.....	19, 21
		Computer Science, Seminar in.....	29
		Computer Science and Technology, School of.....	21, 27
		Computer Systems Management, Master of Science in.....	18, 21, 22, 29
		Computer Systems Management, Seminar in.....	29
		Computers in Management.....	79
		Computers to the Graphic Arts, Application of.....	78
		Computing Theory, Foundations of.....	27
		Consumer Behavior.....	42
		Contemporary Issues.....	88
		Contemporary Issues in Art.....	90
		Contents.....	3
		Continuing Education, College of.....	45
		Continuum Mechanics.....	62
		Control, Optimal.....	58
		Control Systems.....	62
		Cooperation and Conflict.....	43
		Cost Accounting.....	39
		Costs (Tuition, etc.).....	10
		Counseling Center.....	15
		Country Risk Assessment.....	91
		Course Numbering.....	17
		Credit Requirements.....	12
		Criterion Referenced Instruction and Technical Training I, II.....	30
		Cubism to the Present.....	90
		D	
		Data Base Systems.....	28
		Data Base Systems Implementation.....	28
		Data Communications and Networks I, II.....	28
		Data Processing and Administration.....	29
		Data Structures, Algorithms and.....	27
		Deans.....	104
		Decision Analysis.....	42
		Decision Sciences Courses.....	42
		Decision Sciences, Seminar in.....	43
		Deferred Payment Plan.....	10
		Degrees Offered (Graduate Study).....	7
		Department of Career and Human Resource Development.....	19, 26

Department of Chemistry95

Department of Clinical Sciences.96

Department of Computer Engineering.54

Department of Electrical

Engineering.54, 57

Department of Industrial

Engineering.55, 60

Department of Instructional

Technology.23

Department of Mechanical

Engineering.55, 61

Department of Packaging Science.25

Department of Statistics.45

Design Automation of Digital Systems.57

Design of Experiments.79

Design of Experiments I, II.48

Developing Instructional Modules.30

Deviance, Conformity, and

Criminal Behavior.43

Digital Control Systems Design58

Digital Image Processing59

Digital Interface Circuits.57

Digital Systems, Design Automation of57

Digital Systems Design, Topics in.57

Disease, Mechanisms of.96

Distribution Systems.31

Drawing Problems.71

E

Early Photographic Processes.87

Economic Environment of

Human Services.43

Economics Courses.39

Economics, Seminar in.40

Education/Business/Industry

Interrelationships.26

Education, Master of Science in.102

Elasticity, Theory of.61, 62

Elective Courses (Materials Science

and Engineering).99

Elective Graduate Courses (Printing).79

Electrical and Magnetic Properties

of Materials.99

Electrical Engineering Courses.57

Electrical Engineering Department54

Electrical Engineering,

Master of Science in.54

Electrical Engineering,

Special Topics in.58

Electromagnetic Engineering,

Advanced.59

Electromagnetic Fields.59

Electromagnetic Theory,

Special Topics in.58

Electro-optics.59

Emergencies.16

Empirical Modeling.49

Employee and Labor Relations.41

Energy Methods in Mechanics.62

Engineering, College of.51

Engineering Courses.59

Engineering Department, Computer.54

Engineering Department, Electrical.54

Engineering Department, Industrial.55

Engineering Department, Mechanical.55

Engineering Economy.60

Engineering, Master of.53

Engineering Mechanical51, 55, 61

Engineering, Optical (I, II).58, 59

Engineering, Radar.59

Engineering Research and Thesis

Guidance.64

Engineers, Mathematics for.61

Entrepreneurship.40

Error Detecting and Error Correction.59

Escort Services.16

Evaluation of Training

and Instruction.30

Experimental Stress Analysis.61

Experimental Techniques.99

External Clinical Chemistry

Research.96

External Research.95

F

Facilities Planning.60

Faculty.See Graduate Faculty

Fault Tolerant Digital Systems.57

Fiber Optics.59

Film History and Aesthetics.87

Film History and Criticism.90

Film and Society.90

Finance Courses.40

Finance, Problems in.40

Finance, Theory of.40

Finance, Seminar in.40

Financial Accounting.78

Financial Accounting Theory.39

Financial Aid.11

Financial Controls I.78

Financial Management I, II.40

Financial Standing.12

Fine and Applied Arts.65

Fine and Applied Arts, College of.65

Finite Elements.61

Fluid Dynamics, Advanced.62

Foundation Courses.78

Foundations of Computing Theory.27

Fundamentals of Statistics I, II.48

G

Glass.72, 73

Glass, Ceramics and.99

Glass, Master of Fine Arts in.65-70, 72

Glass, Master of Science for

Teachers.65-70, 72

Glass, Stained.72

Goudy-Coggeshal Memorial Workshop.77

Grades.13

Graduate Degree Programs.11

Graduate Degrees Offered.7

Graduate Education at RIT.4

Graduate Education at RIT,

Philosophy of.8

Graduate Faculty:

