R·I·T

2016–2017

GRADUATE BULLETIN

Rochester Institute of Technology
2016–17 Academic Calendar

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

* *Friday of the 12th week of classes*

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

RIT does not discriminate. RIT promotes and values diversity within its workforce and provides equal opportunity to all qualified individuals regardless of race, color, creed, age, marital status, sex, gender, religion, sexual orientation, gender identity, gender expression, national origin, veteran status, or disability.

For Title VI, Title IX, and Section 504/Title II ADA inquiries, contact Judy Bender, Title IX/504 Officer at 585-475-4315, jebpsn@rit.edu, 5000 Eastman Hall, or go to http://www.rit.edu/fa/humanresources/Diversity/TitleIX for more information.

No. 7 August 2016
RIT (USPS-676-870) is published 17 times annually by Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, N.Y. 14623-5603, once in March, four times in June, twice in July, six times in August, once in September, twice in October, and once in November. Periodicals postage paid at Rochester, N.Y. 14623-5603 and additional mailing offices. Postmaster: Send address changes to RIT, Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, N.Y. 14623-5603.

2M-P1872-8/16-COM-AEH

Fall Semester (2161)

August 16 - 21
New Student Orientation

August 22
Day, evening, and online classes begin
First day of 7-day Add/Drop period†

August 27
Saturday classes begin

August 29
Last day of 7-day Add/Drop period†

August 30
First day to drop from classes with a grade of W

September 5
Labor Day (no classes);
University offices closed

October 10
Columbus Day (no classes);
University offices open

November 11
Last day to drop from classes with a grade of W*

November 23
No classes;
University offices open

November 24 - 25
Thanksgiving Holiday (no classes);
University offices closed

November 26
No Saturday classes

November 28
Day, evening, and online classes resume

December 3
Saturday classes resume

December 9
Last day, evening, and online classes

December 10
Last Saturday classes.

Dec. 12, 13, 14, 15, 16
Final exams

December 17
Residence halls close

Dec. 19 - Jan. 2
Holiday break;
University closed

Intersession (2163)

January 3
Day, evening, and online classes begin
First day of 3-day Add/Drop period†

January 5
Last day of 3-day Add/Drop†

January 6
First day to drop from classes with a grade of W

January 13
Last day to drop from classes with a grade of W

January 19
Last day of classes

January 20
Final exams

January 21 - 22
Break between Intersession and spring semester

Spring Semester (2165)

January 18
Residence halls open

January 23
Day, evening, and online classes begin
First day of 6-day Add/Drop period†

January 28
Saturday classes begin

January 30
Last day of 7-day Add/Drop period†

January 31
First day to drop from classes with a grade of W

March 13 - 17
No classes (spring break);
University offices open

March 18
No Saturday classes

March 20
Day, evening, and online classes resume

April 21
Last day to drop from classes with a grade of W*

May 12
Last day, evening, and online classes

May 13
Last Saturday classes

May 15, 16, 17, 18, 19
Final exams

May 19
Convocation and
Commencement ceremonies

May 20
Commencement ceremonies

May 23
Final grades due

May 23 - 28
Break between spring semester and summer terms

May 29
Memorial Day; University closed

10-week Summer Session (2168)

May 30
Day, evening, and online classes begin
First day of 7-day Add/Drop period†

June 3
Saturday classes begin

June 6
Last day to Add/Drop classes†

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

July 4
Independence Day (no classes); University closed

July 21
Last day to drop from classes with a grade of W**

August 4
Last day, evening, and online classes

August 5
Last Saturday classes

August 7, 8, 9, 10
Final exams

August 14
Final grades due

August 14 - 18
Break between summer term and fall semester

5-week Summer Session I (2168)

May 30
Day, evening, and online classes begin
First day of 3-day Add/Drop period†

June 1
Last day to Add/Drop classes†

June 2
First day to drop from classes with a grade of W

June 23
Last day to drop from classes with a grade of W

June 30
Last day of classes (final exams held)

July 3
Final grades due

5-week Summer Session II (2168)

July 3
Day, evening, and online classes begin
First day of 3-day Add/Drop period†

July 4
Independence Day (no classes); University closed

July 6
Last day to Add/Drop classes†

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

July 21
Last day to drop from classes with a grade of W

August 4
Last day, evening, and online classes

August 5
Last Saturday classes

August 7, 8, 9, 10
Final exams

August 14
Final grades due

August 14 -18
Break between summer term and fall semester

Rochester Institute of Technology

About This Bulletin

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

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Rochester Institute of Technology
Office of Graduate Enrollment Services
58 Lomb Memorial Drive
Rochester, NY 14623-5604
(585) 475-2229
gradinfo@rit.edu | rit.edu/grad
Graduate Bulletin 2016–17
Produced by the Office of University Publications

Why Get Your Graduate Degree from Rochester Institute of Technology?

Choices

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

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

Quality

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

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

Selected faculty and student awards, honors, and partnerships

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

Reputation

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

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

More than 118,000 alumni worldwide include business, industry, and government leaders. Hundreds of top companies and government agencies—from global giants to startup companies—rely on RIT as a source for filling full-time positions and providing ongoing employee development.

Results

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

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

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

Graduate Education at RIT

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

College of Applied Science and Technology

Saunders College of Business

B. Thomas Golisano College of Computing and Information Sciences

Kate Gleason College of Engineering

College of Health Sciences and Technology

College of Imaging Arts and Sciences

School of Individualized Study

College of Liberal Arts

National Technical Institute for the Deaf

College of Science

Golisano Institute For Sustainability

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

Message from the Dean of Graduate Studies

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

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

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

A philosophy supported by campus resources

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

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

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

Specialized and diverse programs

While technology is integral to all graduate programs, the essence of RIT graduate education is found in the diversity of programs, course offerings, and learning options. Our reputation as an advanced university is matched by our commitment to offering programs designed to meet the specialized needs of employers.

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

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

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

Convenient and flexible programs

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

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

The RIT philosophy and mission

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

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

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

History of graduate education

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

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

Sponsored research projects

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

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

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

Accreditation

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

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

and

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

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

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

Hector E. Flores

Dean, Graduate Studies

Graduate Programs of Study		Degree and HEGIS Code								
		Adv. Cert	Ph.D.	MBA	ME	MFA	MS	MST	M. Arch	Page #
Art, Crafts, Design, and Visual Communications										
Architecture	Institute for Sustainability								0202	143
Art Education (Visual Art–All Grades)	Imaging Arts and Sciences							0831		89
Ceramics	Imaging Arts and Sciences					1009				54
Film and Animation	Imaging Arts and Sciences					1010				92
Fine Arts Studio	Imaging Arts and Sciences					1002				88
Furniture Design	Imaging Arts and Sciences					1009				85
Glass	Imaging Arts and Sciences					1009				86
Imaging Arts	Imaging Arts and Sciences					1011				94
Industrial Design	Imaging Arts and Sciences					1009				89
Medical Illustration	Health Sciences and Technology					1299				80
Metals and Jewelry Design	Imaging Arts and Sciences					1009				87
Non-toxic Printmaking	Imaging Arts and Sciences	1009								88
Print Media	Imaging Arts and Sciences						0699			91
Visual Communication Design	Imaging Arts and Sciences					1009				90
Business, Management, and Communication										
Accounting	Business			0502						23
Business Administration–Executive	Business			0506						24
Business Administration–Online Executive	Business			0506						25
Business Administration–Traditional	Business			0506						26
Communication and Digital Media	Liberal Arts	0605								103
Communication and Media Technologies	Liberal Arts						0605.00			103
Computational Finance	Business						0504			30
Engineering Management	Engineering				0913					60
Entrepreneurship and Innovative Ventures	Business						0506			31
Environmental, Health and Safety Management	Applied Science and Technology						0420			9
Finance	Business						0504			31
Health Care Finance	Health Sciences and Technology	1202								79
Health Care Interpretation	National Technical Institute for the Deaf						1199.00			112
Health Systems Administration	Health Sciences and Technology						1202			79
Hospitality and Tourism Management	Applied Science and Technology						0510.1			15
Human Resource Development	Applied Science and Technology						0515			16
Management	Business						0513			32
Manufacturing Leadership	Engineering						0599			63
Organizational Learning	Applied Science and Technology	0515								17
Product Development	Engineering						0599			70
Project Management	Individualized Study									100
Service Leadership and Innovation	Applied Science and Technology						0599			18,19
Training, Design and Assessment	Applied Science and Technology	0515								19
Computing and Information Sciences										
Big Data Analytics	Computing and Information Sciences									36
Bioinformatics	Science						0499			126
Computer Engineering	Engineering						0999			55
Computer Science	Computing and Information Sciences						0701			37
Computing and Information Sciences	Computing and Information Sciences		1701							39
Computing Security	Computing and Information Sciences						0799			41
Game Design and Development	Computing and Information Sciences						0799			42
Human-Computer Interaction	Computing and Information Sciences						0799			43
Information Assurance	Computing and Information Sciences	0799								45
Information Sciences and Technologies	Computing and Information Sciences						0699			45
Networking and System Administration	Computing and Information Sciences						0702			47
Networking, Planning and Design	Computing and Information Sciences									48
Software Engineering	Computing and Information Sciences						0999			49
Visual Communication Design	Imaging Arts and Sciences					1009				90
Web Development	Computing and Information Sciences	0699								50
Engineering and Engineering Technology										
Architecture	Institute for Sustainability								0202	143
Computer Engineering	Engineering						0999			55
Electrical Engineering	Engineering						0909			57
Engineering	Engineering		0901							59
Engineering Management	Engineering				0913					60
Industrial and Systems Engineering	Engineering				0913		0913			61
Manufacturing and Mechanical Systems Integration	Applied Science and Technology						0913			10
Manufacturing Leadership	Engineering						0599			63
Materials Science and Engineering	Science						0915			117,119
Mechanical Engineering	Engineering				0910		0910			64,65
Microelectronic Engineering	Engineering						0999			66
Microelectronics Manufacturing Engineering	Engineering				0999					67
Microsystems Engineering	Engineering		0999							68

* Online learning option available.
† Executive education option available.

Graduate Programs of Study		Degree and HEGIS Code								
		Adv. Cert	Ph.D.	MBA	ME	MFA	MS	MST	M. Arch	Page #
Packaging Science	Applied Science and Technology						4999			12
Product Development	Engineering						0599			70
Software Engineering	Computing and Information Sciences						0999			49
Sustainable Engineering	Engineering				0999		0999			71,72
Sustainable Systems	Institute for Sustainability						4904			145
Telecommunications Engineering Technology	Applied Science and Technology						0925			13
Vibrations	Engineering	0910								73
Health Sciences										
Health Care Finance	Health Sciences and Technology	1202								79
Health Care Interpretation	National Technical Institute for the Deaf						1199.00			112
Health Systems Administration	Health Sciences and Technology						1202			79
Medical Illustration	Health Sciences and Technology					1299				80
Multidisciplinary										
Professional Studies	Individualized Study						4999			98
Science, Mathematics, and Imaging Science										
Applied and Computational Mathematics	Science						1799			128
Applied Statistics	Science						1702			130
Astrophysical Sciences and Technology	Science		1912				1912			131,133
Bioinformatics	Science						0499			126
Chemistry	Science						1905			115
Color Science	Science		1999.20				1099.20			120,122
Environmental Science	Science						0420			127
Environmental, Health and Safety Management	Applied Science and Technology						0420			9
Imaging Science	Science		1999.20				1999.20			123,125
Lean Six Sigma	Engineering	1702								62
Materials Science and Engineering	Science						0915			117,119
Sustainability	Institute for Sustainability		4904							144
Sustainable Systems	Institute for Sustainability						4904			145
Social Sciences, Humanities, and Education										
Art Education (Visual Art–All Grades)	Imaging Arts and Sciences							0831		89
Communication and Digital Media	Liberal Arts	0605								103
Communication and Media Technologies	Liberal Arts						0605.00			103
Criminal Justice	Liberal Arts						2209			105
Engineering Psychology	Liberal Arts	2099								106
Environmental Science	Science						0420			127
Environmental, Health and Safety Management	Applied Science and Technology						0420			9
Experimental Psychology	Liberal Arts						2099			107
Human Resource Development	Applied Science and Technology						0515			16
Professional Studies	Center for Multidisciplinary Studies						4999			98
School Psychology	Liberal Arts						0826.02			108
Science, Technology and Public Policy	Liberal Arts						2102			109
Secondary Education of Students Who Are Deaf or Hard of Hearing	National Technical Institute for the Deaf						0803			113
Sustainability and Architecture										
Architecture	Institute for Sustainability								0202	143
Sustainability	Institute for Sustainability		4904							144
Sustainable Engineering	Engineering				0999		0999			71,72
Sustainable Systems	Institute for Sustainability						4904			145

* Online learning option available.
† Executive education option available.

Doctoral Study at RIT

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

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

Doctoral programs of study

RIT offers seven doctoral degrees in areas where RIT shares national and international recognition. Our programs are cross-college collaborations that support interdisciplinary research.

Astrophysical sciences and technology: Students in the astrophysical sciences and technology program will experience a comprehensive curriculum and a broad range of research opportunities that span forefront topics, such as supermassive black holes, dark energy, gravitational waves, supernovae, massive stars, the Galactic center, star formation, clusters of galaxies, Active Galactic Nuclei, astro-informatics, computational astrophysics, and instrument and detector development. This doctoral program not only focuses on discovery and analysis, but also on the development of the technologies—including the instruments, analysis, and modeling techniques—that will enable the next major strides in astrophysics.

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

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

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

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

Imaging science: Imaging was named one of the top twenty engineering achievements of the 20th Century by the National

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

Microsystems engineering: The integration of entire systems into micron-scale devices and the sensing technology to interface these devices to the real world is the core emphasis of the microsystems engineering doctoral program. These systems are at the core of the next generation of technology. Within the past decade, microsystems (micro-optical, micro-electrical, and micro-mechanical systems) have emerged as a critical technology worldwide and this dynamic field is positioned for outstanding growth in the future.

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

Leaders in research

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

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

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

RIT Research Centers and Organizations

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

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

College of Applied Science and Technology

S. Manian Ramkumar, Interim Dean
rit.edu/cast

Programs of Study

Master of Science degrees in:	Page
Environmental, Health, and Safety Management	9
Hospitality and Tourism Management	15
Human Resource Development *Concentrations available in: global HRD, organizational learning, and training and development.*	16
Manufacturing and Mechanical Systems Integration *Concentrations available in: automated manufacturing,electronics packaging, management systems, product development, and quality management.*	10
Packaging Science	12
Service Leadership and Innovation *Concentrations available in: engineering services and service systems.*	18
Telecommunications Engineering Technology	13

Advanced Certificates in:	
Organizational Learning	17
Service Leadership and Innovation	19
Training, Design and Assessment	19

Online learning option available.

The diverse, graduate-level programs offered by the College of Applied Science and Technology represent RIT's commitment to curricular innovation, program flexibility, and academic rigor. The college is committed to advancing the state of the education we provide through research, the latest uses of technology, and current management theories and educational philosophies.

Admission requirements

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

Financial aid and scholarship

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

Faculty

The college's faculty bring a unique blend of academic credentials, scholarship, and significant industrial experience into the classroom. Ongoing participation as professional consultants and researchers allows them to integrate the latest innovations, theories, and content into their classes. This blend creates a learning environment where both theoretical knowledge and application are important.

Facilities

The college's facilities include state-of-the-art laboratories in support of courses that address current and future applications in the areas of electrical, computer, and telecommunications engineering technology; manufacturing and mechanical engineering technology; and packaging science. In addition to laboratories in computer networking and telecommunications, the college also offers a circuits studio, and mechanics and materials labs.

The Center for Integrated Manufacturing Studies gives graduate students the opportunity to test new technologies for actual companies seeking solutions to real problems. Continual upgrades to our computer laboratories mean we have technology that is considered the industry standard.

Most importantly, the academic leadership of our programs is world-renowned. In addition, our close ties to business and industry mean our course content is relevant and practical for tomorrow's managers, whether they oversee computer-integrated manufacturing or a resort hotel. Graduates are eagerly sought out by employers. We have a high placement rate that assures graduates can pick the best positions for their personal and professional development.

Study options

Most graduate programs offer a variety of study options, including full-time, part-time, and online study. Please refer to each individual program for specific information regarding these options.

School of Engineering Technology

Environmental, Health and Safety Management, MS

rit.edu/cast/cetems/ms-environmental-health-safety-management
Joseph Rosenbeck, Graduate Program Director
(585) 475-6469, jmrcem@rit.edu

Program overview

Management of environmental, health and safety issues has changed significantly in the past twenty years. The emergence of voluntary standards and codes of conduct, including international standards, coupled with the need to manage costs and limited resources has resulted in a trend to move beyond regulatory compliance. Now, companies work toward sustainability through the use of integrated environmental, health and safety management systems, which are woven into key business processes.

Although they are distinct disciplines, environmental management, occupational health, and workplace safety share many technical, regulatory, and organizational characteristics. Today's professionals now need to be educated in all three areas.

Graduates are employed by Fortune 100 companies, environmental, health and safety consultancies, universities, and government agencies such as the EPA, OSHA, and NYSDEC.

Plan of study

The MS degree in environmental, health and safety management provides students with a solid foundation in the managerial aspects of developing and implementing environmental, health and safety management systems that can move organizations toward a more sustainable and socially responsible future. In addition, students gain a solid technical foundation in air emissions, wastewater, solid and hazardous waste, occupational safety and occupational health (industrial hygiene). Elements of sustainability are integrated into most of the core courses and some electives

The program consists of 33 credit hours and may be completed entirely through online learning, or via a combination of online and traditional on-campus courses. The curriculum consists of core courses, professional electives, and a choice of a graduate thesis, project, or exam.

Professional electives

Professional electives are subject to availability and include Fire Protection, Occupational Health, Solid and Hazardous Waste Management, Industrial Wastewater Management, Air Emissions Management, Occupational Safety, Mechanical and Electrical Controls and Standards, EHS Law, EHS Accounting and Finance, EHS Project Management, and Organizational Behavior and Leadership. Additional professional electives are available in topics such as business management, quality, sustainability, and other areas.

Curriculum

Environmental, health and safety management (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communication	3
ESHS-720	EHS Management	3
ESHS-740	EHS Management System Design	3
ESHS-755	Corporate Social Responsibility	3
ESHS-760	Integrating EHS Management	3
ESHS-780	EHS Internal Auditing	3
	Professional Electives	6
ESHS-790	Thesis	3
Total Semester Credit Hours		**30**

Environmental, health and safety management (graduate project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
GRCS-701	Research Methods	3
ESHS-720	EHS Management	3
ESHS-740	EHS Management System Design	3
ESHS-755	Corporate Social Responsibility	3
ESHS-760	Integrating EHS Management	3
ESHS-780	EHS Internal Auditing	3
	Professional Electives	9
ESHS-797	Graduate Project	3
Total Semester Credit Hours		**30**

Environmental, health and safety management (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
GRCS-701	Research Methods	3
ESHS-720	EHS Management	3
ESHS-740	EHS Management System Design	3
ESHS-755	Corporate Social Responsibility	3
ESHS-760	Integrating EHS Management	3
ESHS-780	EHS Internal Auditing	3
	Professional Electives	12
ESHS-795	Comprehensive Exam	0
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree from an accredited university or college,
- Have a minimum undergraduate grade point average of 3.0 (B) over the junior- and senior-level years;
- Have completed at least 9 semester hours of college-level course work in the sciences, with at least 3 semester credit hours in each of the following categories: chemistry, biology, and physics.
- Submit two professional recommendations,
- Submit two writing samples to demonstrate written communication skills,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a clearly written one-page statement of purpose,
- Submit a current resume or curriculum vitae, and
- Complete a graduate application
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 570 (paper-based) or 88 (Internet-based) is required. Scores from the International English Language Testing System (IELTS) will be accepted in place of the TOEFL exam. Minimum acceptable scores will vary; however, the absolute minimum

score for an unconditional acceptance is 6.5. It is recommended that international students begin the program in the fall semester.

Applicants with acceptable professional certification(s) and/or work experience may have pre-requisite science course work waived.

Applicants without formal academic training or documented experience in air emmisions, waste water, solid and hazardous waste, occupational health, or occupational safety may be required to take professional electives in these areas. Students without related work experience may complete a graduate cooperative education placement during their program of study.

Graduate Record Examination (GRE) scores are not required; however, applicants may submit test scores to support their candidacy.

Additional information

Transfer credit

With the permission of the department, relevant graduate course work may be transferred into the program, per the maximum number of credit hours allowed.

International students

International students enrolled in courses at the RIT campus are required to take at least two traditional classroom courses and one or two online courses per semester. In addition, international students are solely responsible for meeting the requirements of their government and other sponsors, as applicable.

Manufacturing and Mechanical Systems Integration, MS

rit.edu/cast/mmetps/graduate-programs/ms-in-manufacturing-and-mechanical-systems-integration

James H. Lee, PE, PhD, Program Director for Graduate Studies and Research
(585) 475-2899, james.lee@rit.edu

Program overview

The master of science in manufacturing and mechanical systems integration is a multidisciplinary degree designed for individuals who wish to achieve competence in mechanical or manufacturing engineering through an applied course of study. Highlights of the program include foundation courses in engineering, business practices, and management functions found in many manufacturing enterprises. Students select an area of concentrated study, and a thesis, capstone, or comprehensive exam. Concentrations consisting of a three-course sequence are available in product design, automation, quality, or electronics manufacturing.

The program is offered by the department of manufacturing and mechanical engineering technology in collaboration with Saunders College of Business and the industrial and systems engineering department and the Center for Quality and Applied Statistics within the Kate Gleason College of Engineering.

Plan of study

The program consists of 36 semester credit hours and is comprised of core courses, a concentration, electives, and a capstone project, thesis, or comprehensive exam. Students may be required to take additional prerequisite courses depending on their background and the concentration they select. The graduate director may approve the waiver of courses in the prerequisite group from graduation requirements, depending on a students' academic and employment background. Full-time students are eligible for two co-op blocks (three months for each block) after completing two semesters of study.

Electives

Students in the thesis option must complete one elective. Students in the capstone project option must complete two electives. Students choosing the comprehensive examination option must complete three electives. Courses selected to fulfill elective requirements must be any course from another MMET program concentration, any course outside the concentration or a graduate course from another graduate program (if approved by the graduate director and faculty member teaching the course), or any independent study course if approved by the student's program director.

Curriculum

Manufacturing and mechanical systems integration (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MFET-650	Manufacturing and Mechanical Systems Fundamentals	3
CQAS-670	Designing Experiments for Process Improvement	3
GRCS-702	Graduate Writing Strategies	3
GRCS-701	Research Methods	3
	Concentration Courses	6
CQAS-682	Lean Six Sigma Fundamentals	3
ACCT-703	Accounting for Decision Makers	3
MFET-788	Thesis Planning	3

COURSE		SEMESTER CREDIT HOURS
Second Year		
DECS-744	Project Management	3
	Concentration Course	3
MFET-790	Thesis	3
Total Semester Credit Hours		**36**

Manufacturing and mechanical systems integration (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MFET-650	Manufacturing and Mechanical Systems Fundamentals	3
CQAS-670	Designing Experiments for Process Improvement	3
GRCS-702	Graduate Writing Strategies	3
GRCS-701	Research Methods	3
	Concentration Courses	6
CQAS-682	Lean Six Sigma Fundamentals	3
ACCT-703	Accounting for Decision makers	3
Second Year		
DECS-744	Project Management	3
	Concentration Course	3
	Elective	3
Choose one of the following:		3
MFET-797	Capstone Project	
CQAS-683	Lean Six Sigma Project	
Total Semester Credit Hours		**36**

Manufacturing and mechanical systems integration (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MFET-650	Manufacturing and Mechanical Systems Fundamentals	3
CQAS-670	Designing Experiments for Process Improvement	3
GRCS-702	Graduate Writing Strategies	3
GRCS-701	Research Methods	3
CQAS-682	Lean Six Sigma Fundamentals	3
ACCT-703	Accounting for Decision Makers	3
	Concentration Courses	6
Second Year		
DECS-744	Project Management	3
	Concentration Course	3
	Electives	6
MFET-795	Comprehensive Examination	0
Total Semester Credit Hours		**36**

Concentrations

COURSE		SEMESTER CREDIT HOURS
Automated manufacturing		
ISEE-710	Systems Simulation	3
MFET-670	Manufacturing Automation Controls	3
MFET-685	Robots and CNC in Integrated Manufacturing	3
Electronics packaging		
MFET-655	Electronics Packaging Fundamentals	3
MFET-765	Advanced Concepts in Electronics Packaging	3
TCET-740	Fiber Optics Telecommunications Technology	3
Management systems		
MGMT-740	Organizational Behavior and Leadership	3
MGMT-742	Technology Management	3
	Operations and Supply Chain Management	3
Product development		
MCET-620	Robust Design and Production Systems	3
MCET-670	Concept Design and Critical Parameter Management	3
MCET-720	Product and Production System Development and Integration	3
Quality management		
CQAS-621	Statistical Quality Control	3
CQAS-741	Regression Analysis	3
MCET-620	Robust Design	3

Admission requirements

To be considered for admission to the MS program in manufacturing and mechanical systems integration, candidates must fulfill the following requirements:

- Hold a baccalaureate degree (or equivalent) from an accredited institution in the field of engineering, engineering technology, or computing. Students with degrees in other disciplines will be considered on an individual basis.
- Have a minimum grade point average of 3.0. Applicants with a lower GPA will be evaluated on a case-by-case basis and may be admitted on a probationary basis. These students will have to secure a B or better average in the first three graduate courses to be considered for full admission.
- Have completed college level course work in computer programming and probability and statistics.
- Submit two professional recommendations.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit a clearly written, one-page statement of purpose.
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 550 (paper-based) or 79-80 (Internet-based) is required. International applicants must also submit scores from the Graduate Record Exam (GRE). A score of 1,200 (V&Q) and an analytical writing score of 3.5 or higher are required. Applicants with low GRE scores may be admitted conditionally; but may be required to take additional English language tests and, if required, English language courses along with a reduced program course load.

Packaging Science, MS

rit.edu/cast/packaging/ms-packaging-science
Deanna Jacobs, Graduate Program Director
(585) 475-6801, dmjipk@rit.edu

Program overview

The MS degree in packaging science is designed to meet the needs of professionals who are employed in the field or students who wish to pursue a graduate program immediately upon earning a bachelor's degree.

Plan of study

The program requires the completion of 36 credit hours comprised of six required core courses, elective courses, plus a thesis or project. Faculty advisers assist students in selecting the thesis or project option and the corresponding plan of study is approved by the graduate program chair.

Elective courses

All elective courses are approved by the student's adviser and must meet degree requirements. In certain circumstances, with pre-approval by the graduate adviser and where individual need indicates appropriateness, a limited number of upper-level undergraduate courses may be used to fulfill elective credit. Students, with adviser permission, may include independent study as part of their elective credits. However, independent study may not be used toward the required packaging core course work. Courses selected for elective credit can be combined to create special areas of focus with program chair approval.

Thesis/Project/Comprehensive Exam

The thesis option requires 6 credit hours and develops and tests a hypothesis by scientific method and is grounded in a theoretical framework. Individuals who can capture, interpret, and apply information by this method can add value to their roles as contributors in the workplace. The thesis option is for students seeking to pursue careers that offer a greater opportunity for further research or advanced study in the field of packaging science. It is meant to provide depth of study, emphasizing the research process. The thesis option is by invitation only.

The project option is 3 credit hours and has a practical, application-oriented grounding in literature. It is considered secondary research or the compilation of existing information presented in a new way. The project option is for students who desire advanced study in packaging science, but who do not intend to pursue a research career or further studies beyond the master's level. Students choosing the project option are required to complete one additional elective course.

The comprehensive exam option is 0 credit hours and allows students to complete an exam in place of a thesis or project. Students who choose this option take two additional elective courses.

The student's graduate committee makes the final decision regarding the proposal idea and whether it meets the program's requirements as a graduate project or thesis; or if a student is best served by completing the comprehensive exam.

Curriculum

Packaging science (research thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
PACK-742	Distribution Systems	3
GRCS-702	Principles of Research Communication	3
PACK-730	Packaging and the Environment	3
PACK-763	Packaging for End Use	3
	Packaging Electives	9
Second Year		
PACK-783	Advanced Packaging Dynamics	3
	Packaging Elective	3
PACK-790	Research Thesis	6
Total Semester Credit Hours		**36**

Packaging science (graduate project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
PACK-742	Distribution Systems	3
PACK-730	Packaging and the Environment	3
PACK-763	Packaging for End Use	3
	Packaging Electives	12
Second Year		
PACK-783	Advanced Packaging Dynamics	3
	Packaging Electives	6
PACK-797	Graduate Project	3
Total Semester Credit Hours		**36**

Packaging science (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
PACK-742	Distribution Systems	3
PACK-730	Packaging and the Environment	3
PACK-763	Packaging for End Use	3
	Packaging Electives	12
Second Year		
PACK-783	Advanced Packaging Dynamics	3
	Packaging Electives	9
PACK-795	Comprehensive Exam	0
Total Semester Credit Hours		**36**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have a minimum 3.0 (B) grade point average in their final two years of undergraduate course work,
- Submit two letters of recommendation,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work, and
- Complete a graduate application.

Graduate Record Exam (GRE) scores are not required. However, in cases where there may be some question of the capability of an applicant to complete the program, applicants may wish to submit scores to strengthen their application.

Students who do not have an equivalent bachelor's degree in packaging science will be evaluated and the appropriate undergraduate bridge courses will be prescribed. These courses may not be used for credit toward the MS degree.

Applicants are required to have one semester of physics (mechanics focus), one semester of calculus, one year of chemistry (including organic chemistry), statistics, and basic computer literacy.

Students who do not have an equivalent bachelor's degree in packaging science will be evaluated and the appropriate undergraduate bridge courses will be prescribed. These courses may not be used for credit toward the MS degree.

Additional information

Advising

Students are appointed an academic adviser who works with the program coordinator to develop a program of study. Students follow an outlined curriculum to complete their degree requirements and, with adviser approval, choose packaging electives to enhance their career objectives. Students choose a faculty adviser with approval from their program coordinator for their thesis or project. The faculty adviser guides the student on topic choice and works with the program coordinator for approval and timely completion of the thesis or project.

Telecommunications Engineering Technology, MS

rit.edu/cast/ectet/ms-telecommunications-engineering-technology
Willilam P. Johnson, Graduate Program Director
(585) 475-2179, wpjiee@rit.edu

Program overview

The telecommunications industry has driven technological innovation and provided outstanding career opportunities for people with the right technical and leadership skills. New services offered through the internet, mobility offered by wireless technology, and extreme capacity offered by fiber optics, as well as the evolution of policy and regulation, are shaping the telecommunication network of the future. The MS in telecommunications engineering technology focuses on developing the advanced level of skill and knowledge needed by future leaders in the industry. The program is designed for individuals who seek advancement into managerial roles in the dynamic telecommunications environment.

Plan of study

The program requires 33 semester credit hours of study and includes eight core courses that introduce essential fundamental concepts and skills. Each student is required to complete a comprehensive exam or, with faculty approval, a capstone project or a master's thesis. The remaining credits consist of technical electives or other approved graduate courses.

Comprehensive Exam/Project/Thesis options

All students are required to complete a comprehensive exam at the conclusion of their course work. The comprehensive exam focuses on knowledge of the core competencies, theory and foundation principles, and application of this knowledge to a variety of scenarios. Students who wish to complete a graduate project or thesis under the supervision of a faculty adviser (in place of the comprehensive exam) must have the approval of the faculty and the graduate program director.

Curriculum

Telecommunications engineering technology (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
TCET-710	Principles of Telecommunication	3
TCET-730/PUBL-730	Telecommunications Policy and Issues	3
TCET-750	Wireless Infrastructure and Policy	3
GRCS-701	Research Methods	3
TCET-740, 741	Fiber Optic Telecommunications Technology and Lab	3
TCET-720	Telecommunications Concepts	3
TCET-760	Network Planning and Design	3
TCET-747	Next Generation Networks	3
Second Year		
	Elective	3
TCET-790	Thesis	6
Total Semester Credit Hours		**33**

Telecommunications engineering technology (graduate project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
TCET-710	Principles of Telecommunication	3
TCET-730/PUBL-730	Telecommunications Policy and Issues	3
TCET-750	Wireless Infrastructure and Policy	3
GRCS-701	Research Methods	3
TCET-740, 741	Fiber Optic Telecommunications Technology and Lab	2
TCET-720	Telecommunications Concepts	3
TCET-760	Network Planning and Design	3
TCET-741	Fiber Optic Telecommunication Technology Lab	1
TCET-747	Next Generation Networks	3
Second Year		
	Electives	6
TCET-797	Graduate Project	3
Total Semester Credit Hours		**33**

Telecommunications engineering technology (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
TCET-710	Principles of Telecommunication	3
TCET-730	Telecommunications Policy and Issues	3
TCET-750	Wireless Infrastructure and Policy	3
GRCS-701	Research Methods	3
TCET-740, 741	Fiber Optic Telecommunications Technology and Lab	3
TCET-720	Telecommunications Concepts	3
TCET-760	Network Planning and Design	3
TCET-747	Next Generation Networks	3
Second Year		
	Electives	9
TCET-795	Comprehensive Exam	0
Total Semester Credit Hours		**33**

Admission requirements

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

- Hold a baccalaureate degree in engineering technology, engineering, or a related degree from an accredited institution,
- Submit two professional recommendations,
- Have a minimum cumulative GPA of 3.0 (B),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 570 (paper-based), or 88-89 (Internet-based) are required. Applicants with a lower TOEFL score may be admitted conditionally and may be required to take a prescribed program in English and a reduced program course load. International applicants from universities outside the United States must submit scores from the Graduate Record Examination (GRE).

While GRE scores are not required for applicants submitting transcripts from American universities, they are recommended for those whose undergraduate grade point average is below 3.0.

Additional information

Transfer credit

A limited number of credit hours may be transferred from an accredited institution to the program. Please consult the department chair for more information.

Other approved electives

All students may take three credit hours of graduate elective course work from other graduate programs subject to the approval of the graduate program director. Students often choose to include courses from Saunders College of Business, B. Thomas Golisano College of Computing and Information Sciences, or Kate Gleason College of Engineering. The number of elective credits depends on which completion strategy faculty have approved for the student, the student's choice of thesis, project, or comprehensive exam option.

Research and cooperative education

Students have the opportunity to apply for research projects or a cooperative education experience. While not a requirement of the program, these opportunities increase the value of the program and the marketability of its graduates.

Admission requirements

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

- Hold a baccalaureate degree in engineering technology, engineering, or a related degree from an accredited institution,
- Submit two professional recommendations,
- Have a minimum cumulative GPA of 3.0 (B),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 570 (paper-based) or 88-89 (Internet-based) are required. Applicants with a lower TOEFL score may be admitted conditionally and may be required to take a prescribed program in English and a reduced program course load. International applicants from universities outside the United States must submit scores from the Graduate Record Examination (GRE).

While GRE scores are not required for applicants submitting transcripts from American universities, they are recommended for those whose undergraduate grade point average is below 3.0.

School of International Hospitality and Service Innovation

Hospitality and Tourism Management, MS

rit.edu/cast/htm/graduate-program

Carol Whitlock, Department Chair and Graduate Program Director
(585) 475-2353, cbwism@rit.edu

Program overview

The hospitality and tourism management program prepares students to step into numerous mid-level hospitality and tourism management and government policy positions. The program is focused on hospitality business planning, branding, economic management, and development of quality processes to deliver exceptional leadership within many service and corporate settings and at post-secondary academic institutions.

Plan of study

The program introduces major concepts associated with all aspects of hospitality, tourism, and business management, whether they are applied specifically to the hospitality-tourism industry or the wider service industry. Among the general concepts investigated are hospitality business development and marketing quality. Electives allow in depth study in specialized areas of hospitality manangement, such as resorts and attractions, travel and tourism, conventions and events, technology, and human resource development.

Students must complete a minimum of 30 credit hours. The curriculum is a combination of required core courses in hospitality and tourism management and elective courses chosen by the student to meet career interests and objectives. Students complete a graduate project or a comprehensive exam. A thesis option is available with approval. Course offerings generally are scheduled for evenings or via online learning to facilitate part-time students.

Core courses

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

Electives

Elective courses provide students with an opportunity to individualize their graduate program in line with their career and professional interests. With the approval of the department chair, students are allowed to take a selection of elective courses from outside the program. Courses may be taken from the service leadership and innovation program, the human resource development program, and Saunders College of Business. Students are cautioned to observe course prerequisites in their selections.

Of the six credit hours of electives, students are relatively free to select courses they feel best meet their needs. All elective courses must be graduate-level. If previous course work exists, students may request a transfer of credits. A limited number of credit hours may be taken as independent study or practicum courses.

Project/Capstone/Thesis options

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

Curriculum

Hospitality and tourism management (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communication	3
SERQ-710	Evolving Contexts In Service	3
HSPT-730	Strategic Hospitality And Tourism Branding	3
HSPT-740	Economic Performance Analysis for Hospitality and Tourism	3
HSPT-750	Processes and Assessment of Hospitality and Tourism Industries	3
	Electives	9
HSPT-797	Capstone Project	3
Total Semester Credit Hours		**30**

Hospitality and tourism management (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
SERQ-710	Evolving Contexts In Service	3
HSPT-730	Strategic Hospitality And Tourism Branding	3
HSPT-740	Economic Performance Analysis for Hospitality and Tourism	3
HSPT-750	Processes and Assessment of Hospitality and Tourism Industries	3
	Professional Electives	15
HSPT-794	Integrated Problem Solving	3
HSPT-795	Comprehensive Exam	0
Total Semester Credit Hours		**30**

Hospitality and tourism management (research thesis option), MS degree, typical course sequence

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

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Have a GPA of 3.0 or higher. Foundation course work with a GPA of 3.0 or higher (if required),
- Submit two professional recommendations,
- Submit a current resume, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 80 (Internet-based) is required.

International English Language Testing System (IELTS) scores will be accepted in place of the TOEFL. A minimum score of 6.5 is required. All international students will take the Michigan Test of English Proficiency upon arrival. A prescribed program in English and a reduced program course load may be required.

After a review by the program chair, applicants whose prior undergraduate work has been in areas other than hospitality or tourism may be required to complete additional courses. Students may choose elective courses with the approval of the program.

Additional information

Part time study

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

Human Resource Development, MS

rit.edu/cast/servicesystems/human-resources-development

Linda Underhill, Department Chair and Graduate Program Director
(585) 475-7359, lmuism@rit.edu

Program overview

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

Plan of study

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

Electives

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

Curriculum

Human resource development (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
HRDE-700	Research Design and Methods	3
HRDE-702	Graduate Writing Strategies	3
HRDE-710	Foundations in Human Resource Development	3
HRDE-711	Program Evaluation and Design	3
HRDE-712	Performance Analysis and Development	3
	Concentration Courses	12
	Elective	3
HRDE-794	Integrated Problemsolving	3
SERQ-770	Breakthrough Thinking, Creativity and Innovation	3
HRDE-795	Comprehensive Examination	0
Total Semester Credit Hours		**36**

Human resource development (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
HRDE-700	Research Design and Methods	3
HRDE-702	Graduate Writing Strategies	3
HRDE-710	Foundations in Human Resource Development	3
HRDE-711	Program Evaluation and Design	3
HRDE-712	Performance Analysis and Development	3
	Concentration Courses	12
	Elective	3
SERQ-770	Breakthrough Thinking, Creativity and Innovation	3
HRDE-797	Graduate Project	3
Total Semester Credit Hours		**36**

Human resource development (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
HRDE-700	Research Design and Methods	3
HRDE-702	Graduate Writing Strategies	3
HRDE-710	Foundations in Human Resource Development	3
HRDE-711	Program Evaluation and Design	3
HRDE-712	Performance Analysis and Development	3
	Concentration Courses	12
	Elective	3
	Thesis	6
Total Semester Credit Hours		**36**

Concentrations*

		Sem. Cr. Hrs.
Organizational learning		
HRDE-720	Theories of Organizational Development	3
HRDE-721	Organizational Learning and Knowledge Management	3
HRDE-722	Talent Development	3
HRDE-723	Group Dynamics and Leadership	3
Training and development		
HRDE-730	Theories of Adult Learning	3
HRDE-731	Team Process and Facilitation Skills	3
HRDE-732	Learning Transfer	3
HRDE-733	Instructional Design and Technology in HRD	3
Global Human Resource Development		
HRDE-740	Strategic HRD for Global Organizations	3
HRDE-741	Global HRD Leadership	3
HRDE-742	Change Leadership Development	3
HRDE-743	Training for Global Organizations	3

* A customized concentration may be developed with department approval. A customized concentration cannot include additional business-related courses.

Admission requirements

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

- Hold a baccalaureate degree from an accredited college or university,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Have a cumulative GPA of 3.0 or above (or evidence of relevant professional performance),
- Submit two letters of reference,
- Submit a writing sample designated by the department,
- Participate in an interview with a faculty member (when required by department)
- Submit an official graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 570 (paper-based) or 88 (Internet-based) are required. Scores from the International English Language Testing Systems (ILETS) and Pearson Test of English (PTE) will be accepted in place of the TOFEL. The absolute minimum score for consideration for admission is 6.5 for the IELTS and 62 for the PTE. Upon arrival at RIT, international students may be asked to take an English language proficiency exam. Those who do not meet the minimum standard will be required to take additional English language courses.

All required admission materials must be submitted and reviewed by faculty prior to the completion of 9 credit hours of graduate work in the program.

Additional information

Advisers

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

Organizational Learning, Adv. Cert.

rit.edu/cast/servicesystems/organizational-learning

Linda Underhill, Department Chair and Graduate Program Director
(585) 475-7359, lmuism@rit.edu

Program overview

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

Curriculum

Organizational learning, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HRDE-710	Foundations of HRD	3
HRDE-721	Learning and Knowledge Management	3
HRDE-723	Group Dynamics and Facilitation Skills	3
HRDE-722	Talent Development	3
Total Semester Credit Hours		**12**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have a minimum grade point average of 3.0 (B average or a first class degree from a foreign university),
- Submit transcripts (in English) of all previously completed undergraduate and graduate course work, and
- Complete a graduate application.

Additional information

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/organizationallearning.

Service Leadership and Innovation, MS

rit.edu/cast/servicesystems/service-leadership-innovation

Linda Underhill, Department Chair and Graduate Program Director
(585) 475-7359, lmuism@rit.edu

Program overview

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

Plan of study

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

Curriculum

Service leadership and innovation (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
SERQ-710	Evolving Contexts in Service	3
SERQ-720	Service Scenarios and Strategy Development	3
SERQ-722	Customer Centricity	3
SERQ-723	Service Analytics	3
SERQ-712	Breakthrough Thinking, Creativity and Innovation	3
	Concentration Course	3
Second Year		
	Concentration Courses	6
SERQ-795	Comprehensive Exam*	0
SERQ-711	Service Design and Implementation	3
SERQ-794	Integrated Problem Solving	3
Total Semester Credit Hours		**33**

Service leadership and innovation (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communication	3
SERQ-710	Evolving Contexts in Service	3
SERQ-720	Service Scenarios and Strategy Development	3
SERQ-722	Customer Centricity	3
SERQ-723	Service Analytics	3
SERQ-712	Breakthrough Thinking, Creativity and Innovation	3
Second Year		
	Concentration Courses	9
SERQ-797	Capstone Project	3
Total Semester Credit Hours		**33**

Service leadership and innovation (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
GRCS-701	Research Methods	3
GRCS-702	Principles of Research Communication	3
SERQ-710	Evolving Contexts in Service	3
SERQ-720	Service Scenarios and Strategy Development	3
SERQ-722	Customer Centricity	3
SERQ-723	Service Analytics	3
SERQ-712	Breakthrough Thinking, Creativity and Innovation	3
Second Year		
	Concentration Courses	9
SERQ-790	Thesis	6
Total Semester Credit Hours		**36**

Concentrations*

COURSE		SEMESTER CREDIT HOURS
Engineering services		
SERQ-740	Leadership Tools and Techniques	3
Choose two or three of the following:		
ISEE-682	Lean Six Sigma Fundamentals	3
ISEE-771	Engineering of Systems I	3
ISEE-723	Global Facilities Planning	3
Higher education leadership		
SERQ-750	The Student Experience in Higher Education	3
SERQ-751	Critical Systems in Higher Education	3
SERQ-755	Organization and Leadership in Higher Education	3
Service systems		
SERQ-730	Project Management in Not-For-Profit	3
SERQ-732	Service Quality in Not-For-Profit	3
SERQ-735	Data Mining in Not-For-Profit	3

* Students may also customize a concentration with the approval of the department. Please note: customized concentrations cannot include additional business related courses.

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Have a cumulative GPA of 3.0 or higher (or evidence of relevant professional performance),
- Submit two letters of reference,
- Submit a writing sample designated by the department,
- Participate in an interview with a faculty member (when required by department)
- Submit a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 570 (paper-based) or 88 (Internet-based) are required. Scores from the International English Language Testing Systems (ILETS) and Pearson Test of English (PTE) will be accepted in place of the TOFEL. The absolute minimum score for consideration for admission is 6.5 for the IELTS and 62 for PTE. Upon arrival at RIT, international students may be asked to take an English language proficiency exam. Those who do not meet the minimum standard will be required to take additional English language courses.

All required admission materials must be submitted and reviewed by faculty prior to the completion of 9 semester credit hours of graduate course work in the program.

Service Leadership and Innovation, Adv. Cert.

rit.edu/cast/servicesystems/service-systems

Linda Underhill, Department Chair and Graduate Program Director
(585) 475-7359, lmuism@rit.edu

Program overview

The advanced certificate in service leadership and innovation offers service professionals cutting-edge skills, abilities, and applied service knowledge. The certificate heightens the student's capacity to function in today's highly competitive and quickly evolving service environment.

Plan of study

The advanced certificate is made up of four courses that help students master the following concepts:

- understand service performance system design and implementation parameters,
- understand and use service value delivery system structures and processes,
- comprehend the evolving strategic environment of service-sector businesses,
- establish and use service-system elements/dimensions,
- build service metrics from feedback processes,
- understand and implement customer relationship management, and
- construct innovative approaches to service and managing those changes.

The certificate may be completed as a stand-alone credential or serve as an entry point for the MS program in service leadership and innovation.

Curriculum

Service leadership and innovation, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SERQ-710	Evolving Contexts in Service	3
SERQ-720	Service Scenarios and Strategy Development	3
SERQ-730	Project Management in Not-For-Profit	3
SERQ-735	Data Mining in the Not-for-Profit	3
Total Semester Credit Hours		**12**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have a minimum undergraduate GPA of 3.0,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume,
- Submit a personal statement,
- Submit two letters of recommendation, and
- Complete a graduate application

Additional information

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/service_systems.

Training, Design and Assessment, Adv. Cert.

rit.edu/cast/servicesystems/training-design-and-assessment

Linda Underhill, Department Chair and Graduate Program Director
(585) 475-7359, lmuism@rit.edu

Program overview

Senior leaders in the most successful businesses agree that leveraging the human capital of an organization is vital to survival in today's competitive business climate. This requires businesses to align employee development plans with strategy and provide targeted learning experiences to ensure they equip their workforce to perform at the peak of their capability, attract the best and brightest candidates, and retain the most qualified employees.

The advanced certificate in training, design and assessment provides professionals with the competencies required to develop highly effective learning materials that drive strategic employee development, boost performance, and manage the employee development efforts of an organization.

Curriculum

Training, design and assessment, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HRDE-715	Human Performance Design and Development	3
HRDE-730	Theories of Adult Learning	3
HRDE-733	Instructional Design and Technology	3
HRDE-755	Program Assessment and Evaluation	3
Second Year		
Choose one of the following:		3
HRDE-756	Learning Design and Technology	
HRDE-758	Design for Online Learning	
Total Semester Credit Hours		**15**

Admission requirements

To be considered for admission to the advanced certificate in training, design and assessment, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited institution,
- Have a minimum undergraduate GPA of 3.0,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume,
- Submit a personal statement,
- Submit two letters of recommendation, and
- Complete a graduate application.

Additional information

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/trainingdesignandassessment.