College of Applied Science

and Technology.32

College of Business.44

College of Continuing Education.50

College of Engineering.63, 64

College of Fine and Applied Arts.74

College of Graphic Arts and

Photography.80, 89

College of Liberal Arts.91

College of Science.97, 100

NTID.103

School of Printing.80

School of Photographic Arts

and Sciences.89

Graduate Forum (MFA).72

Graduate Paper

(Electrical Engineering).60

Graduate Programs for

Deaf Students.101

Graduate Programs of Study.7

Graduate Registration.11

Graduate Seminar.31, 87

Graduate Thesis (Packaging).31

Graduation Requirements.12

Graphic Arts and Photography,

College of.75

Graphic Arts and Photography

Courses.78, 87

Graphic Arts, Application of

Computers to the.78

Graphic Arts, Research Methods in.78

Graphic Design.71

Graphic Design (MFA).65-71

Graphic Design (MST).65-71

Graphic Design, Computer.69

Graphic Reproduction Theory.78

Group Development and

Organizational Change.31

Group Dynamics for Career

Development.27

H

Health Service Option.23, 24

Heat Exchanger Design.61

Heat Transfer.62

Heat Transfer, Advanced.62

Heterocyclic Chemistry.95

Higher Education General

Information Survey Code.7

Higher Education Option.23, 24

History and Aesthetics of

Photography.87

Housing.15

Human Services, Economic

Environment of.43

Human Services Group.43

I

IC Operational Amplifiers.57

Ideal Flows.61

Identification Cards.16

Imaging and Photographic Science,

Master of Science in.81, 88

Imaging Systems, Analysis and

Evaluation of.88

Independent Project (Photography).88

Independent Study (Business).41

Independent Study (Chemistry).95, 96

Independent Study (Computers).29

Independent Study (Computer

Systems Management).29

Independent Study (Engineering).59, 62

Independent Study

(Instructional Technology).31

Independent Study (Materials Science) —

100

Independent Study (Packaging Science)31

Individual Learning Style Analysis.30

Industrial and Interior Design.65-71

Industrial and Interior Design

(MFA).65-71

Industrial and Interior Design

(MST).65-71

Industrial Engineering Courses.60

Industrial Engineering Department55

Industrial Engineering,

Special Topics in.61

Information Retrieval Systems in

Career Planning.26

Information Science Courses.29

Information Science,

Master of Science in.19, 21, 22

Information Storage and Retrieval.28

Information Systems.43

Information Theory.59

Ink, Color and Substrates.79

Inorganic Chemistry I, II, III.95

Instructional Development

I, II, III.30

Instructional Facility Design.30

Instructional Techniques.26

Instructional Technology.29

Instructional Technology,

Department of.23

Instructional Technology,

Independent Study.31

Instructional Technology,

Internship.31

Instructional Technology,

Master of Science in.19

Instructional Technology,

Selected Topics in.31

Instructional Technology, Sources

of Information in.29

Instructional Television.29

Instrumental Analysis.95

Instrumental Analysis Laboratory.95

Instrumental and Photographic

Optics.90

Instrumentation and

Experimental Analysis.62

Integrated Business Analysis.41

Interior Design.See Industrial and

Interior Design

International Marketing.42

Internship

(Instructional Technology).31

Interpersonal Communications.30

Interpersonal Skills.43

Interpretation of Data.49

Intervention in the Community.43

Introduction to Business.39

Introduction to Continuum

Mechanics.61

Introduction to Decision Processes.49

Introduction to Instructional

Technology I, II.29

Introduction to Material Science.99

Introduction to Polymer Science.99

Introduction to Printing.78

Introduction to Systems Analysis.79

Introductory Calculus.78

Introductory Experimental Techniques	99
Introductory Theoretical Methods	99
Inventory Design	60

J	
Jewelry, Metalcrafts and	73

L	
Law and the Administrative Process	43
Learning Development Center	15
Learning, Management of	26
Legal Environment of Business	41
Legal Environment, The	31
Liberal Arts, College of	90
Liberal Arts Courses	90
Libraries	14, 77
Lithographic Press	78
Logistics, Marketing	42
Lubrication	62

M	
Macroeconomic Theory, Advanced	40
Macroeconomics	39
Magnetic Resonance, Principles of	96
Management and Budgeting in Instructional Technology	30
Management and Career Development	41
Management, Computers in	80
Management Concepts	39
Management Courses	40
Management, Financial	40
Management of Learning	26
Management, Principles of	40
Management Science	42
Management Seminar	41
Managerial Decision Making	49
Managerial Economics	40
Manpower Forecasting Fundamentals	26
Marketing Communications	42
Marketing Concepts	42
Marketing Courses	42
Marketing Logistics	42
Marketing Management, Advanced	42
Marketing, Seminar in	42
Master of Business Administration	34, 37
Master of Engineering	51, 53
Master of Fine Arts in:	
Ceramics and Ceramic Sculpture	69, 72
Computer Graphic Design	69
Glass	69, 72
Graphic Design	69, 71
Industrial & Interior Design	69, 71
Medical Illustration	69, 72
Metalcrafts & Jewelry	69, 73
Painting	69, 71
Photography	82, 87
Printmaking	69, 72
Weaving & Textile Design	69, 73
Woodworking & Furniture Design	69, 73
Master of Science in:	
Applied and Mathematical Statistics	45
Career and Human Resource Development	18, 19, 25
Chemistry	92, 95
Clinical Chemistry	94, 96
Computer Science	19, 21
Computer Systems Management	19, 22, 29
Education	102
Electrical Engineering	51, 57
Human Services Management	35, 38, 43
Imaging and Photographic Science	81, 88
Information Science	19, 29
Instructional Technology	19, 23, 29
Materials Science and Engineering	53, 98
Mechanical Engineering	51, 61
Packaging Science	19, 25, 31
Printing Technology	75-78
Master of Science for Teachers in:	
Art Education	66, 69, 71
Ceramics and Ceramic Sculpture	66, 69, 72
Glass	66, 69, 72
Graphic Design	65-69, 71
Industrial and Interior Design	65-69, 71
Metalcrafts and Jewelry	66, 69, 73
Painting	66, 69, 71
Printmaking	66, 69, 72

Weaving and Textile Design	66, 69, 73
Woodworking and Furniture Design	66, 69, 73
Master's Thesis	60
Materials Degradation: Corrosion	99
Materials Properties and Selection I, II	99
Materials Science and Engineering Courses	99
Materials Science and Engineering Program	98
Mathematical Programming	42, 60
Mathematics for Engineers	61
Mechanical Engineering Courses	61
Mechanical Engineering Department	55
Mechanical Engineering, Master of Science in	51, 55, 61
Mechanics	61
Mechanics, Energy Methods in	62
Mechanisms of Disease	96
Medical Illustration Photography	72
Medical Illustration Exhibits and Design	72
Medical Illustration Graphics	72
Medical Illustration Surgical I, II	72
Medical Illustration Topics	72
Medical Service (Student Health)	16
Melbert B. Cary, Jr. Graphic Arts Collection	77
Metalcrafts and Jewelry	73
Metalcrafts and Jewelry (MFA)	65, 70, 73
Metalcrafts and Jewelry (MST)	65, 70, 73
Methods and Materials in Art Education	71
MFA Gallery	86
Microcomputers, Microprocessors and	28
Microcomputers in Control and Instrumentation	58
Microeconomic Theory, Advanced	40
Microeconomics	39
Microprocessor Systems Design, Advanced	57
Microprocessors and Microcomputers	28
Microwave Devices	59
Mind, The Philosophy of	91
Minor White Seminar	87
Modeling and Simulation I, II	27
Modern Control Theory	58
MS Thesis	29
Multivariate Analysis I, II	48
Multivariate Methods in Business	43
Music Internship	88

N	
National Technical Institute for the Deaf	101
Network Theory	58
Nonlinear Control Systems	58
Nonparametric Statistics	49
NTID	101
Nuclear Science and Engineering	99
Numerical Methods	62

O	
Occupational/Industrial Environments	26
Officers	104
On-Line Information Systems Design	28
Operations Management	42
Operating Systems I, II	28
Optical Engineering 1	58
Optical Engineering II	59
Optical Properties of Materials	99
Optics, Advanced	99
Optimal Control	58
Optimal Design, Advanced	61
Organic Chemistry, Advanced	95
Organic Chemistry of Polymers	96
Organic Polymers	99
Organizational Behavior	40
Organization and Management	40
Organization Theory	41
Oriental Art	90