S. Manian Ramkumar, BE, PSG, College of Technology-Bharathiar (India); ME, Rochester Institute of Technology; Ph.D., State University of New York at Binghamton—Interim Dean

Linda A. Tolan, NCC, BS, State University College at Geneseo; MS, Rochester Institute of Technology; Ph.D., Andrews University—Senior Associate Dean, Professor

Sean T. Bennett, BS, Clarkson University; M.Ed., State University College at Brockport; Ed.M., Harvard University—Assistant Dean

School of Engineering Technology

Civil Engineering Technology

Amanda Bao, BS, MS, Tianjin University (China); Ph.D., University of Colorado at Boulder—Associate Professor

Harry G. Cooke, PE, BS, Northwestern University; MSCE, University of Texas; Ph.D., Virginia Polytechnic Institute—Associate Professor

Todd Dunn, PE, BS, Dartmouth College; MSCE, University of California—Department Chair; Associate Professor

Robert H. Easton, PE, BS, United States Military Academy; MSCE, Iowa State University—Professor Emeritus

Abdullah Faruque, PE, B.Sc., Bangladesh University of Engineering and Technology (India); M.A.Sc., Ph.D., University of Windsor (Canada)—Associate Professor

Robert E. McGrath Jr., PE, BCE, Rensselaer Polytechnic Institute; MSCE, Syracuse University—Professor Emeritus

Mark Piterman, MCE, Odessa Marine Engineers Institute (Ukraine)—Professor Emeritus

Maureen S. Valentine, PE, BSCE, Tufts University; MECE, Virginia Polytechnic Institute—Professor

Scott B. Wolcott, PE, BS, MS, State University of New York at Buffalo—Undergraduate Program Coordinator; Professor

Teresa Wolcott, BS, State University of New York at Buffalo; MS, Rochester Institute of Technology—Senior Lecturer

Environmental, Healthy and Safety Management

Josh Goldowitz, BS, State University of New York at Binghamton; MS, University of Arizona—Professor

Lisa Greenwood, BS, Rochester Institute of Technology; MS, University of New Haven—Lecturer

John Morelli, PE, BS, Syracuse University; MS, Ph.D., State University of New York College of Environmental Science and Forestry—Professor Emeritus

Joseph M. Rosenbeck, CSP, BS, MS, Central Missouri State University—Graduate Program Director; Professor

Jennifer L. Schneider, CIH, BA, Roberts Wesleyan College; MS, University of Rochester; Ph.D., University of Massachusetts—Professor

Electrical, Computer, and Telecommunications Engineering Technology

Miguel Bazdresch, BE, Western Institute of Technology and Higher Studies (Mexico); ME, National Polytechnic Institute (Mexico); Ph.D., National Higher School of Telecommunications (France)—Assistant Professor

Michael Eastman, BS, MSCS, Rochester Institute of Technology—Department Chair; Professor

Clark Hochgraf, BS, State University of New York at Buffalo; Ph.D., University of Wisconsin at Madison—Associate Professor

Mark J. Indelicato, BEEE, Manhattan College; MS, Polytechnic University—Associate Professor

William P. Johnson, BA, Kings College; BSEE, MSEE, Syracuse University; JD, University at Buffalo Law School—Professor

Sungyoung Kim, BE, Sogang University (Korea); MM, Ph.D., McGill University (Canada)—Assistant Professor

Warren L. G. Koontz, BSEE, University of Maryland; MSEE, Massachusetts Institute of Technology; Ph.D., Purdue University—Professor Emeritus

Drew Maywar, BS, MS, Ph.D., University of Rochester— Associate Professor

Yossi Nygate, MS (computer science), MS (applied mathematics), Wiezmann Institute of Science (Isreal); Ph.D., Case Western University—Associate Professor

Manufacturing and Mechanical Engineering Technology/Packaging Science

Ronald F. Amberger, PE, BME, Rensselaer Polytechnic Institute; ME, Pennsylvania State University—Professor Emeritus

Beth A. Carle, BSE, University of Pittsburgh; MS, Ph.D., University of Illinois; EIT Professional Certification—Associate Professor

Elizabeth M. Dell, BSME, General Motors Institute; MS, University of Michigan—Paul A. Miller Professorship; Associate Professor

Robert D. Garrick, BSEE, GMI Engineering and Management Institute; MBA, Rochester Institute of Technology; MS, University of Rochester; Ph.D., University of South Carolina—Associate Department Chair, Professor

Martin Gordon, PE, BSME, MSME, MBA, State University of New York at Buffalo—Program Director for Undergraduate Studies, Associate Professor

Seung H. Kim, BS, Hanyang University (South Korea); MS, Ph.D., University of Illinois—Program Director for Graduate Studies and Research; Associate Professor

James H. Lee, PE, BS, California Polytechnic State University; MS, Ph.D., Texas A&M University—Associate Professor

William Leonard, AAS, State University College at Canton; BS, MS, Rochester Institute of Technology—Mechanical Engineering Technology Program Chair; Associate Professor

Ti-Lin Liu, MS, Tsinghua University (China)—Associate Professor

Carl A. Lundgren, BS, Rensselaer Polytechnic Institute; MBA, University of Rochester—Professor Emeritus

Jennifer A. O'Neil, BS, Rochester Institute of Technology; Ph.D., Purdue University—Assistant Professor

Michael J. Parthum Sr., BS, MS, Rochester Institute of Technology—Associate Professor

S. Manian Ramkumar, BE, PSG, College of Technology-Bharathiar (India); ME, Rochester Institute of Technology; Ph.D., State University of New York at Binghamton—Department Chair; Professor

Michael J. Slifka, AAS, Niagara County Community College; BS, MS, Rochester Institute of Technology—Senior Lecturer

John A. Stratton, PE, BS, Rochester Institute of Technology; MS, Rensselaer Polytechnic Institute—Professor Emeritus

Larry A. Villasmil, BSME, Universidad del Tachira (Venezuela); MSME, Ph.D., Texas A&M University—Associate Professor

Packaging Science

Carlos Diaz-Acosta, BS, MS, Universidad de los Andes (Colombia), Ph.D., Michigan State University—Assistant Professor

Changfeng Ge, BSME, MSME, Tongji University (China); Ph.D., University of Dortmund (Germany)—Professor

Daniel L. Goodwin, BS, MS, Ph.D., Michigan State University—Professor Emeritus

Deanna M. Jacobs, BS, State University College at Plattsburgh; MA, State University College at Geneseo; MS, Rochester Institute of Technology—Graduate Program Director; Professor

Daniel P. Johnson, BS, MS, Rochester Institute of Technology—Department Chair; Professor

Thomas Kausch, BS, MS, Rochester Institute of Technology—Senior Lecturer

Georgios Koutsimanis, BS, MS, Aristotle University of Thessaloniki (Greece)—Lecturer

Karen L. Proctor, BS, Michigan State University; MBA, Rochester Institute of Technology—Professor

School of International Hospitality and Service Innovation

Hospitality and Tourism Management

Francis Domoy, Ph.D., Michigan State University—Chair Emeritus

Yuchin "Jerrie" Hsieh, BS, National Taiwan Normal University (Taiwan); MS, Ph.D., Purdue University—Associate Professor

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

Richard M. Lagiewski, BS, MS, Rochester Institute of Technology—Senior Lecturer

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

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

Department of Service Systems

James Jacobs Jr., BA, Purdue University; MS, Troy State University; Ph.D., State University of New York at Buffalo—Senior Lecturer

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

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

Patricia Poteat, BA, University of Rochester; MS, Rochester Institute of Technology; Ph.D., University of Rochester—Lecturer

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

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

Saunders College of Business

Jacqueline R. Mozrall, Dean
saunders.rit.edu

Programs of study

Master of Business Administration:	Page
Traditional MBA	26
Concentrations available in: accounting, entrepreneurship, environmentally sustainable management, finance, international business, management and leadership, management information systems, marketing, operations management and supply chain management, product commercialization, quality and applied statistics, and technology management.	
Executive MBA	24
Online Executive MBA	25
MBA—Accounting	23

Master of Science degrees in:	
Accounting	23
Computational Finance	30
Entrepreneurship and Innovative Ventures	31
Finance	31
Management	32
Tracks available in: global management and supply chain management, leadership, and product and ervice development.	

Online learning option available.

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

Entrepreneurship at RIT

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

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

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

Venture Creations Incubator provides assistance in evaluating business opportunities, developing business plans, and offering mentoring and guidance to new ventures. In addition, students have access to the Student Incubator, business plan competitions, and a speaker's series.

Admission requirements

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

Financial aid and scholarship

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

Faculty

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

Facilities

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

Accreditation

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

Accounting, MS

saunders.rit.edu/programs/graduate/ms_accounting.php

Program overview

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

Plan of study

The program consists of 10 courses and a comprehensive exam based on the finance courses completed by the student. The exam is administered at the end of the student's last term. Students must pass the exam to earn their degree.

Curriculum

Accounting, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ACCT-605	Accounting Profession	1
ACCT-645	Accounting Information Systems	3
ACCT-707	Advanced Accounting	3
ACCT-708	Auditing and Professional Responsibility	3
ACCT-710	Advanced Taxation	3
ACCT-738	Information Systems Auditing and Assurance Services	3
ACCT-740	Comparative Financial Statement Analysis	3
ACCT-795	Financial Accounting Theory and Research	3
	Electives	9
	Field Exam	0
Total Semester Credit Hours		**31**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Submit the results of the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE) (GMAT preferred),
- Submit a personal statement,
- Submit a current resume, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 580 (paper-based) or 92 (Internet-based) are required. Scores from the International English Language Testing System (IELTS) are accepted in place of the TOEFL exam. The minimum acceptable score is 7.0. The TOEFL or IELTS requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions. For additional information on the IELTS, visit www.ielts.org.

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

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

Accounting, MBA

saunders.rit.edu/graduate/mba_accounting.php

Program overview

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

Plan of study

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

Curriculum

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

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

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

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

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have working knowledge of algebra and statistics,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE) (GMAT preferred for international applicants and those applying for scholarships),
- Submit a personal statement,
- Submit a current resume, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 580 (paper-based) or 92 (Internet-based) are required. Scores from the International English Language Testing System (IELTS) will be accepted in place of the TOEFL exam. The minimum acceptable score is 7.0. The TOEFL or IELTS requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions. For additional information on the IELTS, visit www.ielts.org.

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

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

Business Administration–Executive, MBA

saunders.rit.edu/executive/index.php
Marty Lawlor, Director of EMBA Programs
(585) 475-4472, mlawlor@saunders.rit.edu

Program overview

The executive MBA is an integrated, 15-month, cohort-based program designed to develop future leaders and general managers in organizations serious about improving customer satisfaction, product quality, and organizational success.

A team of faculty and executives from all sectors of business and industry designed the program for professionals with substantial career experience. Through the use of practical approaches to improving business results and increasing personal productivity, participants will:

- strengthen their leadership and interactive skills by collaborating with teams of professional peers and faculty;
- develop strategic perspectives consistent with the needs of customers, stockholders, employees, the community, and other organizational stakeholders;
- apply cross-functional approaches to enhance their analytical and decision-making capabilities; and
- obtain a solid foundation in the functional areas of business.

Students must have a minimum of six years of professional work experience. Participants work in teams, studying a curriculum that focuses on developing general management skills with a strategic focus. The program is structured in an interactive fashion, with an emphasis on cross-functional integration.

Plan of study

The program consists of 15 months of alternating weekends (all day Fridays and Saturdays), a one-week on-campus session, and a one-week international study trip.

The curriculum focuses on core business concepts, providing fundamental skills, knowledge, and perspectives in accounting, statistics, leadership, finance, and economics. The program develops skills in cross-functional analysis with an emphasis on strategy, marketing, technology, and international business. Interdisciplinary examples, case analyses, and an applied orientation are key components of the program.

The program features practical experience obtained through capstone consulting projects; ongoing support for career-oriented skills such as career development planning, communications, and team building; the application of a cross-functional business simulation model; and a week-long international business trip.

Curriculum

Executive MBA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MGMT-806	Team Building and Ethics (residency) (August)	1
ACCT-801	Accounting and Organizational Goals	2
ACCT-802	Managerial Accounting	2
DECS-810	Statistical Analysis for Managers	2
MGMT-810	Leadership	2
MGMT-800	Leadership Development I	1
ESCB-840	Microeconomics and Pricing	2
FINC-845	Valuation and Capital Budgeting	2
FINC-846	Financial Planning and Analysis	2
MGMT-862	Power and Influence	2
MKTG-851	Marketing Strategy	2
MGMT-818	Strategic Thinking I	2
MGMT-819	Strategic Thinking II	2
DECS-875	Business Simulation (summer)	2
DECS-864	Systems Support for Operations (summer)	2
MGMT-889	Capstone Consulting Project I (summer)	3
MGMT-861	Managing Technology, Innovation and Research (summer)	2
MGMT-801	Leadership Development II (summer)	1
MKTG-865	Managing New Product Commercialization (summer)	2
Second Year		
INTB-820	International Business	2
INTB-825	International Study Seminar	2
FINC-850	International Finance	2
MGMT-860	Executive Leadership	2
MGMT-890	Capstone Consulting Project II	3
Total Semester Credit Hours		**47**

Admission requirements

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

- Have a minimum of six years of professional work experience,
- Hold a baccalaureate degree from an accredited college or university,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Participate in an interview with a representative of the executive MBA team, and
- Complete a graduate application.
- International applicants, whose native language is not English, must submit the scores from the Test of English as a Foreign Language (TOEFL).

Additional information

Sponsorship

Employers sponsoring students must permit candidates to attend scheduled classes, the on-campus session, and the international trip. The program's week-long session occurs in the summer, and the international trip takes place in the student's final semester. Business owners or individuals may sponsor themselves.

Business Administration– Online Executive, MBA

executivembaonline.rit.edu/

Marty Lawlor, Director of Online EMBA Program
(585) 475-4472, mlawlor@saunders.rit.edu

Program overview

The online executive MBA is a challenging and demanding program designed to accelerate the careers of mature, high-performance professionals with significant business experience, unlike traditional MBA programs which are geared primarily toward a less experienced audience. The online program, delivered via distance learning, covers the same rigorous curriculum as the on campus EMBA.

The program is ideal for creative, innovative individuals who have gained experience in the workforce. Participants have established careers and are looking for proven and effective methods and strategies to propel them further up the career ladder. Students master executive skills such as strategic and cross–functional thinking and leadership. They learn from knowledgeable and professional instructors and from the successful, motivated, diverse peer group enrolled in the program.

The program encourages students to think outside the box and places a strong emphasis on group networking. Students leave the program with a solid network of influential peers.

Plan of study

This is a 17-month program with all courses completed online. Students can begin the program in the fall or spring semester. The course sequence presented is based on a student who begins their studies in the fall semester.

Curriculum

Online executive MBA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MGMT-806	Team Building and Ethics	1
ACCT-801	Accounting and Organizational Goals	2
ACCT-802	Managerial Accounting	2
DECS-810	Statistical Analysis for Managers	2
MGMT-810	Leadership	2
MGMT-800	Leadership Development I	1
ESCB-840	Microeconomics and Pricing	2
FINC-845	Valuation and Capital Budgeting	2
FINC-846	Financial Planning and Analysis	2
MGMT-862	Power and Influence	2
MKTG-851	Marketing Strategy	2
MGMT-818	Strategic Thinking I	2
MGMT-819	Strategic Thinking II	2
DECS-875	Business Simulation	2
MGMT-861	Managing Technology, Innovation and Research	2
DECS-864	Systems Support for Operations	2
MGMT-889	Capstone Consulting Project I	3
Second Year		
MKTG-865	Managing New Product Commercialization	2
INTB-820	International Business	2
INTB-825	International Study Seminar	2
FINC-850	International Finance	2
MGMT-860	Executive Leadership	2
MGMT-890	Capstone Consulting Project II	3
MGMT-801	Leadership Development II	1
Total Semester Credit Hours		**47**

Admission requirements

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

- Have a minimum of six years of professional experience and hold advanced technical, managerial, or executive responsibilities,
- Hold a bachelor's degree from an accredited college or university,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Have a GPA of 3.0 or higher, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL).

Business Administration–Traditional, MBA

saunders.rit.edu/graduate/mba_program.php
Donald Wilson, Director of MBA Program
(585) 475-6798, dwilson@saunders.rit.edu

Program overview

The master of business administration degree provides students with the capabilities for strategic and critical thinking needed for effective leadership in a global economy where creative management of both people and technology is vital. The curriculum begins with a solid grounding in the functional areas of business and combines that foundation with the flexibility that allows students to specialize in one or two areas of expertise. In the classroom, students learn the latest theories and concepts, and how they can be immediately applied to solve problems in the workplace.

Plan of study

The MBA program requires 48 credit hours and consists of 16 courses, 11 of which are devoted to core functional areas and five available in concentration areas and as electives.

Concentrations
An MBA concentration is a sequence of three courses in one discipline, giving you in-depth knowledge in that subject matter. In addition to the program's core courses, at least one area of concentration must be selected to complete the MBA program.

Our most popular MBA concentrations are featured below. Customized concentrations can also be created that leverage graduate courses offered at Saunders, as well as the other RIT colleges, providing a wide array of disciplinary focus areas. While several examples are provided, many possibilities exist. Students may also elect to complete a second concentration, if they choose. A graduate advisor can assist in developing a customized plan of study.

Accounting

Designed for students planning to enter corporate accounting, this concentration is also an excellent complement to a concentration in finance or management information systems.

Entrepreneurship

The entrepreneurship concentration is designed to enable students to recognize and commercialize attractive business opportunities—either by new independent ventures or by established firms seeking growth or rejuvenation. It involves integrating all functions of business (marketing, innovation, finance, accounting, etc.) within one coordinated value-creating initiative.

The concentration requires an applied entrepreneurial learning experience that may be satisfied through either the Field Experience in Business Consulting (MGMT-753) course or an approved commercialization project. These projects may involve students developing their own businesses or working with RIT incubator companies, local start-up firms, or RIT multidisciplinary commercialization projects.

Environmentally sustainable management

With a goal of familiarizing students with environmentally sustainable business practices, this concentration is attractive to those with an overall interest in understanding how firms can manage social and political demands for more environmentally sustainable products and operations. It may be of particular interest to those students in industries with a significant environmental impact such as the automotive, chemical, energy, transportation, or agricultural industries, where environmental issues are central to operational and strategic decision making.

Finance
This concentration is designed to provide a foundation of knowledge in finance and allow students to choose courses appropriate for a career in investments or corporate finance. Students interested in investments will acquire advanced skills in securities evaluation and portfolio management. Those interested in corporate finance will acquire advanced skills in budgeting, planning, global financing and operations, and corporate risk management.

International business
This concentration prepares graduates for today's global business environment. Regardless of size, nearly all enterprises operate globally: sourcing, producing, researching, and marketing worldwide. Suppliers and competitors are not only across the street, they are around the globe. Balancing the needs of local, regional, and national communities--and the benefits attained from global competition and cooperation--requires an understanding of the international dimensions of business. Managers and professionals must be able to think, market, negotiate, and make decisions designed for the diversity, complexity, and dynamism that are the hallmarks of global business.

Management and leadership
Managers need to combine effective leadership with analytical reasoning. The management and leadership concentration provides students with the leadership skills needed to be successful managers in business, nonprofit, and public organizations. Students develop the essential analytical and decision-making skills for today's rapidly changing world. They learn why change is difficult, when to initiate change, and how to introduce and manage change in the workplace. These courses also prepare students for the demands of managing people and projects.

Management information systems
This concentration enhances students' understanding of modern information systems. It was designed for students who may not have a background in computers or information systems.

Marketing
The overall process of entering markets, creating value for customers, and developing profit for the firm are the fundamental challenges for today's marketing manager. Effective marketing must consider the target audience, along with the changing business environment and competitive pressures of technological and global challenges. Additionally, digital media, the Internet, and big data continue to drive the development of our global marketplace. Digital marketing is evolving quickly creating an enormous need to understand the implications of these shifts for strategic initiatives in marketing and advertising.

Operations management and supply chain management
This concentration focuses on providing the knowledge to assist in developing, and implementing, efficient supplier systems in order to maximize customer value. Supply chain management is focused on the coordination of the associated processes required both within a business, as well as across businesses/suppliers, to deliver products and services - from raw materials to customer delivery. In addition to courses covering project management, quality control, process improvement and supply chain management, additional electives allow students to broaden their knowledge base across other relevant operations and supply chain management functions.

Product commercialization
This concentration targets students who are interested in developing expertise in managing the marketing-related activities required to move new products and services through preliminary business and development stages to a successful launch. The commercialization of new corporate offerings is increasingly important as product life cycles get shorter.

Quality and applied statistics
This concentration is for students interested in studying the technical aspect of managing quality (i.e., statistical quality control). Students gain an understanding of the basics of statistical process control, quality improvement, acceptance sampling, and off-line quality control techniques such as the design of experiments.

Technology management
In a constantly changing environment, the ability of an organization to innovate and renew itself is critical if it is to survive and prosper. Technology managers, who are typically responsible for the innovation and application of new technology, are central to the long-term strategy and success of their companies. To manage these processes well, managers need to understand both business and technological perspectives. Co-op or internship experience in high-technology settings may be helpful to students pursuing a specialty in technology management.

Customized concentration options
In addition to the above concentrations, MBA students may create a customized three-course concentration utilizing graduate courses from Saunders and other RIT colleges. Some examples are listed below, while additional options may be pursued on a case by case basis. To create a customized concentration the approval of a Saunders College graduate advisor is needed, and course prerequisites may apply.

Communication and media technologies
Communication, and the technologies for message creation and dissemination, is at the center of dramatic economic, social, and cultural changes occurring as a result of technological development and global connectedness. This concentration, offered by the College of Liberal Arts, prepares students for careers as communication experts in commerce, industry, education, entertainment, government, and the not-for-profit sector.

Health systems administration
Specifically designed for students employed in the health care environment, this concentration, offered by the College of Applied Science and Technology, introduces up-to-date, industry-relevant content that is continually developed in response to the changing health care environment. All courses in this concentration are offered online.

Human resource development
The field of human resource development has grown in both size and importance over the last decade, leading to a higher demand for educated and skilled human resource professionals. This concentration, offered by the College of Applied Science and Technology, provides education in training, and career and organizational development.

Industrial and systems engineering management
Organizations need individuals who possess a blend of technical and business skills, as well as the integrated systems perspective needed to commercialize complex products and services. This concentration, offered by the Kate Gleason College of Engineering, may be significantly interdisciplinary.

Information technology
Corporations are aware of the cost savings and performance improvement possible when information technology is applied in a systematic manner, improving organizational information flow, employee learning, and business performance. Information technology includes a mixture of computers and multipurpose devices, information media, and communication technology. Students may choose from the following areas of specialization: Web programming/multimedia, software project manage-

ment, programming, or telecommunications. This concentration is offered by the B. Thomas Golisano College of Computing and Information Sciences.

Print media

Leadership and management in the print media industry require an understanding of the cutting-edge technology and emerging markets to articulate a corporate vision that encompasses new opportunities and directions. This concentration, offered by the College of Imaging Arts and Sciences, is designed to provide a solid technical background in cross-media digital workflow processes and a keen understanding of the issues and trends in the print media industry.

Public policy

Formulating public policy and understanding its impact are critical, whether you work in government, not-for-profit, or the private sector. This concentration, offered by the College of Liberal Arts, gives students the skills to effectively formulate public policy and evaluate its impact, particularly as related to science and technology issues. The courses focus on policy formation, implementation, and analysis.

Curriculum

MBA degree (traditional), typical course sequence

COURSE		SEMESTER CREDIT HOURS
ACCT-603	Accounting for Decision Makers	3
DECS-610	Operations and Supply Chain Management	3
ESCB-705	Economics and Decision Modeling	3
FINC-721	Financial Analysis for Managers	3
MGIS-650	Introduction to Data Analytics and Business Intelligence	3
MGIS-735	Design and Information Systems	3
MGMT-735	Management of Innovation in Products and Services	3
MGMT-740	Organizational Behavior and Leadership	3
MGMT-759	Competitive Strategy	3
MGMT-775	Corporate Social Responsibility and Business Ethics	3
MKTG-761	Marketing Concepts and Commercialization	3
	MBA Electives	15
Total Semester Credit Hours		**48**

Concentrations

Accounting

COURSE		SEMESTER CREDIT HOURS
Required courses:		
ACCT-704	Corporate Financial Reporting I	3
ACCT-705	Corporate Financial Reporting II	3
Choose one accounting elective		3

Entrepreneurship

COURSE		SEMESTER CREDIT HOURS
MGMT-720	Entrepreneurship and New Venture Creation	3
MGMT-753	Field Experience in Business Consulting	3
MKTG-776	Product and Brand Management	3

Environmentally sustainable management

COURSE		SEMESTER CREDIT HOURS
MGMT-710	Managing for Environmental Sustainability	3
Choose two of the following:		6
ECON-810	Economics of Sustainability	
ESHS-720	Environmental Health and Safety Management	
ESHS-725	EHS Accounting and Finance	
ESHS-750	ESH and FM Project Management	
ISEE-785	Fundamentals of Sustainable Engineering	
ISEE-786	Lifecycle Assessment/Costing	
ISUS-704	Industrial Ecology	
ISUS-710	Sustainable Product Design	
PUBL-630	Energy Policy	
PUBL-810	Technology, Policy and Sustainability	
STSO-750	Sustainable Communities	

* Additional electives may be approved upon request.

Finance

COURSE		SEMESTER CREDIT HOURS
FINC-725	Securities and Investment Analysis	3
Choose any two finance electives		6

International business

COURSE		SEMESTER CREDIT HOURS
INTB-710	Global Business Opportunities and Threats	3
Choose any two of following:		6
FINC-760	Finance in a Global Environment	
INTB-730	Cross-cultural Management	
INTB-750	Global Marketing Management	
INTB-758	Seminar in Global Business*	
INTB-780	Global Issues and Strategies	

* Topics may vary.

Management and leadership

COURSE		SEMESTER CREDIT HOURS
MGMT-741	Managing Organizational Change	3
Choose two of the following:		6
BLEG-745	Legal and Ethical Issues in Technology Intensive Environments	
INTB-730	Cross-cultural Management	
MGMT-710	Managing for Environmental Sustainability	
MGMT-720	Entrepreneurship and New Venture Creation	
MGMT-750	Human Resource Management	
MGMT-755	Negotiations	
MGMT-756	Power and Influence	
MGMT-758	Seminar in Management*	
MGMT-763	Behavioral Skills for Managers and Professionals	
MGMT-775	Business Ethics and Corporate Social Responsibility	

* Topics may vary.

Management information systems

COURSE		SEMESTER CREDIT HOURS
MGIS-720	Information Systems Design and Development	3
Choose two of the following:		6
MGIS-725	Data Management and Analytics	
MGIS-730	Information Technology Project Management	
MGIS-755	Information Technology Strategy and Management	
MGIS-760	Integrated Business Systems	
MGIS-761	Business Process Analysis and Workflow Design	

Marketing

COURSE		SEMESTER CREDIT HOURS
MKTG-762	Advanced Marketing Management	3
MKTG-763	Buyer Behavior	3
Choose one of the following:		3
INTB-750	Global Marketing Management	
MKTG-758	Seminar in Marketing*	
MKTG-767	Advertising and Integrated Marketing Communications	
MKTG-771	Marketing Research Methods	
MKTG-772	Internet Marketing: Strategy and Tactics	
MKTG-775	Business-to-Business E-marketing	
MKTG-776	Product and Brand Management	
MKTG-778	Commercialization and Marketing of New Products	

* Topics may vary.

Operations management and supply chain management

COURSE		SEMESTER CREDIT HOURS
DECS-744	Project Management	3
DECS-745	Quality Control and Improvement	3
Choose one of the following:		3
CQAS-621	Statistical Quality Control	
ISEE-682	Lean Six Sigma Fundamentals	
DECS-743	Operations and Supply Chain Management	
ISEE-703	Supply Chain Management	
MGIS-760	Integrated Business Systems	
MGIS-761	Business Process Analysis and Workflow	
MGMT-741	Managing Organizational Change	
MGMT-743	Advanced Topics in Technology Management	

Product commercialization

COURSE		SEMESTER CREDIT HOURS
MKTG-778	Commercialization and Marketing of New Products	3
Choose two of the following:		6
DECS-744	Project Management	
MGMT-743	Advanced Topics in Technology Management	
MKTG-763	Buyer Behavior	
MKTG-771	Marketing Research Methods	
MKTG-776	Product and Brand Management	

Quality and applied statistics

COURSE		SEMESTER CREDIT HOURS
Choose three of the following:		9
CQAS-611	Statistical Software	
CQAS-621	Statistical Quality Control	
CQAS-670	Designing Experiment for Process Improvement	
CQAS-682	Lean Six Sigma Fundmentals	
CQAS-701	Foundations of Experimental Design	
DECS-745	Quality Control and Improvement	

Technology management

COURSE		SEMESTER CREDIT HOURS
MGMT-743	Advanced Topics in Technology Management	3
Choose two of the following:		6
BLEG-745	Legal and Ethical Issues in Technology Intensive Environments	
DECS-744	Project Management	
MGMT-720	Entrepreneurship and New Venture Creation	
MGMT-741	Managing Organizational Change	
MKTG-776	Product and Brand Management	

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have a working knowledge of algebra and statistics,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE) (GMAT preferred for international applicants and those applying for scholarships),
- Submit a personal statement,
- Submit a current resume, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 580 (paper-based) or 92 (Internet-based) are required. Scores from the International English Testing Language System (IELTS) are accepted in place of the TOEFL exam. The minimum acceptable score is 7.0. The TOEFL or IELTS requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions. For additional information on the IELTS, visit www.ielts.org.

Applications are accepted for fall, spring, and summer semesters. Most full-time students begin their program of study in the fall. Students may complete their studies on a full or part-time basis.

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

Additional information

Nonmatriculated status

Students with strong undergraduate records are permitted to take two graduate courses on a nonmatriculated basis. To become a matriculated student and admitted formally to the MBA program, the regular admissions process should be followed. Graduate credits earned as a nonmatriculated student may be applied to the student's degree program.

Academic standards

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

Maximum time limit

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

Orientation

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

Waiver policy/transfer credit

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

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

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

Placement

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

Cooperative education

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

Deferment

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

Computational Finance, MS

saunders.rit.edu/programs/graduate/ms_compfin.php

Program overview

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

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

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

Plan of study

The curriculum offers an integration of finance, mathematics, and computing. The required mathematics courses have substantial financial content and the experiential computational finance course, which students take during the summer, makes use of skills learned in the mathematics, analytics, and finance courses taken up to that point. The program has a strong multidisciplinary nature and combines the expertise of four of RIT's colleges. The program is a full-time, 17-month curriculum beginning exclusively in the fall. The program ends with a required non-credit comprehensive exam based on the courses completed by the student.

Curriculum

Computational finance, MS degree, typical course sequence

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

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Submit the results of the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE) (GMAT preferred),
- Submit a personal statement (Applicants should explain why their background, please indicate mathematical and programming knowledge, and interests make them suitable for the program),
- Submit a current resume, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 580 (paper-based) or 92 (Internet-based) are required. Scores from the International English Language Testing System (IELTS) will be accepted in place of the TOEFL exam. The minimum acceptable score is 7.0. The TOEFL or IELTS requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions. For additional information on the IELTS, visit www.ielts.org.

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

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

Entrepreneurship and Innovative Ventures, MS

saunders.rit.edu/programs/graduate/entrepreneurship/

Program overview

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

Plan of study

The program requires students to complete 30 credit hours consisting of:

- Six required core courses designed to increase a student's knowledge of accounting, organizational behavior and leadership, technology management, entrepreneurship, marketing, and product commercialization;
- Two innovation courses that increase student's knowledge of managing the innovation process.
- Two elective courses that provide students with additional background in areas of interest.

Curriculum

Entrepreneurship and innovative ventures, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
MGMT-740	Organizational Behavior and Leadership	3
MKTG-761	Marketing Concepts and Commercialization	3
MGMT-720	Entrepreneurship and New Venture Creation	3
BLEG-612	Legal and Accounting Issues for New Ventures	3
FINC-605	Financing New Ventures	3
MGMT-765	Applied Venture Creation*	3
Choose two of the following courses:		6
DECS-744	Project Management	
VCDE-711	Design Theory and Methods Seminar	
MGMT-735	Management of Innovation in Products and Services	
MGMT-742	Technology Management	
MKTG-776	Product and Brand Management	
MKTG-778	Commercialization and Marketing of New Products	
	Graduate Electives†	6
Total Semester Credit Hours		**30**

* Students enrolled in Applied Venture Creation (MGMT-765) may work on their own project in the course or they may work on a project in conjunction with Venture Creations, RIT's business incubator.
† Graduate electives taken at RIT may be in courses outside the Saunders College.

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume,
- Submit an essay,*
- Complete a graduate application, and
- Submit the results of the Graduate Management Admission Test† (GMAT) or Graduate Record Exam (GRE). (GRE scores more than five years old will not be accepted.)

* Applicants are required to submit an essay based on one of the following topics: (1) Describe an ethical dilemma you have faced and how you resolved it; (2) Explain what you have learned from a managerial, leadership, or team experience that was not completely successfully; or (3) Describe your greatest professional achievement and how you added value to your organization. The essay should be typed, double-spaced, and two pages in length.
† The GMAT may be waived if an applicant has a GPA of 3.25 or higher, or they can present evidence of professional work experience of six or more years. Students who cannot submit a GMAT, GRE, or one of the two waiver requirements may be considered for admission on a case by case basis.

Finance, MS

saunders.rit.edu/graduate/ms_finance.php

Program overview

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

Plan of study

The program of study consists of 10 courses and a field exam. Candidates must successfully complete the comprehensive field exam.

Curriculum

Finance, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ACCT-603	Accounting for Decision Makers	3
FINC-721	Financial Analysis for Managers	3
FINC-725	Securities and Investment Analysis	3
FINC-760	Finance in a Global Environment	3
FINC-722	Financial Management II	3
FINC-740	Options and Futures	3
FINC-742	Financial Modeling and Analysis	3
	One 700-level Statistics Course	3
	One 700-level Economics Course	3
	One 700-level Finance Course	3
FINC-790	Field Exam	1
Total Semester Credit Hours		**31**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE) (GMAT preferred for international applicants and those applying for scholarships),
- Submit a personal statement,
- Submit a current resume, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 580 (paper-based) or 92 (Internet-based) are required. Scores from the International English Language Testing System (IELTS) are accepted in place of the TOEFL exam. The minimum acceptable score is 7.0. The TOEFL or IELTS requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions. For additional information on the IELTS, visit www.ielts.org.

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

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

Management, MS

saunders.rit.edu/graduate/ms_management.php

Program overview

The master of science in management is designed for students who have a liberal arts, science, or technology background and who have little to no experience in business management. The 12-month program provides students with a solid foundation in business expertise while offering a specialization in one of the following tracks: global management and supply chain management, product and service development, or leadership.

Tracks

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

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

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

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

Plan of study

The program consists of 30 semester credit hours, plus a graduate project or comprehensive exam. Students selecting a graduate project should use one of their electives to enroll in MGMT-791 in the spring or summer term.

Curriculum

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

COURSE		SEMESTER CREDIT HOURS
MGMT-740	Organizational Behavior and Leadership	3
MGMT-735	Managing of Innovation in Products and Services	3
MGMT-755	Negotiations	3
MGMT-775	Corporate Social Responsibility and Business Ethics	3
INTB-710	Global Business Opportunities and Threats	3
DECS-743	Operations and Supply Chain Management	3
INTB-780	Global Issues and Strategies	3
	Business Electives	6
	Track Elective	3
Total Semester Credit Hours		**30**

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

COURSE		SEMESTER CREDIT HOURS
MGMT-740	Organizational Behavior and Leadership	3
MGMT-735	Managing of Innovation in Products and Services	3
MGMT-755	Negotiations	3
MGMT-775	Corporate Social Responsibility and Business Ethics	3
MGMT-741	Managing Organizational Change	3
MGMT-763	Behavioral Skills for Managers and Professionals	3
	Track Elective	3
	Business Electives	6
	Free Elective	3
Total Semester Credit Hours		**30**

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

COURSE		SEMESTER CREDIT HOURS
MGMT-740	Organizational Behavior and Leadership	3
MGMT-735	Managing of Innovation in Products and Services	3
MGMT-755	Negotiations	3
MGMT-775	Corporate Social Responsibility and Business Ethics	3
MGMT-720	Entrepreneurship and New Venture Creation	3
MGMT-743	Advanced Topics in Technology Management	3
	Track Elective	3
	Business Electives	6
	Free Elective	3
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume,
- Submit an essay,*
- Complete a graduate application, and
- Submit the results of the Graduate Management Admission Test† (GMAT) or Graduate Record Exam (GRE). (GRE scores more than five years old will not be accepted.)

* Applicants are required to submit an essay based on one of the following topics: (1) Describe an ethical dilemma you have faced and how you resolved it; (2) Explain what you have learned from a managerial, leadership, or team experience that was not completely successfully; or (3) Describe your greatest professional achievement and how you added value to your organization. The essay should be typed, double-spaced, and two pages in length.

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

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

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

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

Accounting

William H. Dresnack, BS, Long Island University; MS, Binghamton University; JD, University of Buffalo—Department Chair; Professor

William T. Evans, BS, Rensselaer Polytechnic Institute; MBA, University of Rochester—Senior Lecturer

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

Roberta L. Klein, BS, State University College at Brockport; MBA, Rochester Institute of Technology; CPA, New York—Lecturer

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

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

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

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

Decision Science

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

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

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

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

Finance and Economics

William H. Dresnack, BS, Long Island University; MS, Binghamton University; JD, University of Buffalo—Department Chair; Professor

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

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

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

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

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

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

Management and International Business

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

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

Clyde E. Hull, BA, Yale University; MB, MBA, Ph.D., Indiana University—Associate Professor

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

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

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

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

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

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

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

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

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

Management Information Systems

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

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

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

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

Yang Yu, BS, MS, Ph.D., Beijing University of Aeronautics & Astronautics (China); Ph.D., Texas Tech University—Assistant Professor

Marketing

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

Robert B. Boehner, BA, MA, Siena College; JD, University of North Carolina at Chapel Hill—Senior Lecturer

Adriana M. Bóveda-Lambie, BS, University of Maryland at College Park; MA, University of Texas at Austin; Ph.D., University of Rhode Island—Assistant Professor

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

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

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

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

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

Joseph C. Miller, BA, Grand Valley State University; MBA, Wayne State University; Ph.D., Michigan State University—Assistant Professor

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

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

B. Thomas Golisano College of Computing and Information Sciences

Anne R. Haake, Dean
rit.edu/gccis

Programs of Study

Online learning option available.

The B. Thomas Golisano College of Computing and Information Sciences is one of the most comprehensive computing colleges in the United States. The college offers 16 baccalaureate and master's degrees in a variety of computing disciplines, as well as a doctorate in computing and information sciences. With its focus on interdepartmental and intercollege cooperation, the college directs its energy and effort toward discovering new, innovative methods and research opportunities in solving complex, present-day and future computing challenges.

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

Admission requirements

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

Financial aid and scholarships

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

Faculty

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

Research

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

Facilities

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

The College's dedicated Security Lab is isolated from the rest of the campus's networks to allow the in-depth study of viruses, firewalls, and other computer vulnerabilities. Additional labs include an Entertainment Lab for 3D modeling, game and interactive media development; a Mobile Computing and Robotics Lab for the research and development of portable devices; and an Artificial Intelligence lab dedicated to the understanding of human reactions and processing.

Study options

Courses are available during the day and evening, allowing for full- or part-time study. Several master's degrees and advanced certificate programs are available online. Please refer to each individual program for more information.

Big Data Analytics, Adv. Cert.

rit.edu/gccis/advanced-certificate-big-data-analytics
Hans-Peter Bischof, Graduate Program Coordinator
(585) 475-5568, hpb@cs.rit.edu

Program overview

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

Plan of study

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

Curriculum

Big data analytics, advanced certificate, typical course sequence

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

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

Admission requirements

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

- Hold a baccalaureate degree in science, computing, engineering, or related majors from an accredited college or university;
- Have a minimum GPA of 3.0;
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work;
- Have acceptable college level credit or practical experience in probability and statistics, computer programming in a high-level language, and database systems; and
- Complete a graduate application.

Additional information

Study options

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

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/big_data.

Computer Science, MS

cs.rit.edu/

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

Program overview

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

The degree is offered on a full- or part-time basis. Courses are generally offered in the afternoons and evenings to accommodate part-time students. Full-time students take three or four courses per semester and may be able to complete the course work in three semesters. Full-time students who are required to take additional bridge courses may be able to complete the course work in four semesters. Part-time students take one or two courses per semester and may be able to complete the course work in four to five semesters. The time required to complete a master's project is one semester, but can vary according to the student and the scope of the topic. Two semesters is typical.

Plan of study

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

Clusters

Students select three cluster courses from the following areas:

Computer graphics and visualization

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

Data manangement

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

Distributed systems

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

Intelligent systems

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

Languages and tools

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

Security

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

Theory

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

Electives

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

Master's thesis/project

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

Curriculum

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

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

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

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

Clusters

Computer graphics and visualization

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

* Required course.

Data manangement

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

* Required course.

Distributed systems

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

* Required course.

Intelligent systems

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

* Required course.

Languages and tools

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

* Required course.

Security

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

* Required course.

Theory

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

Admission requirements

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

- Hold a baccalaureate or equivalent degree from an accredited institution,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Record Exam,
- Have a minimum grade point average of 3.0 (B), and
- Complete a graduate application.
- International applicants, whose native language is not English, must submit scores from the Test of English as a Foreign Language. A minimum score of 570 (paper-based) or 88 (Internet-based) is required.

Prerequisites

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

Additional information

Bridge courses

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

Faculty

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

Facilities

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

- a graduate lab with more than 15 Mac's and a graduate library;
- specialized labs in graphics, computer vision, pattern recognition, security, database, and robotics; and
- six general purpose computing labs with more than 100 workstations running Linux, Windows, and OS X; plus campus-wide wireless access.

Maximum time limit

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

Computing and Information Sciences, Ph.D.

rit.edu/gccis/phd

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

Program overview

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

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

Cyberinfrastructure

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

Intra-disciplinary knowledge

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

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

Interaction refers to topics related to the combined action of two or more entities (human or computational) that affect one another and work together when facilitated by technology. It encompasses several subtopics relating to how people and technology interact and interface. Several common threads weave through all of these areas, many of which rely heavily and build upon foundations in the social and behavioral sciences with an emphasis on understanding human and social/organizational phenomena. To some extent, these fields follow an engineering approach to the design of interactions in which solutions are based on rules and principles derived from research and practice, but require analyses that go beyond the analytical approach. From this perspective, solutions can be measured and evaluated against goals and intended outcomes. However, while efficiency and effectiveness are often the watchwords of these fields in practice, this is also where science meets art in computing. Creative design and sensitivity to human needs and aesthetics are critical. Some of the specialties available in this area are human-computer interaction, computer-based instructional systems, and access technologies.

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

Interdisciplinary domains

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

Active research areas

Computing

- Algorithm and theory
- Communication and networking
- Computer vision and pattern recognition
- Database and data mining
- Graphics and visualization
- Grid and cloud computing
- Human-computer interaction
- Pervasive and Mobile Computing
- Programming languages
- Machine learning
- Security and cryptology
- Software engineering

Domain applications

- Access technology
- Biomedical computing
- Computational astrophysics
- Environmental informatics
- Green computing
- Imaging and image informatics

- Cognitive sciences
- Service sciences
- Social computing

Plan of study

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

Required courses

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

Electives

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

Dissertation and research

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

Assessments

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

1. Research potential assessment: qualifying exam

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

2. Thesis proposal defense: candidacy exam

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

3. Dissertation defense

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

Curriculum

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

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

Admission requirements

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

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

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

† Basic exam score; taken within last 5 years.

Interview

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

Additional information

Residency requirement

One year of full-time residency is required.

Transfer credit

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

Assistantships

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

Computing Security, MS

rit.edu/gccis/computingsecurity

Sumita Mishra, Graduate Program Director
(585) 475-2963, sumita.mishra@rit.edu

Program overview

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

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

Plan of study

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

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

Electives

Students are required to choose up to six technical electives.

Curriculum

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

COURSE		SEMESTER CREDIT HOURS
CSEC-601	Research Methods and Proposal Development	3
CSEC-603	Enterprise Security	3
CSEC-604	Cryptography and Authentication	3
	Technical Electives	15
CSEC-790	MS Thesis	6
Total Semester Credit Hours		**30**

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

COURSE		SEMESTER CREDIT HOURS
CSEC-601	Research Methods and Proposal Development	3
CSEC-603	Enterprise Security	3
CSEC-604	Cryptography and Authentication	3
	Technical Electives	18
CSEC-791	MS Project	3
Total Semester Credit Hours		**30**

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

COURSE		SEMESTER CREDIT HOURS
CSEC-601	Research Methods and Proposal Development	3
CSEC-603	Enterprise Security	3
CSEC-604	Cryptography and Authentication	3
	Technical Electives	18
CSEC-793	Capstone in Computing Security	3
Total Semester Credit Hours		**30**

Elective courses

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

Admission requirements

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

- Hold a baccalaureate degree in computing security, computer science, software engineering, information technology, networking, computer engineering, electrical engineering, applied mathematics, or computer engineering technology (exceptional students from other fields may be admitted on a contingent basis),
- Have a minimum grade point average equivalent to a 3.0/4.0,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a minimum of two recommendations from individuals who are well-qualified to assess the applicant's potential for success, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 570 (paper-based) or 88 (Internet-based) are required. Applicants who have completed undergraduate study at foreign universities must submit Graduate Record Examination (GRE) scores. GRE scores are also recommended for applicants whose undergraduate GPA is below 3.0.

Prerequisites

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

Bridge program

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

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

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

Additional information

Study options

Students may pursue the degree on a full-time basis, on-campus only.

Faculty

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

Maximum time limit

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

Game Design and Development, MS

igm.rit.edu/

David Schwartz, Director
(585) 475-5521, disvks@rit.edu
Jessica Bayliss, Associate Director
(585) 475-2507, jdbics@rit.edu

Program overview

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

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

Plan of study

The program's curriculum consists of required courses, a choice of five advanced electives, and a capstone experience.

Capstone experience

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

Curriculum

Game design and development, MS degree, typical course sequence

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

Advanced electives

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

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

Admission requirements

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

- Hold an undergraduate degree in a relevant field, such as information technology, computer science, software engineering, or computer graphics. Students with undergraduate degrees in related disciplines such as computer animation or human-computer interaction may be considered.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum GPA of 3.25 or a first-class international degree with distinction.
- Submission of a portfolio and/or scores from the Graduate Record Exam (GRE) is required. If you choose to submit a portfolio it should include evidence of individual and group projects (clearly marked as such) relevant to the area you wish to study within the degree program.
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 570 (paper-based) or 88 (Internet-based) is required. International applicants also are required to submit scores from the Graduate Record Exam (GRE).

Due to the cohort nature of the program, students are admitted in the fall semester only. Admission to the program is highly competitive. While GRE scores are not required for domestic students, students may submit scores to strengthen their application. Those applicants with a GPA below 3.25 are required to submit GRE scores.

Additional information

Prerequisites

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

Maximum time limit

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

Human-Computer Interaction, MS

hci.rit.edu/

Qi Yu, Graduate Program Director
(585) 475-6929, qyuvks@rit.edu

Program overview

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

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

Plan of study

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

Core courses

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

Electives

Student choose up to three electives, depending on which capstone option they choose to complete.

Program electives

Students will select two courses from the program electives list. In select cases, students can petition for approval to include a course complementray to the degree program as a program elective.

COURSE	
HCIN-660	Fundamentals of Instructional Technology
HCIN-661	Interactive Courseware
HCIN-700	Current Topics in HCI
HCIN-705	Topics in HCI for Biomedical Informatics
HCIN-715	Agent-based and Cognitive Modeling
HCIN-720	Designing User Experiences for Internet-enabled Devices
HCIN-722	Human Computer Interaction with Mobile Devices
HCIN-730	User-Centered Design Methods
HCIN-735	Collaboration, Technology, and the Human Experience
HCIN-794	MS HCI Capstone Proposal
ISTE-645	Foundations of Web Technologies I
ISTE-646	Foundations of Web Technologies II
ISTE-740	Geographic Information Science and Technology
ISTE-744	Thematic Cartography and Geographic Visualization
ISTE-772	Knowledge Discovery for Biomedical Informatics
PSYC-712	Graduate Cognition
PSYC-715	Graduate Perception

Application domain courses

To gain breadth in a technical area to which HCI concepts can be applied, students complete two courses in any of the following application domain areas. A special topics option is also available, with faculty approval, for individuals with interest in other HCI-related areas.

Thesis/Capstone project
Students may complete a thesis or capstone project. (Student who choose the capstone will complete one additional elective.) This experience is meant to be an empirical study of a HCI problem, which can be the development of a software product through user-centered design processes. The results are either published in a peer-reviewed journal or publicly disseminated in an appropriate professional venue.

Curriculum

Human-computer interaction (capstone project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIN-600	Research Methods	3
HCIN-610	Foundations of Human-Computer Interaction	3
HCIN-620	Information and Interaction Design	3
	Application Domain Courses	6
HCIN-630	Usability Testing*	3
HCIN-794	MS HCI Project Proposal	3
	Program Elective	3
Second Year		
	Program Elective	3
HCIN-795	MS HCI Project	3
Total Semester Credit Hours		**30**

Human-computer interaction (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIN-600	Research Methods	3
HCIN-610	Foundations of Human-Computer Interaction	3
HCIN-620	Information and Interaction Design	3
	Application Domain Courses	6
HCIN-630	Usability Testing	3
	Program Electives	6
Second Year		
HCIN-796	MS HCI Thesis	6
Total Semester Credit Hours		**30**

Application domain courses

eLearning technologies

COURSE	
HCIN-660	Fundamentals of Instructional Technology
HCIN-661	Interactive Courseware

Geographic information science and technology

COURSE	
ISTE-740	Geographic Information Science and Technology
ISTE-744	Thematic Cartography and Geographic Visualization

Smart device application design and development

COURSE	
HCIN-720	Designing User Experiences for Internet-enabled Devices
HCIN-722	Human Computer Interaction with Mobile Devices

Web development

COURSE	
ISTE-645	Foundations of Web Technologies I
ISTE-646	Foundations of Web Technologies II

Admission requirements

To be considered for admission to the MS program in human-computer interaction, candidates must fulfill the following requirements:

- Hold a baccalaureate (or equivalent) degree from a regionally accredited institution,
- Have a minimum cumulative GPA of 3.0* (B average),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Have prior study or professional experience in computing; however, study in other disciplines will be given consideration, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 570 (paper-based) or 88 (Internet-based) are required.
- Applicants with undergraduate degrees from foreign universities are required to submit GRE scores.

* Applicants with a GPA below 3.0 may be considered, but are required to submit standard Graduate Record Exam (GRE) scores.

Additional information

Prerequisites

The program requires strong technical and social science skills. Knowledge of quantitative statistical methodologies is important since students review research studies as well as analyze the results of their own usability evaluations. Students are also expected to have a solid background in computer programming. These competencies may be demonstrated by previous course work, technical certifications, or comparable work experience. Bridge courses are available to fulfill any gaps in an applicant's qualifications. Applicants will be made aware of any areas where additional course work may be necessary.

Maximum time limit

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

Online option

The program can be completed on campus or online.

Information Assurance, Adv. Cert.

csec.rit.edu/
Sumita Mishra, Graduate Program Director
(585) 475-2700, sumita.mishra@rit.edu

Program overview

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

Curriculum

Information assurance, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CSEC-744	Network Security	3
CSEC-603	Enterprise Security	3
CSEC-742	Computer System Security	3
CSEC-730	Advanced Computer Forensics	3
Total Semester Credit Hours		**12**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution.
- Knowledge of computing networking and system administration and introductory knowledge of computing security.
- Have a minimum grade point average of 3.0 (B average or a first class degree from a foreign university),
- Submit transcripts (in English) of all previously completed undergraduate and graduate course work, and
- Complete a graduate application.

While GRE scores are not required, they are strongly recommended for applicants with an undergraduate GPA that is lower than required. Relevant employment experience can strengthen a candidate's application for admission.

Additional information

Study options

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

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/informationassurance.

Information Sciences and Technologies, MS

it.rit.edu/
Qi Yu, Graduate Program Director
(585) 475-6929, qyuvks@rit.edu

Program overview

The Internet has brought a new kind of democracy where all information is created equal. No longer the sole province of experts and the traditional media, it has become grassroots, viral, and global. The sheer volume and lightning speed of information transfer has changed how the world communicates, educates, learns, and ultimately solves problems. As the Web and its related technologies evolve, users will need help in managing these new tools.