P	
Package Design, Advanced	31
Packaging Administration	31
Packaging Dynamics	31

Packaging Economics, Advanced	31
Packaging for End Use	31
Packaging, Research Methods in	31
Packaging Science Courses	31
Packaging Science, Master of Science Degree in	19, 25, 31
Painting	71
Painting (MFA)	65-71
Painting (MST)	65-71
Parsing, Theory of	29
Perception and Photography	87
Personnel Systems	41
Philosophy of Graduate Education at RIT	8
Philosophy of the Mind, The	91
Photo Typography Procedures	79
Photographic Core	87
Photographic Museum Practice	87
Photographic Process, Theory of the	88
Photographic Science, Imaging and	81, 88
Photographic Science, Special Topics in	88
Photographic Workshops	87
Photography Courses	87
Photography, History and Aesthetics of	87
Photography, Master of Fine Arts in	82, 87
Photography, Reproduction	78
Physical Chemistry of Polymers	96, 99
Physical Chemistry, Survey of	96
Physics of Semiconductor Devices I, II	57
Picasso	91
Placement	See Career Services
Planning and Finishing	78
Plates and Shells, Theory of	61
Polymer Processing	99
Portfolio Guidelines for Graduate Applicants (Fine and Applied Arts)	72
Practical R & D Management	58
Practice Teaching in Art	71
Preparative Inorganic Chemistry	95
Principles of Magnetic Resonance	96
Principles of Management	40
Principles of Operations Research 1	60
Principles of Remote Sensing and Image Analysis	88
Printing	75-80
Printing Courses	78
Printing, Introduction to	78
Printing Plates	78
Printing, School of	75-80
Printing Technology	78
Printing Technology, Master of Science in	75-78
Printing Technology, Trends in	79
Printmaking	72
Printmaking (MFA)	65-70, 72
Printmaking (MST)	65-70, 72
Problems in Finance	40
Production Control	60
Programmed Instruction	29
Programming I, II	27
Programming Language Theory	27
Psychology of Learning and Teaching	30
Physiology, Advanced	96
Purchasing	40

Q	
Quality and Applied Statistics, Center for	45
Quality Control: Acceptance Sampling	48
Quality Control: Control Charts	48
Quantum Mechanics	96

R	
Radar Engineering	59
Random Signals and Noise	59
Readmission	9
Reception and Photography	88
Refund Policy	10
Regression Analysis I, II	48, 49
Registration	11
Reliability	48
Rembrandt	91

Reproduction Photography.	78
Reproduction Theory, Graphic.	78
Research and Thesis (Photography).	88
Research and Thesis	
Guidance.	62, 72, 73, 79, 88, 95, 100
Research, Clinical Chemistry.	96
Research Corporation.	8
Research, External.	95
Research in Instructional	
Technology.	30
Research Methods in Graphic Arts.	78
Research Methods in Packaging.	31
Research Projects.	30, 79
Research Seminar.	88
Rochester, University of.	102
Room and Board.	11
S	
Sales Management.	42
Sample Size Determination.	49
Sampling Theory and Applications.	49
School for American Craftsmen.	72
School of Art and Design.	71
School of Computer Science and	
Technology.	21, 27
School of Photographic Arts and	
Sciences.	81-89
School of Printing.	75-80
Science, College of.	92
Science Courses.	95
Sculpture.	72
Sculpture, Ceramic.	72
Securities and Investment Analysis.	40
Selected Topics in Instructional	
Technology.	31
Semiconductor Physics.	57
Seminar, Career.	39, 40
Seminar in Aesthetics.	91
Seminar, Graduate.	31, 87
Seminar in Art Education.	71
Seminar in Career and Human	
Resource Development.	26
Seminar in Chemistry.	95
Seminar in Computer Science.	29
Seminar in Computer Systems	
Management.	29
Seminar in Decision Science.	43
Seminar in Economics.	40
Seminar in Finance.	40
Seminar in Management.	41
Seminar in Marketing.	42
Seminar in Materials Science.	100
Seminar, Minor White.	87
Seminar, Research.	88
Seminar, Statistics.	49
Sensitometry, Advanced.	87
Sign Language.	102
Signal Analysis, Advanced	
Topics in.	59
Signal Analysis and Processing,	
Topics in.	59
Simulation.	43
Small Business Administration.	41
Solid State Science.	99
Sources of Information in	
Instructional Technology.	29
Special Populations.	43
Special Projects—Career and	
Human Resource Development.	27
Special Topics—Chemistry.	95
Special Topics—Clinical Science.	96
Special Topics in Applied	
Mechanics.	61
Special Topics in Applied	
Statistics.	49
Special Topics in Electrical	
Engineering.	58
Special Topics in Electromagnetic	
Theory.	59
Special Topics in Industrial	
Engineering.	61
Special Topics in Materials	
Science.	100
Special Topics in Photographic	
Science.	88
Special Topics in Thermo Fluid	
Systems.	61