Graduate study in a computing discipline that only focuses on traditional computing approaches is not flexible enough to meet the needs of the real world. New hardware and software tools are continually introduced into the market. IT professionals must have a specific area of expertise as well as be adaptable and ready to tackle to the next new thing—or just as often, retrofit available technologies to help their users adapt to the latest trends. The MS in information sciences and technologies provides an opportunity for in-depth study to prepare for today's high-demand computing careers. Companies are drowning in data—structured, semi-structured, and unstructured. Big data is not just high transaction volumes; it is also data in various formats, with high velocity change, and increasing complexity. Information is gleaned from unstructured sources—such as Web traffic or social networks—as well as traditional ones; and information delivery must be immediate and on demand.

As the users' advocate, IT professionals also need the critical thinking skills to problem-solve in a wide variety of computing situations, combined with an understanding of the needs of their audience. Just knowing how technology works is no longer enough. Today, computing professionals need to know how to make it all work.

The information sciences and technologies program addresses the Web systems and integration technologies, and the information management and database technology pillars, of the IT academic discipline, along with the additional option of discovery informatics. A special topics option is available to support the creation of a customized area of study. The program is offered full- or part-time, on-campus only.

Plan of study

The program consists of 30 semester credit hours of graduate study and includes four core courses, four or five track or domain electives (depending upon capstone option chosen), and either a capstone experience, thesis, or project.

Track or domain electives

Students choose track or domain electives from the following tracks. With permission of the graduate program director, students may select the special topics track to fulfill the track or domain electives requirement. See the graduate program director for more information.

Capstone options

For their capstone experience, students may choose from three options that build upon their domain of study: course-based, project, or thesis. The course-based and project options are 3 credit hours each and require one additional 3 credit domain elective. The thesis option is 6 credit hours and does not require an additional track or domain elective.

Curriculum

Information sciences and technologies (capstone option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-605	Scholarship in Information Sciences and Technologies	3
ISTE-610	Knowledge Representation Technologies	3
ISTE-612	Knowledge Processing Technologies	3
ITSE-600	Analytical Thinking	3
	Track or Domain Electives	12
Second Year		
	Track Elective	3
ISTE-795	Capstone in Information Sciences and Technologies	3
Total Semester Credit Hours		**30**

Information sciences and technologies (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-605	Scholarship in Information Sciences and Technologies	3
ISTE-610	Knowledge Representation Technologies	3
ISTE-612	Knowledge Processing Technologies	3
ITSE-600	Analytical Thinking	3
	Track or Domain Electives	12
Second Year		
ISTE-790	Thesis in Information Sciences and Technologies	6
Total Semester Credit Hours		**30**

Information sciences and technologies (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-605	Scholarship in Information Sciences and Technologies	3
ISTE-610	Knowledge Representation Technologies	3
ISTE-612	Knowledge Processing Technologies	3
ITSE-600	Analytical Thinking	3
	Track or Domain Electives	12
Second Year		
	Track Elective	3
ISTE-791	Project in Information Sciences and Technologies	3
Total Semester Credit Hours		**30**

Track or domain electives

COURSE	
Discovery Informatics	
ISTE-724	Data Warehousing
ISTE-771	XML Programming
ISTE-782	Visual Analytics
Information Manangement and Database Technology	
ISTE-721	Information Assurance Fundamentals
ISTE-722	Database Connectivity and Access
ISTE-724	Data Warehousing
ISTE-726	Database Management and Access
ISTE-728	Database Performance and Tuning
Web Systems and Integration Technologies	
ISTE-721	Information Assurance Fundamentals
ISTE-754	Client Design and Development
ISTE-756	Server Design and Development
ISTE-759	Web Client Server Programming
ISTE-771	XML Programming

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have a minimum cumulative GPA of 3.0/4.0,
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work,
- Submit a resume,
- Submit two letters of recommendation, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 570 (paper-based) or 88 (Internet-based) are required. Applicants with a lower TOEFL score may be admitted conditionally and will be required to complete a prescribed program in English, along with a reduced program course load.

Applicants from foreign universities must submit Graduate Record Examination (GRE) scores. Scores from the GRE are strongly recommended for applicants whose undergraduate grade point average is less than 3.0.

Additional information

Prerequisites

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

Bridge program

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

Maximum time limit

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

Networking and System Administration, MS

nsa.rit.edu/

Qi Yu, Graduate Program Director
(585) 475-6929, qyuvks@rit.edu

Program overview

Trends in network communications–unifying wired and wireless infrastructures, Cloud computing, scalability, collaboration tools, and security–can only be coalesced into reliable communication services if there are highly educated and technically proficient networking and system administration professionals who understand both traditional and emerging communication technologies as well as how to apply these technologies to organizational needs and opportunities.

The explosion in ubiquitous computing today means an increased need for greater efficiency and for better management oversight in the provision of IT services. Network environments are not only becoming increasingly complex, there is a greater recognition of the power of information technology to be a strategic enabler of corporate growth and adaptation.

The master of science program in networking and system administration is designed to provide both the knowledge and the technical skills needed to successfully compete in this environment. It is uniquely focused to address current issues in networking and systems administration through investigation of both the theoretical and the practical aspects of this continually evolving field. Course work examines the organizational and technological issues involved in enterprise scale networking, including emerging network technologies, network processing, high performance computing, network programming, and security.

The program is intended to prepare graduates to assume leadership positions in for-profit and not-for-profit organizations dealing with evolving networking solutions or to continue their education through advanced degrees. It is available for full- and part-time study in both an online format as well as a traditional on-campus setting.

Plan of study

The program consists of two required core courses, a three-course knowledge domain sequence, up to four technical electives (depending upon the capstone option chosen), and a capstone thesis or project.

Electives

Students are required to choose up to four electives from the following choices.

Curriculum

Networking and system administration (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-605	Scholarship in Information Sciences and Technologies	3
NSSA-602	Enterprise Computing	3
NSSA-620	Emerging Computing and Network Technologies	3
NSSA-615	Advanced OOP for Networking and System Administration	3
NSSA-615	Advanced OOP Networking and Systems Administration	3
	Track or Domain Electives	6
Second Year		
	Track or Domain Elective	3
NSSA-714	Advanced Large Scale Computing	3
NSSA-790	MS Thesis	6
Total Semester Credit Hours		**30**

Networking and system administration (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISTE-605	Scholarship in Information Scineces and Technologies	3
NSSA-602	Enterprise Computing	3
NSSA-620	Emerging Computing and Network Technologies	3
NSSA-615	Advanced OOP for Networking and System Administration	3
	Track or Domain Electives	6
Second Year		
NSSA-714	Advanced Large Scale Computing	3
	Track or Domain Electives	6
NSSA-791	MS Project	3
Total Semester Credit Hours		**30**

Electives

COURSE	
NSSA-610	Advanced Wired Networking Concepts*
NSSA-611	Advanced Topics in Wireless Networks and Technologies*
NSSA-612	Network Modeling and Analysis*
NSSA-621	Design and Deployment of Wireless Networks
NSSA-710	Network Management
NSSA-712	Advanced Storeage Technologies
NSSA-713	Enterprise Service Provisioning
NSSA-715	Network Design and Performance
NSSA-716	Enterprise Mobile Computing
ISTE-721	Information Assurnce Fundamentals
ISTE-764	Project Management

* Students are required to complete at least one theoretical course. These electives have a theoretical focus.

Admission requirements

To be considered for admission to the MS program in networking and system administration, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited institution,
- Have a minimum cumulative grade point average of 3.0 (B)*,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit two professional recommendations, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 570 (paper-based) or 88 (Internet-based) are required. Applicants with a lower TOEFL score may be admitted conditionally, but will be required to complete a prescribed program in English preparation along with a reduced program course load. Applicants from foreign universities also must submit Graduate Record Examination (GRE) scores. Visa forms cannot be issued by RIT for part-time or distance education.

* The GRE is recommended for those applicant's whose undergraduate grade point average is less than 3.0.

Additional information

Bridge courses

Students must have solid backgrounds in computer programming (C++ required); networking and systems administration theory and practice; and statistics. Students whose undergraduate preparation or industrial experience does not satisfy these prerequisites can make up deficiencies through additional study. The graduate program director will make recommendations on prerequisite course work. Formal acceptance into the program may be possible even though the applicant must complete bridge courses.

Bridge courses are not part of the required curriculum for the master's degree. Grades for these courses are only included in the student's GPA if

courses are completed after matriculation. Bridge course work can be designed in a variety of ways. Other courses can be substituted, or courses at other colleges can be applied. Contact the graduate program director for more information.

Study options
This program may be completed on a full- or part-time basis, through on-campus instruction or via online learning. Full-time students may be able to complete the program in two years; part-time students may take approximately four years.

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

Networking, Planning and Design, Adv. Cert.

ist.rit.edu/
Qi Yu, Graduate Program Director
(585) 475-6929, qyuvks@rit.edu

Program overview

The advanced certificate in networking, planning and design provides the knowledge and expertise needed to seek careers that require foundation knowledge of enterprise network architectures and administration, emerging network technologies, the network design process, and project management. Students completing this certificate are able to design and implement plans for sophisticated network design projects; understand and work with emerging technologies in networking and system administration; and develop, test, and implement a network model that simulates the performance of an enterprise scale network.

Plan of study
The program consists of four courses, all of which may be later applied to the MS in networking and system administration.

Curriculum

Networking, planning and design, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
NSSA-602	Enterprise Computing	3
DECS-744	Project Management	3
NSSA-620	Emerging Computing and Networking Technologies	3
NSSA-715	Network Design and Performance	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in networking, planning and design, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited institution with course work or extensive work experience in networking, systems administration, and programming in C++; experience in OS scripting (Perl preferred) is beneficial,
- Have a minimum grade point average of 3.0 (B average or a first class degree from a foreign university),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work, and
- Complete a graduate application.

While GRE scores are not required, they are strongly recommended for applicants seeking admission whose undergraduate GPA does not meet the minimum requirement. Relevant work experience can also strengthen a candidate's application for admission.

Additional information

Study options
This certificate is intended for part-time study; therefore, RIT cannot issue I-20 paperwork. International students may study part-time through online learning. Courses are available both on campus and online.

Gainful employment
Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/networkplandesign/.

Software Engineering, MS

se.rit.edu/grad
J. Scott Hawker, Graduate Program Director
(585) 475-2705, jshvse@rit.edu

Program overview

The master of science in software engineering is designed to attract professionals with a formal undergraduate background in software engineering, computer science, or computer engineering and at least one year of professional experience. The program's core content ensures that graduates will possess both breadth and depth of knowledge in software engineering. Specialization tracks in software quality and design provide students with the opportunity to match their graduate education with their professional goals.

Plan of study

The program comprises 36 semester credit hours, anchored by either a thesis or a capstone project.

Curriculum

Software engineering (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SWEN-610	Foundations of Software Engineering	3
SWEN-745	Software Modeling	3
	Elective	3
SWEN-722	Process Engineering	3
SWEN-749	Software Evolution and Re-engineering	3
	Elective	3
Second Year		
SWEN-772	Software Quality Engineering	3
SWEN-755	Software Architectures and Product Lines	3
SWEN-799	Independent Study	3
SWEN-790	Thesis	6
SWEN-640	Research Methods	3
Total Semester Credit Hours		**36**

Software engineering (capstone option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SWEN-610	Foundations of Software Engineering	3
SWEN-745	Software Modeling	3
	Elective	3
SWEN-722	Process Engineering	3
SWEN-749	Software Evolution and Re-engineering	3
	Elective	3
Second Year		
SWEN-772	Software Quality Engineering	3
SWEN-755	Software Architectures and Product Lines	3
	Electives	3
SWEN-640	Research Methods	3
SWEN-780	Capstone Research Project	6
Total Semester Credit Hours		**36**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have a cumulative grade point average of 3.0 or higher (Prospective students from institutions that do not use the GPA scale are expected to demonstrate an equivalent level of academic accomplishment. Formal academic background in software engineering, computer science, or computer engineering is a plus.),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a professional essay (1-4 pages) describing current job (if applicable), relevant experience, and career plans,
- Submit a current resume (including descriptions of significant software projects in which the candidate participated),
- Submit two letters of recommendation, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 570 (paper-based) or 88 (Internet-based) are required. International applicants must provide Graduate Record Exam (GRE) scores. Domestic students are encouraged to provide GRE scores.

Professional experience developing software is preferred, but candidates without a background in computing will be considered. Additional bridge course work will be required, and may extend time to graduation.

Additional information

Bridge courses

Based on the evaluation of academic and relevant experience, the graduate program director may require some applicants to successfully complete bridge courses to fill in any gaps in their background. Successful completion of bridge courses is necessary for registration in graduate-level courses.

Web Development, Adv. Cert.

ist.rit.edu/

Qi Yu, Graduate Program Director
(585) 475-6929, qyuvks@rit.edu

Program overview

As interactive technologies advance, the ways in which we communicate change—and the importance of enhancing the communication experience within electronic environments increases. The advanced certificate in web development provides an opportunity for students to gain firsthand knowledge and expertise in the art and science of interactive multimedia design.

Plan of study

In this certificate, students explore the theories of interactive computing, fundamentals of interactive design, web and multimedia programming, and the impact of networked technologies in web communications. Projects include the development of websites and interactive multimedia applications. Students have at their disposal a variety of computer, video, and digitizing equipment in our state-of-the-art interactive media laboratories.

Curriculum

Web development, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIN-610	Foundations of HCI	3
ISTE-645	Foundations of Web Technologies I	3
ISTE-646	Foundations of Web Technologies II	3
HCIN-636	Interactive Programming	3
Total Semester Credit Hours		**12**

Admission requirements

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

- Hold a baccalaureate (or equivalent) degree from an accredited institution,
- Have a minimum cumulative GPA of 3.0 (B average) or equivalent,
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work,
- Submit a resume,
- Complete a personal statement,
- Submit two professional recommendations, and
- Complete a graduate application.

Additional information

Prerequisites

Due to continuing advances in the technologies used for interactive multimedia, knowledge of programming is necessary in this field. Students must have object-oriented programming skills equivalent to one year of study. Bridge courses are available to complete any requirements missing from the applicant's credentials.

Study options

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

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/webdevelopment.

Anne R. Haake, BA, Colgate University; MS, Rochester Institute of Technology; MS, Ph.D., University of South Carolina—Dean; Professor

Michael A. Yacci, BS, Ithaca College; MS, Rochester Institute of Technology; Ph.D., Syracuse University—Associate Dean for Academic Affairs; Professor

Pengcheng Shi, BS, Shanghai Jiao Tong University (China); MS, M.Phil, Ph.D., Yale University—Doctorate Program Director; Professor; Associate Dean for Research & Scholarship

Computer Science

Mohan Kumar, BE, Bangalore University (India); MTech, Ph.D., Indian Insitute of Science (India)—Department Chair; Professor

Peter G. Anderson, BS, Ph.D., Massachusetts Institute of Technology—Professor Emeritus

Reynold Bailey, BS, Midwestern State University; MS, Ph.D., Washington University—Associate Professor

Ivona Bezakova, BS, Comenius University (Slovakia); Ph.D., University of Chicago—Associate Professor

Hans-Peter Bischof, BS, MS, University of Ulm (Germany); Ph.D., University of Osnabrück (Germany)—Graduate Program Director; Professor

Zack Butler, BS, Alfred University; Ph.D., Carnegie Mellon University—Associate Professor

Warren Carithers, BS, MS, University of Kansas—Associate Professor

Henry Etlinger, BS, University of Rochester; MS, Syracuse University—Undergraduate Program Coordinator; Associate Professor

Matthew Fluet, BS, Harvey Mudd College; Ph.D., Cornell University—Associate Professor

Roger S. Gaborski, BS, MS, State University of New York at Buffalo; Ph.D., University of Maryland—Professor

Joe Geigel, BS, Manhattan College; MS, Stevens Institute of Technology; Ph.D., George Washington University—Professor

James Heliotis, BS, Cornell University; Ph.D., University of Rochester—Professor

Edith Hemaspaandra, BS, MS, Ph.D., University of Amsterdam (Netherlands)—Professor

Chris Homan, AB, Cornell University; MS, Ph.D., University of Rochester—Associate Professor

Trudy Howles, BS, MS, Rochester Institute of Technology; Ph.D., Nova Southwestern University—Professor

Alan Kaminsky, BS, Lehigh University; MS, University of Michigan—Professor

Fereydoun Kazemian, BS, Queen Mary College; MS, Pittsburgh State University; Ph.D., Kansas State University—Associate Professor

Mineseok Kwon, BS, MS, Seoul National University (South Korea); Ph.D., Purdue University—Associate Professor

Xumin Liu, BE, Dalian University (China); ME, Jinan University (China); Ph.D., Virginia Polytechnic Institute—Associate Professor

Wiley McKinzie, BA, University of Wichita; MS, State University of New York at Buffalo—Professor Emeritus

Stanislaw Radziszowski, MS, Ph.D., University of Warsaw (Poland)—Professor

Rajendra K. Raj, BS, Indian Institute of Technology (India); MS, University of Tennessee; MS, Ph.D., University of Washington—Professor

Leonid Reznik, MS, St. Petersburg Aircraft Academy; Ph.D., St. Petersburg Polytechnic Institute—Professor

Carol Romanowski, BS, MS, Ph.D., University of Buffalo—Associate Professor

Paul Tymann, BS, MS, Syracuse University—Professor

Walter A. Wolf, BA, Wesleyan University; MS, Rochester Institute of Technology; MA, Ph.D., Brandeis University—Professor Emeritus

Richard Zanibbi, BA, MS, Ph.D., Queens University (Canada)—Associate Professor

Computing Security

Bo Yuan, BS, MS, Shanghai Normal University (China); Ph.D., State University of New York at Binghamton—Department Chair, Associate Professor

Jayalaxmi Chakravarthy, BS, State University College at Brockport; MS, University of Albany; MS, Nova Southeastern University—Lecturer

Daryl Johnson, BS, St. John Fisher College; MS, Rochester Institute of Technology—Associate Professor

Sumita Mishra, BS, Patna University (India); BS, Ph.D., State University of New York at Buffalo—Associate Professor

Yin Pan, BS, MS, Shanghai Normal University (China); MS, Ph.D., State University of New York at Binghamton—Professor

Chaim Sanders, BS, MS, Rochester Institute of Technology—Lecturer

William Stackpole, BS, Roberts Wesleyan College; MS, Rochester Institute of Technology—Professor

Jonathan Weissman, BS, College of Staten Island; MA, Brooklyn College—Lecturer

Information Sciences and Technologies

Stephen Zilora, BS, University of Rochester; MS, New Jersey Institute of Technology—Department Chair; Associate Professor

Daniel Ashbrook, BS, MS, Ph.D., Georgia Institute of Technology—Assistant Professor

Catherine I. Beaton, BA, BEd, MITE, Dalhousie University (Canada)—Associate Professor

Daniel S. Bogaard, BFA, Indiana University; MS, Rochester Institute of Technology—Undergraduate Program Director; Associate Professor

Charles B. Border, BA, State University College at Plattsburgh; MBA, Ph.D., State University of New York at Buffalo—Associate Professor

Michael Floeser, AAS, BS, MS, Rochester Institute of Technology—Senior Lecturer

Vicki Hanson, BA, University of Colorado; MA, Ph.D., University of Oregon—Distinguished Professor

Bruce H. Hartpence, BS, MS, Rochester Institute of Technology—Professor

Matt Huenerfauth, MS, University of Delaware; MSc, University College Dublin (Ireland); Ph.D., University of Pennsylvania—Associate Professor

Lawrence Hill, BS, MS, Rochester Institute of Technology—Associate Professor

Edward Holden, BA, State University College at Oswego; MBA, Rochester Institute of Technology—Associate Professor

Jai Kang, BS, Seoul National University (South Korea); MA, Kent State University; MS, Georgia Institute of Technology; Ph.D., State University of New York at Buffalo—Associate Professor

Daniel Kennedy, BS, MS, Rochester Institute of Technology—Lecturer

Jeffrey A. Lasky, BBA, MBA, City College of New York; MS, University of Minnesota—Professor

Jim Leone, BS, University of Cincinnati; MA, Ph.D., Johns Hopkins University—Professor

Peter Lutz, BS, St. John Fisher College; MS, Ph.D., State University of New York at Buffalo—Professor

Sharon P. Mason, BS, Ithaca College; MS, Rochester Institute of Technology—Professor

Michael McQuaid, BFA, New York University; MBA, MS, University of Wisconsin; Ph.D., University of Arizona—Lecturer

Tae (Tom) Oh, BS, Texas Tech University; MS, Ph.D., Southern Methodist University—Associate Professor

Sylvia Perez-Hardy, BS, MBA, Cornell University—Associate Professor

Evelyn P. Rozanski, BS, State University College at Brockport; MS, Syracuse University; Ph.D., State University of New York at Buffalo—Professor Emeritus

Nirmala Shenoy, BE, ME, University of Madras (India); Ph.D., University of Bremen (Germany)—Professor

Brian Tomaszewski, BA, University at Albany; MA, State University of New York at Buffalo; Ph.D., Pennsylvania State University—Associate Professor

Ronald P. Vullo, BS, LeMoyne College; Ed.M., Ph.D., University at Buffalo—Associate Professor

Elissa M. Weeden, BS, MS, Rochester Institute of Technology—Associate Professor

Qi Yu, BE, Zhejiang University (China); MS, National University of Singapore (Singapore); Ph.D., Virginia Polytechnic Institute—Associate Professor

Interactive Games and Media

David I. Schwartz, BS, MS, Ph.D., University of Buffalo—Director; Associate Professor

Jessica Bayliss, BS, California State University at Fresno; MS, Ph.D., University of Rochester—Associate Director; Associate Professor

Kevin Bierre, BA, State University College at Geneseo; MS, Cornell University and Rochester Institute of Technology—Associate Professor

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

Sean Boyle, BS, MS, Rochester Institute of Technology—Lecturer

Nancy Doubleday, BS, MS, Rochester Institute of Technology—Associate Professor

Chris Egert, BS, MS, Rochester Institute of Technology; Ph.D., University at Buffalo—Associate Professor

Gordon Goodman, BS, State University of New York at Binghamton; MS (computer science), MS (information technology), Rochester Institute of Technology—Professor

W. Michelle Harris, BS, Carnegie Mellon University; MPS, New York University—Associate Professor

Tona Henderson, BS, Southwest Missouri State University; MS, University of Missouri—Associate Professor

Jay Alan Jackson, BS, MS, Ph.D., Florida State University—Associate Professor

Stephen Jacobs, BA, MA, New School for Social Research—Professor

Anthony Jefferson, BS, State University College at Oswego; MS, Rochester Institute of Technology—Senior Lecturer

Elizabeth Lane Lawley, AB, MLS, University of Michigan; Ph.D., University of Alabama—Professor

Elouise Oyzon, BFA, MFA, Rochester Institute of Technology—Associate Professor

Andrew Phelps, BFA, Bowling Green State University; MS, Rochester Institute of Technology—Professor

David Simkins, BA, Earlham College; MS, Ph.D., University of Wisconsin-Madison—Assistant Professor

Software Engineering

Naveen Sharma, MS, Indian Institutes of Sciences (India); Ph.D., Kent State University—Department Chair; Professor

Yasmine El-Glaly, BSc, Faculty of Computers and Informatics (Egypt); MSc, Ain Shams University (Egypt); Ph.D., Virginia Polytechnic Institute and State University—Visiting Lecturer

J. Scott Hawker, BS, MS, Texas Tech University; Ph.D., Lehigh University—Graduate Program Director; Associate Professor

Jeffrey Jockel, BS, USNA, MS, Stevens Institute of Technology; MBA, University of Baltimore—Visiting Lecturer

Daniel Krutz, BS, St. John Fisher College, MS, Rochester Institute of Technology; Ph.D., Nova Southeastern University—Lecturer

Andrew Meneely, BA, Calvin College; Ph.D., North Carolina State University—Assistant Professor

Mehdi Mirakhorli, BS, Teacher Training University (Iran); MS, National University (Iran); Ph.D., DePaul University—Assistant Professor

Meiyappan Nagappan, BE, Amma University (India); MS, Ph.D., North Carolina State University—Assistant Professor

Thomas Reichlmayr, BS, MS, Rochester Institute of Technology—Associate Professor

James Vallino, BE, The Cooper Union; MS, University of Wisconsin; Ph.D., University of Rochester—Professor

Computing and Information Sciences

Pengcheng Shi, BS, Shanghai Jiao Tong University (China); MS, M.Phil., Ph.D., Yale University—Doctorate Program Director; Professor; Associate Dean for Research and Scholarship

Linwei Wang, BS, Zhejiang University (China); M.Phil., Hong Kong University of Science and Technology (Hong Kong); Ph.D., Rochester Institute of Technology—Assistant Professor

Kate Gleason College of Engineering

Doreen Edwards, Dean
rit.edu/kgcoe

Programs of Study

Online learning option available.

The Kate Gleason College of Engineering offers comprehensive, innovative graduate programs in a broad range of engineering disciplines. Programs include master of science degrees, master of engineering degrees, advanced certificates, and broad-based, cross-disciplinary doctoral programs in engineering and microsystems engineering. In conjunction with the College of Science, the Kate Gleason College offers an interdisciplinary MS degree in materials science and engineering.

The doctorate program in engineering prepares the next generation of engineering leaders to tackle some of the most daunting and complex problems facing our society. This program provides an original approach to engineering doctoral education, resulting in graduates who are prepared equally well for careers in industry as well as academia. The doctorate program in microsystems engineering builds on the fundamentals of traditional engineering and science combined with curriculum and research activities addressing the numerous technical challenges of micro- and nanosystems. This program provides a foundation to explore future technology through research in nano-engineering, design methods, and technologies and their integration into micro- and nano-scaled systems.

The master of science degree programs in the Kate Gleason College include extensive course work and an individual research experience to prepare graduates for employment in industry or graduate study at the doctoral level. The master of engineering degree programs are generally considered to be terminal degrees, focused on preparing graduates for technical and leadership careers in industry. A capstone experience combined with additional course work replaces the traditional thesis requirement.

Details on specific programs, including courses, research activities, thesis requirements, and assistantships, are outlined in this *Graduate Bulletin* as well as on the college and program websites.

Admission requirements

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

Financial aid and scholarships

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

Faculty

The college's faculty are committed to continuous learning and professional growth, and most are actively engaged in fundamental and/or applied research projects to extend the boundaries of knowledge within their discipline. A key characteristic of graduate study in the Kate Gleason College is the close working relationship between the faculty and graduate students on research, thesis, and graduate project work. Each graduate student is assigned a

faculty adviser who supervises the student's progress toward degree completion and guides the student in achieving their educational goals.

Facilities

The college provides students with access to over ninety state-of-the-art laboratories and computing facilities supporting a broad range of specializations, including machine tools and manufacturing, 3D printing, ergonomics, advanced systems integration, production systems, materials processing, biofluids, fuel cells, thermal analysis, robotics, electronics, microchip fabrication (clean room), VLSI, embedded systems, hardware design, analog devices, laserand optics, electromagnetics, computer architecture, and digital design, to name a few. Close corporate partnerships provide the college with access to current software and equipment used in industry.

Research

Engineering faculty are active in numerous research areas, which often take place across engineering disciplines and involves other RIT colleges, local health care institutions, and major industry partners.

Much of the research is inspired by the broad-based challenges within four key application domains that will have a transformational impact on our society in the coming decades: transportation, energy, communications, and health care. Graduate students and faculty members collaborate on research projects inspired by these application domains and contribute to solving daunting problems of national and global importance.

Our faculty members bring substantial expertise from a broad range of technology domains to tackle these fundamental and applied research problems. Technology strengths of faculty include nano-science and engineering; signal and image processing; high-performance and power-aware computing; access and assistive technologies; simulation, modeling and optimization; manufacturing and materials science, safety and security, heat transfer and thermo-fluids, and robotics and mechatronics.

A sampling of current research includes 3D printing and additive manufacturing, autonomous vehicles and robotics, bio-inspired computing systems, resilient and secure systems design, industry ergonomics and human performance, optics and photonics, micro-machines, water treatment and purification, signal and image processing, cardiovascular biomechanics, robotics and control, VLSI design, electron beam lithography, computer architecture, multimedia information systems, object-oriented software development, big data analytics, industrial statistics and more.

Externally sponsored projects are a vital and integral component of RIT's educational and research activities. These projects add to the body of knowledge, enhance professional development, and strengthen academic programs. Sponsored projects enhance the university's academic programs, broaden its research resources, provide opportunities for student participation in research, strengthen university-industrial partnerships, and serve the wider community. RIT's major public sponsors include the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Energy (DOE), the Department of Defense (DOD and DARPA), the Department of Education (USDE), the National Aeronautics and Science Administration (NASA), and New York State.

Study options

Students may matriculate on either a full- or part-time basis.

Full-time study: Students may matriculate on either a full- or part-time basis. A full-time student will generally take between 9 and 15 credits per semester, depending upon their research or graduate project activity, and can complete the requirements for a master's degree in one calendar year. A full-time student in a master of engineering degree program may choose to alternate academic semesters with an internship (if applicable).

Part-time study: The college encourages practicing engineers in the greater Rochester industrial community to pursue a program of study leading to the master of science or master of engineering degree while maintaining full-time employment. To facilitate this, many of the courses are scheduled in the late afternoon or early evening. Students employed full-time are limited to a maximum of two courses or 6 semester credits per semester. A student who wishes to register for more than 6 semester credits must obtain the approval of his or her adviser and the department head.

Nonmatriculated status: Individuals may take graduate courses as a nonmatriculated student if they have a bachelor's degree from an approved undergraduate school and the necessary background for the specific courses in which they wish to enroll. The courses taken for credit usually can be applied toward the master's degree when the student is formally admitted to the graduate program at a later date. However, the number of credits that will be transferred to the degree program from courses taken at RIT as a nonmatriculated student is normally limited to a maximum of 9 semester credits.

Computer Engineering, MS

rit.edu/kgcoe/area-of-study/ms-computer-engineering
Shanchieh Jay Yang, Department Head
(585) 475-2987, jay.yang@rit.edu
Dhireesha Kudithipudi, Graduate Coordinator
(585) 475-5085, dxkeec@rit.edu

Program overview

Program Overview

The master of science degree in computer engineering provides students with a high level of specialized knowledge in computer engineering, strengthening their ability to successfully formulate solutions to current technical problems, and offers a significant independent learning experience in preparation for further graduate study or for continuing professional development at the leading edge of the discipline. The program accommodates applicants with undergraduate degrees in computer engineering or related programs such as electrical engineering or computer science. (Some additional bridge courses may be required for applicants from undergraduate degrees outside of computer engineering.)

Plan of study

The degree requires 30 semester credit hours and includes Analytical Topics in Computer Engineering (CMPE-610), two core courses, four graduate electives, two semesters of graduate seminar, and the option of completing either a thesis research or a graduate project. The core courses and graduate electives provide breadth and depth of knowledge. The Computer Engineering Graduate Seminar (CMPE-795) provides students with exposure to a variety of topics presented by researchers from within RIT, industry, and other universities, and guides students to choose either a thesis or project as their culminating experience. The Project/Thesis Initiation Seminar (CMPE-796) guides students to complete their thesis proposal or project execution plan with their faculty adviser.

Students who pursue the thesis option complete nine semester credit hours of thesis research (CMPE-790) to conduct research with a faculty adviser to answer a fundamental science/engineering question that contributes to new knowledge in the field. Students are expected to formulate the problem under the faculty adviser's guidance and conduct extensive quantitative or qualitative analyses with sound methodology. Research findings should be repeatable and generalizable, with sufficient quality to make them publishable in technical conferences and/or journals.

Students who pursue the project option take six semester credits of graduate electives directly related to their project deliverables and three semester credits of Graduate Project (CMPE-792) to professionally execute a project under the supervision of a faculty adviser. The project generally addresses an immediate and practical problem, a scholarly undertaking that can have tangible outcomes, where students are expected to give a presentation or demonstration of the final deliverables of the project.

Research tracks/Graduate electives

Students may select four graduate electives from within the following research tracks. Students are encouraged to choose most of their graduate electives within a single research track. At least two of the electives must be from the computer engineering department (computer engineering department courses begin with the prefix CMPE). Courses outside the lists below may be considered with approval from the department of computer engineering. Research tracks are available in the following areas:

Computer architecture

Computer architecture deals with hardware resource management, instruction set architectures and their close connection with the underlying hardware, and the interconnection and communication of those hardware components. Some of the current computer architecture challenges that are being tackled in the computer engineering department include energy efficient architectures, high performance architectures, graphic processing units (GPUs), reconfigurable hardware, chip multiprocessors, and Networks-on-Chips.

Computer vision and machine intelligence

Visual information is ubiquitous and ever more important for applications such as robotics, health care, human-computer interaction, biometrics, surveillance, games, entertainment, transportation, and commerce. Computer vision focuses on extracting information from image and video data for modeling, interpretation, detection, tracking, and recognition. Machine intelligence methods deal with human-machine interaction, artificial intelligence, agent reasoning, and robotics. Algorithm development for these areas spans image processing, pattern recognition, and machine learning, and is intimately related to system design and hardware implementations.

Integrated circuits and systems

Modern processors demand high computational density, small form factors, and low energy dissipation with extremely high performance demands. This is enabled by the nanoscale and heterogeneous integration of transistors and other emerging devices at the massive-scale. Such nanocomputers open unimaginable opportunities as well as challenges to computer engineers. This research focuses on designing computers with emerging novel technologies in the presence of severe physical constraints; investigating dynamic reconfigurability to exploit the power of nano-scale electronics for building reliable computing systems; and studying the applicability of emerging technologies to address challenges in computing hardware of the future.

Networks and security

The prevalence of interconnected computing, sensing, and actuating devices have transformed our way of life. Ubiquitous access to data using/from these devices with reliable performance as well as security assurance presents exciting challenges for engineers and scientists. Resilient to environmental uncertainty, system failures, and cyber attacks requires advances in hardware, software, and networking techniques. The research track in networks and security focuses on intelligent wireless and sensor networks, cryptographic engineering, and predictive cyber situation awareness.

Signal processing, control and embedded systems

This research area is concerned with algorithms and devices used at the core of systems that interact with our physical world. As such, this area considers the sensing, analysis, and modeling of dynamic systems with the intent of measuring information about a system, communicating this information, and processing it to adapt its behavior. Application areas are robust feedback-based control where uncertainty in the dynamics and environment must be considered during the design process and signal processing algorithms and devices for system sensing and adaptation.

Additional graduate-level math courses

Additional math courses also may be used as electives. Students must consult with their adviser and obtain department approval for using these or other graduate-level math courses towards electives.

Curriculum

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

COURSE		SEMESTER CREDIT HOURS
First Year		
CMPE-610	Analytical Topics in Computer Engineering	3
	CE Flexible Core for MS I†	3
Choose two of the following restricted core courses:		6
CMPE-630	Digital Integrated Circuit Design	
CMPE-655	Multiple Processor Systems	
CMPE-660	Reconfigurable Computing	
CMPE-670	Data and Communication Network	
CMPE-685	Computer Vision	
	Graduate Electives*	9
CMPE-796	Thesis and Project Initiation Seminar	0
CMPE-795	Graduate Seminar	0
Second Year		
CMPE-790	Thesis	9
	Graduate Elective	3
Total Semester Credit Hours		**30**

* At least two graduate electives must come from the computer engineering department.

† Students may choose one of the following courses to fulfill this requirement: Digital IC Design (CMPE-630), Multiple Processor Systems (CMPE-655), Reconfigurable Computing (CMPE-660), Data and Communications Networks (CMPE-670), or Computer Vision (CMPE-685).

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

COURSE		SEMESTER CREDIT HOURS
First Year		
CMPE-610	Analytical Topics in Computer Engineering	3
	CE Flexible Core for MS I†	3
Choose two of the following restricted core courses:		6
CMPE-630	Digital Integrated Circuit Design	
CMPE-655	Multiple Processor Systems	
CMPE-660	Reconfigurable Computing	
CMPE-670	Data and Communication Network	
CMPE-685	Computer Vision	
	Graduate Electives*	9
CMPE-795	Graduate Seminar	0
Second Year		
	Project Focus Electives	6
	Graduate Elective	3
CMPE-792	Graduate Project	3
Total Semester Credit Hours		**30**

† Students may choose one of the following courses to fulfill this requirement: Digital IC Design (CMPE-630), Multiple Processor Systems (CMPE-655), Reconfigurable Computing (CMPE-660), Data and Communications Networks (CMPE-670), or Computer Vision (CMPE-685).

Computer architecture

COURSE	
CMPE-655	Multiple Processor Systems
CMPE-660	Reconfigurable Computing
CMPE-655	Performance Engineering of Real-time and Embedded Systems
CMPE-731	Design and Testing of Multi-core Chips
CMPE-750	Advanced Computer Architecture
CMPE-755	High Performance Architectures
CSCI-652	Distributed Systems
CSCI-654	Foundations of Parallel Computing
CSCI-742	Compiler Construction

Computer vision and machine intelligence

COURSE	
CMPE-680	Digital Image Processing Algorithms
CMPE-685	Computer Vision
CSCI-713	Applied Perception in Graphics and Visualization
CSCI-715	Applications in Virtual Reality
CSCI-719	Topics in Computer Graphics
CSCI-720	Big Data Analytics
CSCI-731	Advanced Computer Vision
EEEE-647	Artificial Intelligence Explorations
EEEE-670	Pattern Recognition
EEEE-685	Principles of Robotics
EEEE-780	Digital Video Processing
EEEE-781	Image and Video Compression
IMGS-756	Advanced Digital Image Processing

Integrated circuits and systems

COURSE	
CMPE-630	Digital Integrated Circuit Design
CMPE-655	Multiple Processor Systems
CMPE-730	Advanced Digital Integrated Circuit Design
CMPE-731	Design and Testing of Multi-core Chips
CMPE-750	Advanced Computer Architecture
EEEE-602	Random Signals and Noise
EEEE-610	Analog Electronics
EEEE-620	Design of Digital Systems
EEEE-712	Advanced Field Effect Devices
EEEE-713	Solid State Physics
EEEE-720	Advanced Topics in Digital Systems Design
EEEE-726	Mixed Signal IC Design
EEEE-730	Advanced Analog IC Design

Networks and security

COURSE	
CMPE-661	Hardware and Software Design for Cryptographic Applications
CMPE-670	Data and Communication Networks
CMPE-770	Wireless Networks
CSCI-642	Secure Coding
CSCI-662	Foundations of Cryptography
CSCI-720	Big Data Analytics
CSCI-734	Foundations of Security Measurement and Evaluation
CSCI-735	Foundations of Intelligent Security Systems
CSCI-736	Neural Networks and Machine Learning
CSCI-762	Advanced Cryptography
CSEC-743	Computer Viruses and Malicious Software
CSEC-744	Network Security
EEEE-602	Random Signals and Noise
EEEE-693	Digital Data Communication
EEEE-797	Wireless Communication
NSSA-612	Network Modeling and Analysis
NSSA-711	Advanced Routing Protocols
NSSA-715	Network Design and Performance

Signal processing, control and embedded systems

COURSE	
CMPE-663	Real-time and Embedded Systems
CMPE-664	Modeling of Real-time Systems
CMPE-665	Performance Engineering of Real-Time and Embedded Systems
EEEE-602	Random Signals and Noise
EEEE-610	Analog Electronics
EEEE-661	Modern Control Theory
EEEE-733	Robust Control
EEEE-765	Optimal Control
EEEE-768	Adaptive Signal Processing
EEEE-793	Error Detection and Error Correction
EEEE-794	Information Theory
MATH-781	Wavelets and Applications

Additional graduate-level math courses

COURSE	
ISEE-601	Systems Modeling and Optimization
ISEE-701	Linear Programming
ISEE-702	Integer and Nonlinear Programming
MATH-603	Optimization Theory
MATH-605	Stochastic Processes
MATH-611	Numerical Analysis
MATH-651	Combinatorics and Graph Theory I

Admission requirements

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

- Hold a baccalaureate degree from an accredited university in computer engineering or a related field,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have an GPA of 3.0 or higher,
- Submit scores from the Graduate Record Exam (GRE),
- Submit two letters of reference from individuals well qualified to judge the candidate's ability for graduate study, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Electrical Engineering, MS

rit.edu/kgcoe/program/electrical-engineering-0
Sohail Dianat, Department Head
(585) 475-7115, sadeee@rit.edu
Jayanti Venkataraman, Graduate Program Director
(585) 475-2143, jnveee@rit.edu

Program overview

The master of science degree in electrical engineering allows students to customize their course work while working closely with electrical engineering faculty in a contemporary, applied research area. Students may choose among the following six options to customize their graduate program of study: communication, control, digital systems, integrated electronics, MEMs, or signal and image processing.

Plan of study

The MS degree is awarded upon the successful completion of a minimum of 30 semester credit hours, which includes a 6 credit hour thesis. Students have the option of doing a 3 credit hour graduate paper in place of the thesis. In this case an additional course is required. Another option is a course-only option with a comprehensive exam. (0 credits). All students are expected to attend the Electrical Engineering Graduate Seminar (EEEE-795) for every semester they are on campus.

Curriculum

Electrical engineering (communication focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-603	Matrix Methods in Electrical Engineering	3
EEEE-602	Random Signals and Noise	3
EEEE-692	Communication Networks	3
EEEE-693	Digital Data Communication	3
EEEE-794	Information Theory	3
EEEE-795	Electrical Engineering Graduate Seminar	0
EEEE-797	Wireless Communication	3
Second Year		
	Electives	6
EEEE-790	MSEE Thesis	6
EEEE-795	Electrical Engineering Graduate Seminar	0
Total Semester Credit Hours		**30**

Electrical engineering (control focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-603	Matrix Methods in Electrical Engineering	3
EEEE-602	Random Signals and Noise	3
EEEE-669	Fuzzy Logic and Applications	3
EEEE-661	Modern Control	3
EEEE-765	Optimal Control	3
EEEE-766	Multivariable Modeling	3
EEEE-795	Electrical Engineering Graduate Seminar	0
Second Year		
	Electives	6
EEEE-790	MSEE Thesis	6
EEEE-795	Electrical Engineering Graduate Seminar	0
Total Semester Credit Hours		**30**

Electrical engineering (digital systems focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-603	Matrix Methods in Electrical Engineering	3
EEEE-620	Design of Digital Systems	3
EEEE-720	Advanced Topics in Digital System Design	3
EEEE-621	Design of Computer Systems	3
EEEE-721	Advanced Topics in Computer System Design	3
EEEE-795	Electrical Engineering Graduate Seminar	0
	Elective	3
Second Year		
	Electives	6
EEEE-790	MSEE Thesis	6
EEEE-795	Electrical Engineering Graduate Seminar	0
Total Semester Credit Hours		**30**

Electrical engineering (MEMs focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-603	Matrix Methods in Electrical Engineering	3
EEEE-602	Random Signals and Noise	3
EEEE-689	Fundamentals of MEMs	3
EEEE-661	Modern Control Theory	3
MCEE-770	Microelectromechanical Systems	3
EEEE-787	MEMs Evaluation	3
EEEE-795	Electrical Engineering Graduate Seminar	0
Second Year		
EEEE-718	Design and Characterization of Microwave Systems	3
	Elective	3
EEEE-790	MSEE Thesis	6
EEEE-795	Electrical Engineering Graduate Seminar	0
Total Semester Credit Hours		**30**

Electrical engineering (integrated electronics focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-603	Matrix Methods in Electrical Engineering	3
EEEE-610	Analog Electronics	3
EEEE-711	Advanced Carrier-Injection Devices	3
EEEE-712	Advanced Field-Effect Devices	3
EEEE-713	Solid-State Physics	3
EEEE-795	Electrical Engineering Graduate Seminar	0
	Elective	3
Second Year		
EEEE-726	Mixed-Signal IC Design	3
	Elective	3
EEEE-790	MSEE Thesis	6
EEEE-795	Electrical Engineering Graduate Seminar	0
Total Semester Credit Hours		**30**

Electrical engineering (signal and image processing focus area), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
EEEE-603	Matrix Methods in Electrical Engineering	3
EEEE-602	Random Signals and Noise	3
EEEE-678	Digital Signal Processing	3
EEEE-779	Image Processing	3
EEEE-670	Pattern Recognition	3
EEEE-780	Digital Video Processing	3
EEEE-795	Electrical Engineering Graduate Seminar	0
Second Year		
	Electives	6
EEEE-790	MSEE Thesis	6
EEEE-795	Electrical Engineering Graduate Seminar	0
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree from an accredited university in an engineering or a related field,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have a GPA of 3.0 or higher,
- Submit scores from the Graduate Record Exam (GRE),
- Submit two letters of reference from individuals well qualified to judge the candidate's ability for graduate study, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL).

Candidates with a bachelor of science degree in fields outside of electrical engineering may be considered for admission, however, they may be required to complete bridge courses to ensure they are adequately prepared for graduate studies in electrical engineering.

Additional information

Graduation requirements

Students must maintain a minimum grade-point average of 3.0 or higher. Under certain circumstances, a student chooses or may be required to complete more than the minimum number of credits.

Engineering, Ph.D.

rit.edu/kgcoe/program/engineering

Edward C. Hensel, Associate Dean for Research and Graduate Studies
(585) 475-7684, echeme@rit.edu

Program overview

The doctorate program in engineering prepares the next generation of engineering leaders to tackle some of the most daunting and complex problems facing our society.

The program's goal is to produce engineering graduates who are subject matter experts in a knowledge domain within an engineering discipline and who can compete successfully with those who have earned discipline-specific doctorates in engineering. Instead of restricting graduates to individual engineering fields (e.g., chemical, computer, electrical, industrial, mechanical, etc.) the program provides students with the flexibility to become subject matter experts and engineering innovators in an open-architecture environment, fostering intellectual growth along both interdisciplinary pathways and within the bounds of conventional engineering disciplines. With this approach, the program develops world-class researchers who can capitalize on the most promising discoveries and innovations, regardless of their origin within the engineering field, to develop interdisciplinary solutions for real-world challenges.

The Ph.D. in engineering requires each student to address fundamental technical problems of national and global importance for the 21st Century. Four key industries–health care, communications, energy, and transportation–are addressed specifically. These application domains impact every individual on the planet and are the focus areas doctoral candidates and faculty will contribute to through study and research. The college has identified several technology research strengths including: manufacturing and materials, signal and image processing, robotics and mechatronics, heat transfer and thermo-fluids, performance and power-aware computing, access and assistive technologies, simulation, modeling and optimization, safety and security, and nano-science and engineering. Students collaborate with faculty members from a variety of engineering disciplines to bring these technology strengths to bear on solving problems of global significance in the application domains.

Plan of study

The curriculum for the doctorate in engineering provides disciplinary and interdisciplinary courses, research mentorship, and engineering focus area seminars. Students are expected to have a disciplinary-rooted technical strength to conduct and complete independent, original, and novel collaborative interdisciplinary research contributing to one of the four industrial and/or societal focus areas. The program is comprised of 66 credit hours: 18 core course credits, 9 discipline foundation credits, 9 industry focus area credits, and 30 research credits

Core courses

Students will complete the following core courses: Interdisciplinary Research Methods, Engineering Analytics Foundation, Translating Discovery into Practice, Engineering Analytics Elective, and Doctoral Seminar.

Discipline foundation courses

Foundation courses build depth within a disciplinary field of engineering, such as mechanical engineering, electrical and microelectronics engineering, computer engineering, industrial and systems engineering, chemical engineering, or biomedical engineering.

Application domain courses

This rigorous set of engineering courses provides students with comprehensive coverage of engineering challenges and solution approaches in one of the four key industry areas associated with the program: health care, energy, communications, and transportation. Students choose a focus area and work with the program director to identify a set of focus area courses appropriate to their research and professional interests. Students can also take additional courses from their selected industry as electives.

Qualifying exam

Students complete a qualifying exam at the end of their first year of study. The exam evaluates the student's aptitude, potential, and competency in conducting Ph.D. level research.

Dissertation proposal and candidacy exam

Students must present a dissertation proposal to their dissertation committee no sooner than six months after the qualifying exam and at least twelve months prior to the dissertation defense exam. The proposal provides the opportunity for the student to elaborate on their research plans and to obtain feedback on the direction and approach to their research from his/her dissertation committee.

Research review meetings

The research review meetings provide comprehensive feedback to the student regarding their dissertation research progress and expected outcomes prior to defense of their full dissertation. Research review meetings must be held at least every six months following the conclusion of the dissertation proposal and candidacy exam until the dissertation defense.

Dissertation presentation and defense

Each doctoral candidate will prepare an original, technically sound, and well-written dissertation. They will present and defend their dissertation and its accompanying research to their dissertation committee.

Curriculum

Engineering, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ENGR-707	Engineering Analytics Foundation	3
ENGR-701	Interdisciplinary Research Methods	3
ENGR-702	Translating Discovery Into Practice	3
	Discipline Foundation Courses	9
	Engineering Analytics Elective	3
	Engineering Focus Area Seminars	2
ENGR-890	Dissertation Research	3
Second Year		
	Cross-disciplinary Electives	9
ENGR-890	Dissertation Research	9
	Engineering Focus Area Seminars	2
Third Year		
ENGR-890	Dissertation Research	18
	Engineering Focus Area Seminars	2
Fourth Year		
	Continuation of Dissertation	0
	Engineering Focus Area Seminars	0
Total Semester Credit Hours		**66**

Admission requirements

To be considered for admission to the Ph.D. program in engineering, candidates must fulfill the following requirements:

- Hold a baccalaureate degree in an engineering discipline from an accredited university,
- Submit a resume highlighting educational background and experiences,
- Submit a Statement of Purpose for Research describing the applicant's (a) interest in one of the four application domains of transportation, energy, communications or health care; (b) areas of technology strength aligned with KGCOE faculty; and (c) disciplinary foundation,
- Submit scores from the Graduate Record Examination (GRE),

- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work,
- Have a GPA of 3.0 or higher (or a minimum GPA of 3.0 in foundation course work),
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral candidates must be confidential and must be submitted directly from the referee to RIT.
- Participate in an on-campus or teleconference interview (when applicable), and
- Complete a graduate application.
- For international applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 587 (paper-based) or 94 (Internet-based) are required. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL exam. Minimum scores vary; however, the absolute minimum score required for unconditional acceptance is 6.5.

Additional information

Residency
All students in the program must spend at least three years as resident student before completing the degree.