Special Topics Workshop	
(Photography).	87
Spectrometric Chemical Identification	
of Organic Compounds.	95
Stained Glass.	77
Statistical Analysis, Applied.	42
Statistical Analysis for	
Engineers I, II.	60
Statistical Inference.	78
Statistics and Computer Techniques	
for Photographic Systems.	88
Statistics and Quality Control.	96
Statistics, Bayesian.	49
Statistics, Fundamentals of.	48
Statistics Seminar.	49
Statistics, Theory of.	48
Stereochemistry.	95
Stochastic Estimation and Control.	58
Student Health Service.	16
Student Services.	14
Summary Experience.	12
Survey Design and Sampling.	42
Survey of Accounting Concepts.	78
Survey of Operations Research.	60
Survey of Physical Chemistry.	96
Switching Theory, Topics in.	58
Systems Analysis, Introduction to.	79
Systems Development.	29
Systems Safety Engineering.	60
Systems Simulation.	60

T	
Table of Contents.	3
Taxation Accounting, Advanced.	39
Taxation Accounting, Basic.	39
Teachers, Photographic Workshop for.	87
Teaching Internship.	27
Teaching, Learning, Content and	
Environment.	26
Technical & Education Center	
Library.	77
Techniques of Work Analysis.	30
Technological Forecasting.	60
The Legal Environment.	31
The Philosophy of Mind.	91
The Two-Year Colleges.	26
Theories of Aesthetics and Art	
Criticism.	90
Theory of Elasticity.	61, 62
Theory of Finance.	40
Theory of Parsing.	29
Theory of Plates and Shells.	61
Theory of Statistics I, II.	48
Theory of the Photographic Process.	88
Thermal Stresses.	62
Thermo Fluid Systems Analysis.	61
Thermodynamics, Advanced.	62
Thermodynamics, Chemical.	96
Thesis Guidance, Research and	
62, 72, 73, 79, 88, 95, 100	
Thesis, Master's.	61
Thesis Requirements.	12
Thesis (Statistics).	49
Thyristor Power Control and	
Conversion.	58
Time Series Analysis.	49
Tone and Color Analysis.	79
Topics in Digital Systems	
Design I, II.	57
Topics in Operating Systems.	28
Topics in Signal Analysis	
and Processing.	59
Topics in Switching Theory.	58
Toxicology, Chemical.	95
Training and Development.	23, 24
Transfer Credit.	12
Trends in Printing Technology.	79
Tribal Societies,	
Arts and Crafts in.	90
Trustees.	104
Tuition and Costs.	10
Tuition Assistance.	11
Turbomachinery.	61
Twentieth Century American Art.	90
Two-Year Colleges, The.	26
Typography 1.	78
Typography Procedures, Photo.	79