Engineering Management, ME

rit.edu/kgcoe/program/engineering-management
Marcos Esterman, Graduate Program Director
(585) 475-6922, mxeeie@rit.edu

Program overview

The engineering management curriculum is a combination of engineering courses from the industrial and systems engineering program and management courses from Saunders College of Business. The program combines technical expertise with managerial skills to focus on the management of engineering and technological enterprises. Students understand the technology involved in engineering projects and the management process through which the technology is applied. The objective is to provide a solid foundation in the areas commonly needed by managers who oversee engineers and engineering projects. In addition to industrial engineering expertise, students gain valuable knowledge in areas such as organizational behavior, finance, and accounting.

Curriculum

Engineering management, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-750	Systems and Project Management	3
ISEE-771	Engineering of Systems I	3
ACCT-794	Cost Management in Technical Organizations	3
ISEE-760	Design of Experiments	3
	Engineering Management Elective	3
	Elective	3
Second Year		
	Engineering Management Electives	6
	Elective	3
ISEE-792	Engineering Capstone	3
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree in engineering, mathematics, or science,
- Have a minimum cumulative undergraduate GPA of 3.00,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Record Exam (GRE) (recommended if candidate's degree is from an ABET accredited institution, otherwise required)
- Submit letters of recommendation,
- Submit a one-page statement of purpose, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 580 (paper-based) or 90 (Internet-based) are required.

Industrial and Systems Engineering, ME

rit.edu/kgcoe/program/industrial-engineering-1
Marcos Esterman, Graduate Program Director
(585) 475-6922, mxeeie@rit.edu

Program overview

The master of engineering in industrial and systems engineering focuses on the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy. The program emphasizes specialized knowledge and skills in the mathematical, physical, computer, and social sciences together with the principles and methods of engineering analysis and design. The overarching goal of industrial and systems engineering is the optimization of the system, regardless of whether the activity engaged in is a manufacturing, distribution, or a service-related capacity. Students graduate with a variety of skills in the areas of applied statistics/quality, ergonomics/human factors, operations research/simulation, manufacturing, and systems engineering.

Curriculum

Industrial and systems engineering, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-601	Systems Modeling and Optimization	3
ISEE-771	Engineering of Systems I	3
ISEE-760	Design of Experiments	3
	Electives	9
Second Year		
	Electives	9
ISEE-792	Engineering Capstone	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the ME program in industrial and systems engineering, candidates must fulfill the following requirements:

- Hold a baccalaureate degree in engineering, mathematics, or science from an accredited institution,
- Have a minimum cumulative undergraduate GPA of 3.0,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Record Exam (GRE)
- Submit two letters of recommendation,
- Submit a one page statement of purpose, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 550 (paper-based) or 80 (Internet-based) are required.

Industrial and Systems Engineering, MS

rit.edu/kgcoe/program/industrial-engineering-0
Marcos Esterman, Graduate Program Director
(585) 475-6922, mxeeie@rit.edu

Program overview

The master of science degree in industrial and systems engineering allows students to customize their course work while working closely with industrial and systems engineering faculty in a contemporary, applied research area. Faculty members are currently conducting applied project and research work in the areas of contemporary manufacturing processes/systems, ergonomic/biomedical analysis, logistics and supply chain management, sustainable design and development, systems engineering/product development, and systems simulation.

Plan of study

The MS degree is awarded upon successful completion of a minimum of 30 semester credit hours of study. This includes eight courses and a 6 semester credit hour thesis. All students are required to complete at least two semesters of Graduate Seminar (ISEE-795, 796).

Curriculum

Industrial and systems engineering, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-601	Systems Modeling and Optimization	3
ISEE-771	Engineering of Systems I	3
ISEE-795, 796	Graduate Seminar I, II	0
ISEE-760	Design of Experiments	3
	Electives	9
Second Year		
	Electives	6
ISEE-790	Research and Thesis	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in industrial and systems engineering, candidates must fulfill the following requirements:

- Hold a baccalaureate degree in engineering, mathematics, or science from an accredited institution,
- Have a minimum cumulative undergraduate GPA of 3.0,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Record Exam (GRE),
- Submit two letters of recommendation,
- Submit a one page statement of purpose, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 580 (paper-based) or 90 (Internet-based) are required.

Lean Six Sigma, Adv. Cert.

rit.edu/kgcoe/cqas/academics/advanced-certificate-in-lean-six-sigma
Mark Smith, Director, Center for Quality & Applied Statistics
(585) 475-7102, mark.smith@rit.edu
Rebecca Ziebarth, Program Coordinator
(585) 475-2033, razeqa@rit.edu

Program overview

Lean Six Sigma focuses on the use of the DMAIC (define, measure, analyze, improve, and control) process and advanced statistical techniques to improve processes and reduce defects. The advanced certificate in Lean Six Sigma is for engineers, process-improvement facilitators, and other practitioners looking to increase their effectiveness or enhance their qualifications to broaden their careers. Industry certifications such as Lean Six Sigma Green Belt and Black Belt are not the focus of this academic program, but students interested in obtaining these credentials are well prepared to do so after completing courses in program.

Curriculum

Lean Six Sigma, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ISEE-682	Lean Six Sigma Fundamentals	3
ISEE 660 or STAT-621	Applied Statistical Quality Control	3
ISEE-760 or STAT-670	Design of Experiments	3
	Elective	3
Total Semester Credit Hours		**12**

Admission requirements

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

- Have a baccalaureate degree from an accredited institution,
- Have a minimum GPA of 3.0,
- Have a satisfactory background in statistics (at least one course in probability and statistics),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit one letter of recommendation,
- Submit a current resume, and
- Complete a graduate application.

International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 80 (Internet-based) is required. Scores from the International English Testing Language System (IELTS) are accepted in place of the TOEFL exam. The minimum acceptable score is 6.5. The TOEFL or IELTS requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions. For additional information on the IELTS, visit www.ielts.org.

Graduate entrance exams are not required, however, students are welcome to submit scores from the Graduate Management Admission Test (GMAT) or the Graduate Record Exam (GRE) to support their application for admission.

Additional information

Prerequisites

Students should have basic familiarity with MINITAB statistical software. This may be obtained by self-study or through a short course.

Grades

Students must maintain an overall program GPA of 3.0 (B) to qualify for graduation.

Format

Classes are available online and on-campus.

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/leansixsigma/.

Manufacturing Leadership, MS

rit.edu/kgcoe/program/manufacturing-leadership
Mark W. Smith, Director
(585) 475-7102, mark.smith@rit.edu
Christine Fisher, Coordinator
(585) 475-7971, mml@rit.edu

Program overview

The master of science degree in manufacturing leadership is designed for experienced professionals moving to mid- and senior-level positions in manufacturing and service organizations. The program integrates business and engineering courses, delivering them in an online format where students continue to work while taking classes. The program can also be taken on a full-time basis, with several courses available on-campus.

Manufacturing leadership is a highly focused program developed jointly by the Kate Gleason College of Engineering and Saunders College of Business. Particular emphasis is placed on supply chain management, global manufacturing and operations, lean thinking, leadership, and decision making. A capstone project, oriented to the solution of a manufacturing or service management problem or process improvement initiative, enables students to apply new skills and capabilities to the solution of a pressing real-world problem, with significant financial benefit to sponsors.

Curriculum

Manufacturing leadership, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MGMT-740	Organizational Behavior and Leadership	3
ISEE-771	Engineering of Systems I	3
ISEE-682	Lean Six Sigma Fundamentals	3
ISEE-750	Systems and Project Management	3
Choose one of the following:		3
ACCT-603	Accounting for Decision Makers	
ACCT-794	Cost Management in Technical Organizations	
Second Year		
ISEE-745	Manufacturing Systems	3
ISEE-703	Supply Chain Management	3
ISEE-723	Global Facilities Planning	3
Choose one of the following:		3
ISEE-793	MML Capstone	
ISEE-792	Engineering Capstone	
	Engineering Elective	3
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate (or equivalent) degree from an accredited institution,
- Have a minimum cumulative grade point average of 3.0,
- Have at least two years of experience in a manufacturing-related organization or business environment,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit one professional recommendation,
- Submit a current resume, and
- Complete a graduate application.

Exceptions to admission requirements may be considered on a case-by-case basis. No graduate entrance exam is required, although candidates are welcome to support their application with results from the Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE).

Additional information

Prerequisite knowledge

Admitted students must possess knowledge and skills at the introductory course level in probability and statistics, engineering economy or basic accounting. Areas that need strengthening may be addressed by guided reading, independent study, or formal course work.

Format

Students may start the program during any semester and complete the course work at their own pace. Classes are available online but several courses may be taken on-campus for local or full-time students.

Students may take up to three courses on a nonmatriculated basis. Credits earned while enrolled as a nonmatriculated student may be applied to the degree program following formal admission.

Mechanical Engineering, ME

rit.edu/kgcoe/mechanical/program/graduate-meng/overview
Risa J. Robinson, Department Head
(585) 475-6445, rjreme@rit.edu

Program overview

The master of engineering in mechanical engineering is a 30 credit hour degree program. It is intended to be a terminal degree program designed for those who do not expect to pursue a doctoral degree but who wish to become a leader within the mechanical engineering field. This degree is particularly well-suited for students who wish to study part time, for those interested in updating their technical skills, or for those who are not focused on a research-oriented master of science thesis. A conventional thesis is not required for the program. In its place, students complete a capstone experience, which may be a design project leadership course or a well-organized and carefully chosen industrial internship. A research methods course may also fulfill the capstone experience; however, this option is primarily intended for students who are considering transitioning to the MS program in mechanical engineering. (Courses taken within the ME program are transferrable to the MS program.)

Plan of study

In addition to the two required courses, students choose three courses from 9 different focus areas and four elective courses. All full-time equivalent students are required to attend the weekly graduate seminar each semester they are on campus. Up to three courses may be taken outside the mechanical engineering department. Students may complete the program's requirements within one calendar year with summer study. Students may also augment their education through cooperative education employment opportunities. Although co-op is not a requirement of the program, it does give students an opportunity to gain employment experience within the field.

Curriculum

Mechanical engineering, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ENGR-707	Engineering Analysis	3
ENGR-709	Advanced Engineering Mathematics	3
	Focus Area Courses	9
	Electives	12
Choose one of the following:		3
MECE-730	Design Project Leadership*	
MECE-777	Internship†	
MECE-792	Project‡	
MECE-701	Research Methods§	
MECE-795	Graduate Seminar	
Total Semester Credit Hours		**30**

Graduate Seminar (MECE-795) is a 0 credit course required for all full-time and full-time equivalent students.
* Design Project Leadership (MECE-730) is reserved only for students enrolled in the accelerated BS/M. Eng. program.
† Internship (MECE-777) is optional for all ME students.
‡ Project (MECE-792) is an option for all ME students and students enrolled in the accelerated BS/MEng program.
§ Research Methods (MECE-701) is intended for students planning to transition to the MS degree.

Focus areas

COURSE		SEMESTER CREDIT HOURS
Automotive systems		
Choose three of the following:		
ISEE-740	Design for Manufacture and Assembly	3
MECE-623	Powertrain Systems and Design	3
MECE-624	Vehicle Dynamics	3
MECE-643	Classical Controls	3
MECE-658	Introduction to Engineering Vibrations	3
MECE-752	Tribology Fundamentals	3
Business		
ACCT-703	Accounting for Decision Makers	3
MGMT-740	Organizational Behavior and Leadership	3
Choose one of the following:		
ACCT-706	Cost Management	3
INTB-730	Managing in a Global Environment	3
MGMT-735	Management of Innovation in Products and Services	3
Controls		
MECE-643	Classical Controls	3
Choose two of the following:		6
EEEE-661	Modern Control Theory	
EEEE-733	Robust Control	
EEEE-765	Optimal Control	
MECE-743	Digital Controls	
MECE-744	Nonlinear Controls	
Manufacturing		
Choose three of the following		
ISEE-626	Contemporary Production Systems	3
ISEE-720	Production Control	3
ISEE-740	Design for Manufacture and Assembly	3
ISEE-741	3D Printing	3
ISEE-745	Manufacturing Systems	3
MECE-643	Classical Controls	3
Mechanics design/materials		
Choose three of the following:		
MECE-605	Finite Materials	3
MECE-620	Introduction to Optimal Design	3
MECE-644	Introduction to Composite Materials	3
MECE-657	Applied Biomaterials	3
MECE-752	Tribology Fundamentals	3
MECE-785	Advanced Mechanics of Materials	3
Product development		
Choose three of the following:		
ISEE-741	3D Printing	3
ISEE-750	Systems and Project Management	3
ISEE-751	Decision and Risk Benefit Analysis	3
ISEE-771	Engineering Systems I	3
ISEE-772	Engineering Systems II	3
Sustainability		
Choose three of the following:		
MECE-629	Renewable Energy Systems	3
MECE-733	Sustainable Energy Management	3
MECE-739	Alternative Fuels and Energy Efficiency	3
ISEE-785	Fundamentals of Sustainable Engineering	3
ISEE-786	Life Cycle Assessment	3
ISEE-787	Design for the Environment	3
Thermo/Fluids engineering		
MCSE-610	Applied Biofluid Mechanics and Microcirculation	3
MECE-731	Computational Fluid Dynamics	3
MECE-738	Ideal Flows	3
MECE-751	Convective Phenomena	3
Vibrations engineering		
MECE-658	Introduction to Engineering Vibrations	3
MECE-758	Intermediate Engineering Vibrations	3
Choose one of the following:		
EEEE-602	Random Signals and Noise	3
EEEE-678	Digital Signal Processing	3
MECE-606	System Modeling	3

Admission requirements

To be considered for admission to the ME program in mechanical engineering, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited university in mechanical engineering, physics, or a related field,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have a GPA of 3.0 or higher,
- Submit two letters of reference from individuals well qualified to judge the candidate's ability for graduate study, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS).

Mechanical Engineering, MS

rit.edu/kgcoe/mechanical/program/graduate-ms/overview
Risa J. Robinson, Department Head
(585) 475-6445, rjreme@rit.edu

Program overview

The master of science degree in mechanical engineering consists of a minimum of 30 credit hours (24 credit hours of course work and 6 credit hours of thesis). A limited number of credit hours may be transferred from graduate courses taken outside the university, provided such courses complement a student's proposed graduate program in the mechanical engineering department. An adviser will review course work for possible transfer credit. Upon matriculation into the MS program, the student should formulate a plan of study in consultation with an adviser.

Plan of study

The program includes core courses, focus area courses, elective courses, and a thesis. All full-time and full-time equivalent students are required to attend the weekly graduate seminar each semester they are on campus.

Focus area courses
All students must develop a focus area of study, with prior approval from their adviser and the department head. The focus area should consist of at least 9 credit hours of graduate study in mechanical engineering and be related to the student's technical and professional development interests. Examples of focus areas include controls, thermo/fluids, and mechanics/design/materials.

Independent study
A student also may earn a limited number of credits by doing an independent study with guidance from a member of the graduate faculty. Areas for independent study include selected topics in applied mathematics, mechanics, thermo-fluids, and controls.

Thesis
Students prepare and present a formal thesis proposal to their faculty adviser prior to completing their course work. An acceptable proposal – including a statement of work, extensive literature search, and proposed timeline, signed by the student and approved by their faculty adviser and department head – is required before students can register for MSMS Thesis (MECE-790). Students are required to submit a written thesis and orally present their thesis work.

Curriculum

Mechanical engineering, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
ENGR-707	Engineering Analysis	3
ENGR-709	Advanced Engineering Mathematics	3
	Focus Area Courses	9
	Electives	9
MECE-790	MSME Thesis	6
MECE-795	Graduate Seminar	0
Total Semester Credit Hours		**30**

* Graduate Seminar (MECE-795) is a zero credit hour course required for all full-time and full-time equivalent students.

Admission requirements

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

- Hold a baccalaureate degree from an accredited university in mechanical engineering (or a related field),
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have an GPA of 3.0 or higher,
- Submit scores from the Graduate Record Exam (minimum scores of 302 (V&Q) and 3.0 (writing) are required),
- Submit two letters of reference from individuals well qualified to judge the candidate's ability for graduate study, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS).

Microelectronic Engineering, MS

rit.edu/kgcoe/program/microelectronic-engineering-0
Robert Pearson, Program Director
(585) 475-2923, repemc@rit.edu

Program overview

The objective of the master of science degree in microelectronic engineering is to provide an opportunity for students to perform graduate-level research as they prepare for entry into either the semiconductor industry or a doctoral program. The degree requires strong preparation in the area of microelectronics and requires a thesis.

Program outcomes

- Understand the fundamental scientific principles governing solid-state devices and their incorporation into modern integrated circuits.
- Understand the relevance of a process or device, either proposed or existing, to current manufacturing practices.
- Develop in-depth knowledge in existing or emerging areas of the field of microelectronics such as device engineering, circuit design, lithography, materials and processes, yield, and manufacturing.
- Apply microelectronic processing techniques to the creation/investigation of new process/device structures.
- Communicate technical material effectively through oral presentations, written reports, and publications.

Plan of study

The MS degree is awarded upon the successful completion of a minimum of 33 semester credit hours, including a 6 credit hour thesis.

The program consists of eight core courses, two graduate electives, 3 credits of graduate seminar and a thesis. The curriculum is designed for students who do not have an undergraduate degree in microelectronic engineering. Students who have an undergraduate degree in microelectronic engineering develop a custom course of study with their graduate adviser.

Thesis

A thesis is undertaken once the student has completed approximately 20 semester credit hours of study. Planning for the thesis, however, should begin as early as possible. Generally, full-time students should complete their degree requirements, including thesis defense, within two years (four academic semesters and one summer term).

Curriculum

Microelectronic engineering, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MCEE-601	Microelectronic Fabrication	3
MCEE-605	Lithographic Materials and Processes	3
MCEE-603	Thin Films	3
MCEE-795	Microelectronics Research Methods	1
MCEE-732	Microelectronic Man.	3
MCEE-602	VLS Process Modeling	3
	Graduate Elective*	3
MCEE-795	Microelectronics Research Methods	1
Second Year		
MCEE-704	Physical Modeling of Semiconductor Devices	3
	Graduate Elective*	3
MCEE-790	MS Thesis	6
MCEE-795	Microelectronics Research Methods	1
Total Semester Credit Hours		**33**

* With adviser approval.

Admission requirements

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

- Hold a baccalaureate degree from an accredited university in engineering or a related field,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have an GPA of 3.0 or higher,
- Submit scores from the Graduate Record Exam (RIT graduates exempt),
- Submit two letters of reference from individuals well qualified to judge the candidate's ability for graduate study, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL).

Candidates applying with a bachelor's degree in fields outside of electrical and microelectronic engineering may be considered for admission; however, bridge courses may be required to ensure the student is adequately prepared for graduate study.

Microelectronics Manufacturing Engineering, ME

rit.edu/kgcoe/program/microelectronic-engineering-1
Robert Pearson, Program Director
(585) 475-2923, repemc@rit.edu

Program overview

The master of engineering in microelectronics manufacturing engineering provides a broad-based education for students who are interested in a career in the semiconductor industry and hold a bachelor's degree in traditional engineering or other science disciplines.

Program outcomes

After completing the program, students will be able to:

- Design and understand a sequence of processing steps to fabricate a solid state device to meet a set of geometric, electrical, and/or processing parameters.
- Analyze experimental electrical data from a solid state device to extract performance parameters for comparison to modeling parameters used in the device design.
- Understand current lithographic materials, processes, and systems to meet imaging and/or device patterning requirements.
- Understand the relevance of a process or device, either proposed or existing, to current manufacturing practices.
- Perform in a microelectronic engineering environment, as evidenced by an internship.
- Appreciate the areas of specialty in the field of microelectronics, such as device engineering, circuit design, lithography, materials and processes, and yield and manufacturing.

Plan of study

This 30 credit hour program is awarded upon the successful completion of six core courses, two elective courses, a research methods course, and an internship. Under certain circumstances, a student may be required to complete bridge courses totaling more than the minimum number of credits. Students complete courses in microelectronics, microlithography, and manufacturing.

Microelectronics

The microelectronics courses cover major aspects of integrated circuit manufacturing technology, such as oxidation, diffusion, ion implantation, chemical vapor deposition, metalization, plasma etching, etc. These courses emphasize modeling and simulation techniques as well as hands-on laboratory verification of these processes. Students use special software tools for these processes. In the laboratory, students design and fabricate silicon MOS integrated circuits, learn how to utilize semiconductor processing equipment, develop and create a process, and manufacture and test their own integrated circuits.

Microlithography

The microlithography courses are advanced courses in the chemistry, physics, and processing involved in microlithography. Optical lithography will be studied through diffraction, Fourier, and image-assessment techniques. Scalar diffraction models will be utilized to simulate aerial image formation and influences of imaging parameters. Positive and negative resist systems as well as processes for IC application will be studied. Advanced topics will include chemically amplified resists; multiple-layer resist systems; phase-shift masks; and electron beam, X-ray, and deep UV lithography. Laboratory exercises include projection-system design, resist-materials characterization, process optimization, and electron-beam lithography.

Manufacturing

The manufacturing courses include topics such as scheduling, work-in-progress tracking, costing, inventory control, capital budgeting, productivity measures, and personnel management. Concepts of quality and statistical process control are introduced. The laboratory for this course is a student-run factory functioning within the department. Important issues such as measurement of yield, defect density, wafer mapping, control charts, and other manufacturing measurement tools are examined in lectures and through laboratory work. Computer-integrated manufacturing also is studied in detail. Process modeling, simulation, direct control, computer networking, database systems, linking application programs, facility monitoring, expert systems applications for diagnosis and training, and robotics are supported by laboratory experiences in the integrated circuit factory. The program is also offered online for engineers employed in the semiconductor industry.

Internship

The program requires students to complete an internship. This requirement provides a structured and supervised work experience that enables students to gain job-related skills that assist them in achieving their desired career goals.

Students with prior engineering-related job experience may submit a request for internship waiver with the program director. A letter from the appropriate authority substantiating the student's job responsibility, duration, and performance quality would be required.

For students who are not working in the semiconductor industry while enrolled in this program, the internship may be completed at RIT. It involves an investigation or study of a subject or process directly related to microelectronic engineering under the supervision of a faculty adviser. An internship may be taken any time after the completion of the first semester, and may be designed in a number of ways. At the conclusion of the internship, submission of a final internship report to the faculty adviser and program director is required.

Curriculum

Microelectronics manufacturing engineering, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MCEE-601	Microelectronic Fabrication	3
MCEE-605	Lithography Materials and Processes	3
MCEE-603	Thin Films	3
MCEE-795	Microelectronics Research Methods	1
MCEE-732	Evaluation of Microelectronic Manufacturing	3
MCEE-602	VLS Process Modeling	3
MCEE-615	Nanolithography Systems	3
MCEE-795	Microelectronics Research Methods	1
MCEE-777	Microelectronic Engineering Internship	4
	Graduate Electives	6
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the ME program in microelectronic manufacturing engineering, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited university in engineering or a related field,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have an GPA of 3.0 or higher,
- Submit two letters of reference from individuals well qualified to judge the candidate's ability for graduate study, and

- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL) or from the International English Language Testing System (IELTS).

Candidates applying with a bachelor's degree in non-electrical or non-microelectronic engineering fields may be considered for admission, however they may be required to complete additional bridge courses to ensure they are adequately prepared for graduate study.

Microsystems Engineering, Ph.D.

rit.edu/kgcoe/program/microsystems-engineering
Bruce Smith, Director
(585) 475-2295, bruce.smith@rit.edu

Program overview

The multidisciplinary doctorate degree in microsystems engineering builds on the fundamentals of traditional engineering and science combined with curriculum and research activities addressing the numerous technical challenges of micro- and nano-systems. These include the manipulation of electrical, photonic, optical, mechanical, chemical, and biological functionality to process, sense, and interface with the world at a nanometer scale. The program provides a foundation to explore future technology through research in nano-engineering, design methods, and technologies and their integration into micro- and nano-scaled systems. Some of the program's areas of exploration include:

- Next-generation nanoelectronics including: development of new techniques, processes and architectures for nanoelectronic and nano-optoelectronic devices exploration into new materials research including germanium, III-V materials, carbon annotubes, and spintronics
- Photovoltaic research in silicon, compound semiconductor, and organic solar cells
- Photonics and nanophotonics imaging, communications, and sensing research including couplers, micro-lasers, microdetectors, integrated silicon waveguides, silicon spectrometers, and biosensors
- MEMS (micro-electro-mechanical systems), MEOMS (micro-electro-optical-mechanical systems), and NEMS (nano-electro-mechanical systems) device, processing, and materials research for smart sensors, actuators, biochips, and micro-implantable appliances
- Scaled micro- and nano- electronics for integration into biomedical systems
- New and improved technologies in organic electronic components and devices
- Anaomaterials research including carbon nanotubes, nanoparticles, quantum dots, self-assembly materials and their applications in electronics, optics, and materials science
- Microfluidics research on the behavior, control, and manipulation of fluids at the micro-scale

Mission

The program fulfills a critical need for an expanded knowledge base and expertise in the innovation, design, fabrication, and application of micro- and nano-scale materials, process, devices, components, and systems. RIT is an internationally recognized leader in education and research in the fields of microsystems and nanoscale engineering.

The curriculum is structured to provide a sound background and a thorough foundation in engineering and science through world-class education in the innovative application of educational technologies and research experiences.

Program highlights

The program is designed for students with a strong background in engineering and the physical sciences, and with an interest in hands on exploration into new fields of micro- and nano-systems.