U

University of Rochester, Joint Program	
for Educational Specialists.	102

V

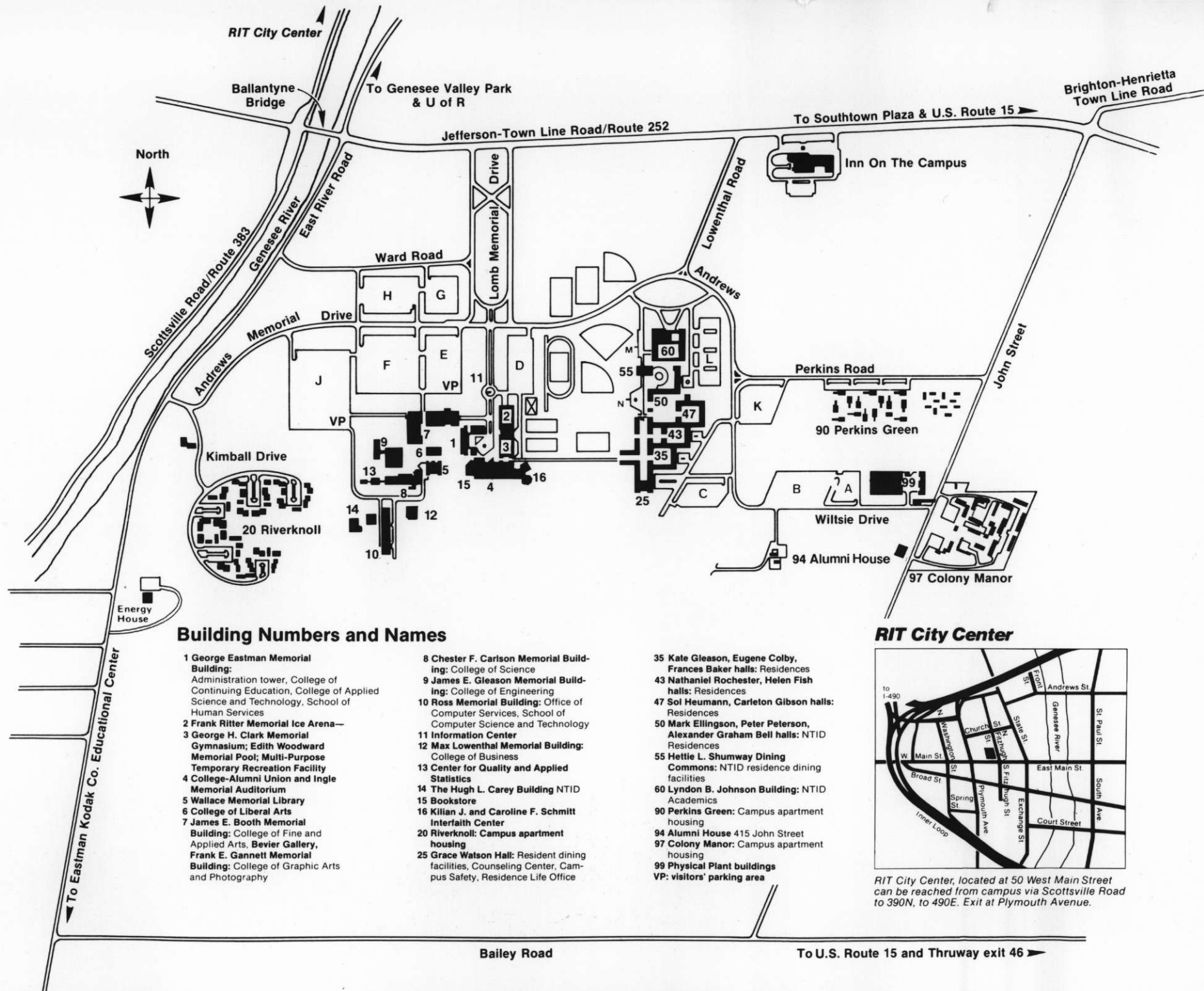
Value Analysis.	60
Veterans' Benefits.	16
Vibration Theory, Advanced.	62
Vibration Theory and Applications.	61
VLSI Design.	57

W

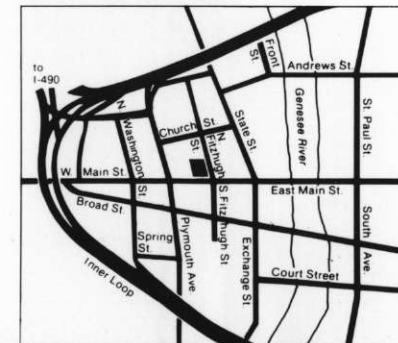
Wallace Memorial Library.	14
Weaving and Textile Design.	73
Weaving and Textile Design (MFA).	65-70, 73
Weaving and Textile Design (MST).	65-70, 73
White, Minor Seminar.	87
Woodworking and Furniture Design.	73
Woodworking and Furniture Design	
(MFA).	65-70, 73
Woodworking and Furniture Design	
(MST).	65-70, 73
Work Analysis, Techniques of.	30
Workshop for Teachers, Photographic.	87

Z

Zone System Principles.	87
---------------------------------	----



RIT City Center



RIT City Center, located at 50 West Main Street can be reached from campus via Scottsville Road to 390N, to 490E. Exit at Plymouth Avenue.



Rochester Institute of Technology

Office of Admissions
One Lomb Memorial Drive
Post Office Box 9887
Rochester, NY 14623