- The program has a renowned, multidisciplinary faculty that shares resources and expertise over a wide variety of micro- and nao-scale tehcnologies. The program is administered by core faculty from RIT's colleges of engineering and science.
- Unique state-of-the art research laboratories have been developed to provide a focus for microsystems and nanoscale engineering research

across traditional disciplinary boundaries. A semiconductor and microsystems fabrication clean-room constitute part of the research facilities, providing students access to the most advanced micro- and nano-electronic processing capabilities.
- Students explore applications of microsystems and nanotechnology through close collaboration with industry and government laboratories.
- Graduates have discovered exciting opportunities in new technology frontiers.

Plan of study

A total of 66 credit hours of combined graduate course work and research are required for completion of the program. The course work requires a combination of foundation courses, major and minor technical area courses, and electives. The student must pass the Qualifying Exam, the Candidacy Exam and the Dissertation Defense Exam to complete the degree requirements.

Phase 1: The first phase prepares students with the foundation in science and engineering required for the program as well as to determine the student's ability to do independent research. This includes the foundation and specialization courses taken during the first year together with the successful completion of the Qualifying Exam. The Qualifying Exam tests the student's ability to think and learn independently, to critically evaluate current research work in microsystems engineering, and to use good judgment and creativity to determine appropriate directions for future research work.

Phase 2: The second phase continues students course work and preliminary dissertation research. Much of this course work supports the dissertation research to be conducted in the third phase. This phase is completed when the student has finished most of the formal course work as prescribed in the program of study, has prepared the Dissertation Proposal, and has passed the Candidacy Examination.

Phase 3: The third phase includes the completion of the experimental and/or theoretical work needed to complete the student's dissertation along with the required publication of results. The Research Review Milestone is held as a meeting during this phase, as is the Defense of the Dissertation, which consists of a public oral presentation and examination.

The course work requirements are divided into four parts to ensure that students complete a well-rounded program of study with the necessary concentration in their specialized field.

Foundation courses

Students complete the following foundation courses: Microelectronics I (MCEE-601), Introduction to Nanotechnology and Microsystems (MCSE-702), Material Science for Microsystems Engineering (MCSE-703), and Theoretical Methods in Materials Science and Engineering (MTSE-704).

Major technical interest area

Students complete a sequence of three courses (9 credit hours) in the major technical research area and a sequence of two courses (6 credit hours) in a support area.

Minor technical interest areas

Students complete a two-course sequence in a minor technical area which should be outside of the student's undergraduate degree major (6 credit hours).

Elective courses

Students complete at least two elective courses, in addition to the foundation and technical interest courses (6 credit hours).

General course requirements

The total number of credit hours required for the degree depends upon the highest degree level completed by the student before entering the program. Students entering without prior graduate work must complete a minimum of 39 credit hours of course work as outlined above. A minimum of 18 research credits and a total of 66 total credits are required. Credits beyond the minimum of 39 course and 18 research requirements can be taken from either category to reach the 66 credit total.

Students entering the program with a master's degree may be permitted up to 21 course credit hours toward those required for the degree, based on the approval of the program director.

All students are required to maintain a cumulative grade-point average of 3.0 (on a 4.0 scale) to remain in good standing in the program.

Preparing a program of study

Students should prepare a program of study after passing the Qualifying Exam and no later than the spring semester of the second year. The program of study should be reviewed periodically by the student and the adviser, and modifications should be made as necessary. Leading up to or upon completion of the Candidacy exam, the student's adviser and advisory committee may add additional course work requirements to ensure the student is sufficiently prepared to carry out and complete their dissertation research.

Qualifying examination

Every student must take the Qualifying Examination, which tests student's ability to think and learn independently, to critically evaluate current research work in the field of microsystems engineering, and to use good judgment and creativity to determine appropriate directions for future research work. The exam must be completed successfully before a student can submit a thesis proposal and attempt the Candidacy Examination.

Research proposal

A research topic chosen by the student and their research adviser becomes the basis for the dissertation. The research proposal sets forth both the exact nature of the matter to be investigated and a detailed account of the methods to be employed. In addition, the proposal usually contains material supporting the importance of the topic selected and the appropriateness of the research methods to be employed.

Candidacy examination

The Candidacy Examination is an oral examination based on the dissertation research proposal and allows the advising committee to judge the student's ability to execute a research task and to communicate the results. The exam also serves to evaluate the proposed topic to ensure that if completed as posed it constitutes an original contribution to knowledge.

Research review milestone

The Research Review Milestone is administered by the student's adviser and the advisory committee between the time the student passes the Candidacy Exam and registers for the Dissertation Defense. This normally occurs approximately six months prior to the Dissertation Defense.

Dissertation defense and examination

The culmination of a student's work toward the doctorate degree is the publication of their research. In addition to developing experimental and technical skills during the creation of research, a student needs to acquire the necessary literary skills to communicate results to others. The preparation of the proposal and the dissertation manuscripts will demonstrate these skills. It is also expected that these skills are developed through the publication of technical papers and communications. The Dissertation Defense and examination is scheduled after all course requirements for the degree have been successfully completed.

Curriculum

Microsystems engineering, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MCSE-702	Introduction to Nanotechnology and Microsystems	3
MCEE-601	Microelectronics I	3
	Major Technical Area Electives (A)	6
MCSE-703	Material Science for Microsystems Engineering	3
MTSE-704	Theoretical Methods in Materials Science and Engineering	3
Second Year		
	Major Technical Area Elective A	3
	Minor Technical Area Electives	6
	Technical Elective	3
MCSE-890	Doctoral Dissertation (Research and Thesis)	2
Third Year		
	Technical Elective	3
	Major Technical Area Electives (B)	6
MCSE-890	Doctoral Dissertation (Research and Thesis)	7
Fourth Year		
MCSE-890	Doctoral Dissertation (Research and Thesis)	18
Total Semester Credit Hours		**66**

Admission requirements

To be considered for admission to the doctorate program in microsystems engineering, candidates must complete a graduate application and fulfill the following requirements:

- Hold a baccalaureate degree from an accredited university in the physical sciences or engineering,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have an undergraduate GPA of 3.0 or higher, and (if applicable) a graduate GPA of 3.5 or higher,
- Submit Graduate Record Exam (GRE) scores, with minimum requirements of 156 (verbal), 156 (quantitative) and 3.5 (writing),
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral candidates must be confidential and must be submitted by the referee directly to RIT.
- Submit a personal statement of educational objectives which specifically addresses research interests.
- Submit a current resume or curriculum vitae.
- Complete a graduate application.
- International applicants whose native language is not English are required to submit scores from the Test of English as a Foreign Language (TOEFL).

Additional information

Advising

Doctoral students' work is overseen by an adviser, the advisory committee, and the program's director.

Product Development, MS

rit.edu/kgcoe/program/product-development
Mark W. Smith, Director
(585) 475-7102, mark.smith@rit.edu
Christine Fisher, Graduate Program Director
(585) 475-7971, mpdmail@rit.edu

Program overview

The master of science in product development is a leadership program designed for engineers, scientists, technical managers, and other experienced professionals who aspire to mid- and senior-level positions associated with product innovation. The program integrates business and engineering courses consistent with cross-functional, end-to-end product development, as well as the systems perspective critical to conceive, create, launch, and support today's complex product portfolios.

To stay on the cutting edge, the program was designed by academic and industry leaders and integrates formal education with state-of-the-art research and best practices from industry. Electives and a capstone project provide flexibility to tailor the program's content to specific learning objectives of students and sponsoring organizations.

Curriculum

Product development, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-781	Excellence in New Product Development	3
ISEE-771	Engineering of Systems I	3
ISEE-772	Engineering of Systems II	3
ISEE-751	Decision and Risk Benefit Analysis	3
ISEE-750	Systems and Project Management (summer)	3
ACCT-603	Accounting for Decision Makers (summer)	3
Second Year		
MKTG-761	Marketing Concepts and Commercialization	3
DECS-743	Operations and Supply Chain Management	3
ISEE-797	Product Development Capstone	3
	Engineering or Business Elective	3
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree (or equivalent) in engineering (or a related scientific or technical field),
- Have a minimum cumulative grade point average of 3.0,
- Have at least two years of experience in product development or a related business environment,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit one professional recommendation,
- Submit a current resume, and
- Complete a graduate application.

Exceptions may be considered on a case-by-case basis. No graduate entrance exam is required, although candidates are welcome to support their application with results from the Graduate Management Admission Test (GMAT) or the Graduate Record Exam (GRE).

Additional information

Format

Students may start the program during any semester and complete the course work at their own pace. Classes are available online but several courses may be taken on-campus for local students.

Students may take up to three courses on a nonmatriculated basis. Credits earned while enrolled as a nonmatriculated student may be applied to the degree program following formal admission.

Sustainable Engineering, ME

rit.edu/kgcoe/program/sustainable-engineering-0
Brian Thorn, Program Director
(585) 475-6166, bkteie@rit.edu

Program overview

Sustainable engineering refers to the integration of social, environmental, and economic considerations into product, process, and energy system design methods. Additionally, sustainable engineering encourages the consideration of the complete product and process lifecycle during the design effort. The intent is to minimize environmental impacts across the entire lifecycle while simultaneously maximizing the benefits to social and economic stakeholders. The master of engineering in sustainable engineering is multidisciplinary and managed by the industrial and systems engineering department.

The program builds on RIT's work in sustainability research and education and offers students the flexibility to develop tracks in areas such as renewable energy systems, systems modeling and analysis, product design, and engineering policy and management. The program is offered on campus, and available on a full- or part-time basis.

Educational objectives

The program is designed to accomplish the following educational objectives:

- Heightened awareness of issues in areas of sustainability (e.g., global warming, ozone layer depletion, deforestation, pollution, ethical issues, fair trade, gender equity, etc.).
- Clear understanding of the role and impacts of various aspects of engineering (design, technology, etc.) and engineering decisions on environmental, societal, and economic problems. Particular emphasis is placed on the potential trade-offs between environmental, social, and economic objectives.
- Strong ability to apply engineering and decision-making tools and methodologies to sustainability-related problems.
- Demonstrated capacity to distinguish professional and ethical responsibilities associated with the practice of engineering.

Plan of study

Technical in nature, the program equips engineers with the tools they need to meet the challenges associated with delivering goods, energy, and services through sustainable means. In addition to basic course work in engineering and classes in public policy and environmental management, students are required to complete a capstone project directly related to sustainable design challenges impacting society. Many of these projects can be incorporated into sustainability themed research by RIT faculty in the areas of fuel-cell development, life-cycle engineering, and sustainable process implementation.

Students must successfully complete a total of 36 credit hours through course work and a capstone project. This program is designed to be completed in three semesters.

Curriculum

Sustainable engineering, ME degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-785	Fundamentals of Sustainable Engineering	3
ISEE-771	Engineering of Systems I	3
MECE-629	Renewable Energy Systems	3
ISEE-786	Lifecycle Assessment	3
	Engineering Elective	6

COURSE		SEMESTER CREDIT HOURS
Second Year		
	Engineering Elective	3
	Social Context Elective	3
	Technology Elective	3
ISEE-792	Engineering Capstone	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the ME program in sustainable engineering, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited university in engineering, mathematics, or science,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have a GPA of 3.0 or higher,
- Submit scores from the Graduate Record Exam (GRE),
- Submit a statement of purpose,
- Submit three letters of reference from individuals well qualified to judge the candidate's ability for graduate study, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL).

Applicants who have a bachelor's degree in a field outside of engineering may be considered for admission; however, additional bridge course work may be required before full admission into the major.

Sustainable Engineering, MS

rit.edu/kgcoe/program/sustainable-engineering
Brian Thorn, Program Director
(585) 475-6166, bkteie@rit.edu

Program overview

Sustainable engineering refers to the integration of social, environmental, and economic considerations into product, process, and energy system design methods. Additionally, sustainable engineering encourages the consideration of the complete product and process lifecycle during the design effort. The intent is to minimize environmental impacts across the entire lifecycle while simultaneously maximizing the benefits to social and economic stakeholders. The MS in sustainable engineering is multidisciplinary and managed by the industrial and systems engineering department.

The program builds on RIT's work in sustainability research and education and offers students the flexibility to develop tracks in areas such as renewable energy systems, systems modeling and analysis, product design, and engineering policy and management. Course work is offered on campus and available on a full- or part-time basis.

Educational objectives

The program is designed to accomplish the following educational objectives:

- Heighten awareness of issues in areas of sustainability (e.g., global warming, ozone layer depletion, deforestation, pollution, ethical issues, fair trade, gender equity, etc.).
- Establish a clear understanding of the role and impact of various aspects of engineering (design, technology, etc.) and engineering decisions on environmental, societal, and economic problems. Particular emphasis is placed on the potential trade-offs between environmental, social, and economic objectives.
- Strong ability to apply engineering and decision-making tools and methodologies to sustainability-related problems.
- Demonstrate a capacity to distinguish professional and ethical responsibilities associated with the practice of engineering.

Plan of study

Technical in nature, the program equips engineers with the tools they need to meet the challenges associated with delivering goods, energy, and services through sustainable means. In addition to basic course work in engineering and classes in public policy and environmental management, students are required to complete a research thesis directly related to sustainable design challenges impacting society. Many of these thesis projects support the sustainability themed research by RIT faculty in the areas of fuel-cell development, life-cycle engineering, and sustainable process implementation.

Students must successfully complete a total of 33 semester credit hours of course work comprised of five required core courses; two graduate engineering electives in an area of interest such as energy, modeling, manufacturing and materials, transportation and logistics, or product design and development; one social context elective; one environmental technology elective; two semesters of Graduate Seminar I, II (ISEE-795, 796); and a thesis. This research-oriented program is designed to be completed in two years.

Curriculum

Sustainable engineering, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISEE-785	Fundamentals of Sustainable Engineering	3
ISEE-771	Engineering of Systems I	3
MECE-629	Renewable Energy Systems	3
ISEE-795	Graduate Seminar I	0
ISEE-786	Lifecycle Assessment	3
	Engineering Electives	6
ISEE-796	Graduate Seminar II	0
Second Year		
	Technology Elective	3
	Social Context Elective	3
ISEE-790	Research and Thesis	6
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution in engineering, mathematics, or science,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have a minimum GPA of 3.0,
- Submit scores from the Graduate Record Exam (GRE),
- Submit a statement of purpose,
- Submit three letters of reference from individuals well qualified to judge the candidate's ability for graduate study, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL).

Applicants who have a bachelor's degree in a field outside of engineering may be considered for admission; however, additional bridge course work may be required before full admission into the program.

Vibrations, Adv. Cert.

rit.edu/kgcoe/mechanical/
Risa J. Robinson, Department Head
(585) 475-6445, rjreme@rit.edu

Program overview

The advanced certificate in vibrations provides students with specialized skills that are sought after in a variety of industrial settings. Engineers with skills in vibration engineering contribute to manufacturing production systems, aerospace systems, automotive engineering, medical product development, building mechanical and plumbing systems, consumer product development, and a host of industrial equipment and process systems. This certificate takes students beyond the normal preparation in vibration engineering that students typically complete during their undergraduate program of study. Students learn to use sophisticated software tools, analytical techniques and experimental methods to design, develop, and implement solutions for problems of vibration control and minimization in engineering systems. Students are exposed to modern technologies used in industry to ensure that they are prepared for their specialized job market. The curriculum answers a need for graduate level instruction for practicing engineers in a field of importance for the 21st century.

Plan of study

The advanced certificate requires students to successfully complete six required courses. Students may be able to apply the courses toward a master's degree at a later date.

Curriculum

Vibrations, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MECE-601	Math I For Engineers	3
MECE-602	Math II For Engineers	3
MECE-658	Introduction to Engineering Vibrations	3
MECE-758	Intermediate Engineering Vibrations	3
Choose one of the following:		
MECE-606	Systems Modeling	3
EEEE-602	Random Signals and Noise	3
EEEE-678	Digital Signal Processing	3
Total Semester Credit Hours		**15**

Additional information

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/vibrations.

Doreen Edwards, BS, South Dakota School of Mines and Technology; Ph.D., Northwestern University—Dean; Professor

Biomedical Engineering

Iris Asllani, B.Sc., University of Tirana (Albania); M.Sc., Ph.D., University of Washington, Seattle—Assistant Professor

Jennifer Bailey, BS, Ph.D., Purdue University—Lecturer

Steven Day, BS, Ph.D., University of Virginia; Diploma, von Karman Institute for Fluid Mechanics—Department Head; Associate Professor

Thomas Gaborski, BS, Cornell University; MS, Ph.D., University of Rochester—Assistant Professor, Nanomaterials, Separations, Cellular Mechanics

Behnaz Ghoraani, B.Sc., Sharif University of Technology (Iran); M.Sc., Amirkabir University of Technology (Iran); Ph.D., Ryerson University (Canada)—Assistant Professor, Biomedical Signal Analysis, Pattern Recognition in Cardiac Electrophysiology, Biomedical Instrumentation

Blanca Lapizco-Encinas, BS, MS, Instituto Tecnologico de Sonora (Mexico), Ph.D., University of Cincinnati—Associate Professor, Microfluidics, Microscale Electrokinetics and Bioseparations

Cristian Linte, BS, University of Windsor (Canada); MS, Ph.D., University of Western Ontario (Canada)—Assistant Professor

Daniel Phillips, BS, State University of New York at Buffalo; MS, Ph.D., University of Rochester—Associate Professor

Cory Stiehl, BS, University of Rochester; Ph.D., University of Massachusetts, Amherst—Senior Lecturer

Chemical Engineering

Steven J. Weinstein, BS, University of Rochester; MS, Ph.D., University of Pennsylvania—Department Head; Professor, Interfacial Transport Processes, Hydrodynamic Wave Phenomena, Applied Mathematics

Anju Gupta, BS, University of Mumbai (India); MS, Worcester Polytechnic Institute; Ph.D., University of Rhode Island—Assistant Professor

Karuna Koppula, B. Tech, Andhra University (India); MS, University of New Hampshire; Ph.D., Michigan State University—Lecturer

Brian J. Landi, BS, MS, Ph.D., Rochester Institute of Technology—Associate Professor, Carbon Nanotubes, Batteries, Wires

Christiaan Richter, BA, BSc, University of Pretoria (South Africa); MS, University of Nebraska at Lincoln; Ph.D., Northeastern University—Assistant Professor, Solar Energy, Nanomaterials, Terahertz Spectroscopy

Reginald E. Rogers, BS, Massachusetts Institute of Technology; MS, Northeastern University; Ph.D., University of Michigan—Assistant Professor, Carbon Nanotubes, Adsorption, Batteries

Kenneth J. Ruschak, BS, Carnegie Mellon University; Ph.D., University of Minnesota—Research Professor, Die Manifold Design, Interfacial Transport

Patricia Taboada-Serrano, BS, Mayor de San Andres University (Bolivia); MS, Simon Bolivar University (Bolivia); Ph.D., Georgia Institute of Technology—Assistant Professor

Computer Engineering

Shanchieh J. Yang, BS, National Chiao-Tung University (Taiwan); MS, Ph.D., University of Texas at Austin—Department Head; Professor, Network Modeling, Network Security, Cyber Situation and Threat Assessment

Reza Azarderakhsh, BS, University of Technology (Iran); Ph.D., Western University (Canada)—Assistant Professor, Cryptographic Hardware and Software, Applied Cryptography, Elliptic Curve Cryptography, High-Performance Computation, Post-quantum Cryptography

Louis Beato, BS, MS, Rochester Institute of Technology—Lecturer

Juan C. Cockburn, BS, Universidad Nacional de Ingenieria (Peru); MS, Ph.D., University of Minnesota—Associate Professor, Robust Control Systems, Active Vision

Amlan Ganguly, B. Tech, Indian Institute of Technology (India); MS, Ph.D., Washington State University—Assistant Professor, Wireless Network on Chip, Dependable Multi-core Systems

Dhireesha Kudithipudi, BS, Nagarjuna University (India); MS, Wright State University; Ph.D., University of Texas at San Antonio—Associate Professor, Nanoscale Circuits and Systems, Low-power Systems, Nontraditional CMOS Technologies

Andres Kwasinski, M.Sc., Ph.D., University of Maryland at College Park—Associate Professor, Wireless Networks, Digital Signal Processing, Cognitive Networks, and Networks for Sustainable Systems

Sonia Lopez Alarcon, BS, Ph.D., Complutense University of Madrid (Spain)—Assistant Professor, Heterpgeneous Computing, High Performance Computing and Architecture

Marcin Lukowiak, MS, Ph.D., Poznan University (Poland)—Associate Professor, Reconfigurable Computing, Cryptographic Engineering

Roy W. Melton, B.Sc., M.Sc, Ph.D., Georgia Institute of Technology—Senior Lecturer, Computer Architecture, Mobile and Cloud Computing

Raymond Ptucha, BS, State University of New York at Buffalo; MS, Ph.D., Rochester Institute of Technology—Assistant Professor, Machine Learning, Computer Vision, Robotics

Andreas Savakis, BS, MS, Old Dominion University; Ph.D., North Carolina State University—Professor, Digital Image Processing, Computer Vision

Muhammed E. Shaaban, BS, MS, University of Petroleum and Minerals (Saudi Arabia); Ph.D., University of Southern California—Associate Professor, Computer Architecture, Parallel High Performance Computing

Electrical and Microelectronic Engineering

Sohail A. Dianat, BS, Aria-Mehr University of Technology (Iran); MS, Ph.D., George Washington University—Department Head; Professor, Control Systems, Communications, Signal/Image Processing

Mustafa A. G. Abushagur, BS, Tripoli University (Libya); MS, Ph.D., California Institute of Technology—Professor, Micro-optical Systems, Micro- and Nano-photonic Devices

David Borkholder, BS, Rochester Institute of Technology; MS, Ph.D., Stanford University—Bausch and Lomb Professor, Professor, Biosensors (electromagnetic and chemical), Biomedical Instrumentation MEMS Fabrication, Systems Engineering

Edward E. Brown, Jr., BS, University of Pennsylvania; MS, Ph.D., Vanderbilt University—Associate Professor, Rehabilitation, Robotics, Control Systems, Biomechatronics

William W. Destler, BS, Stevens Institute of Technology; Ph.D., Cornell University—President, RIT; Professor, high power microwave sources, advanced accelerator concepts

Dale E. Ewbank, BS, MS, Ph.D., Rochester Institute of Technology—Senior Lecturer, Microlithography, Optics, Design of Experiments, Electro-optic Microsystems

Lynn F. Fuller, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Professor, IC Design, Semiconductor Manufacturing, MEMS and Microsystems

Karl D. Hirschman, BS, MS, Rochester Institute of Technology; Ph.D., University of Rochester—Director, Semiconductor and Microsystems Fabrication Laboratory; Professor, Semiconductor Process Integration, Photonic Devices

Christopher R. Hoople, BS, Union College; Ph.D., Cornell University—Senior Lecturer, Power Electronics, Device Physics

Mark Hopkins, BS, Southern Illinois University; MS, Ph.D., Virginia Polytechnic Institute—Professor, Control Systems, System Identification

Michael A. Jackson, BS, MS, Ph.D., State University of New York at Buffalo—Associate Professor, Solid State Devices, IC Metrology, Electronic Materials and Processing, Photovoltaics

Santosh Kurinec, BS, MS, Ph.D., University of Delhi (India)—Professor, Electronic Materials and Devices, IC Processing, Quantum and Nanoscale Devices, Non Volatile Memory, Photovoltaics

Zhaolin Lu, B.A., Chongqing University (China); MS, Michigan Technology University; Ph.D., University of Delaware—Associate Professor

Sergey Lyshevski, MS, Ph.D., Kiev Polytechnic Institute (Ukraine)—Professor, Microsystems

Panos P. Markopoulos, BS, MS, Technical University of Crete (Greece); Ph.D., University at Buffalo—Assistant Professor, Communication and Signal Processing

Sildomar Monteiro, BS, University of Amazona (Brazil); MS, Aeronautics Institute of Technology; Ph.D., Toyko Institute of Technology (Japan)—Assistant Professor, Mobile Robotics, Machine Learning, Remote Sensing, Hyperspectral Signal and Image Processing

James Moon, BS, Carnegie Mellon University; MBA, University of Rochester; MS, Ph.D., University of California at Berkeley—Associate Professor, Semiconductor and Solid State Physics, Integrated Circuit Design, Microfluidic MEMS

Mehran Mozaffari-Kermani, BS, Tehran University (Iran); MS, Ph.D., Western University—Assistant Professor, Cryptographic Engineering, Embedded Systems Security, Reliability of Cryptosystems, and Secure ASIC/FPGA Design

P. R. Mukund, BS, MS, Ph.D., University of Tennessee—Professor, VLSI Design, Electronic Devices and Circuit Design

Dorin Patru, BS, MS, Technical University of Cluj-Napoca (Romania); Ph.D., Washington State University—Associate Professor, Mixed-Signal and Digital Integrated Circuits and Systems

Robert E. Pearson, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Microelectronic Engineering Program Director, Associate Professor, Advanced Device and Process Modeling, VLSI Design and Parameter Extraction

Stefan Preble, BS, Rochester Institute of Technology; Ph.D., Cornell University—Associate Professor

Ivan Puchades, BS, MS, Ph.D., Rochester Institute of Technology—Research Assistant Professor, MEMS Design and Fabrication and Test

Sean L. Rommel, BS, Ph.D., University of Delaware—Associate Professor, Emerging Semiconductor Devices, Photonic Devices, Integration

Eli Saber, BS, State University of New York at Buffalo; MS, Ph.D., University of Rochester—Gleason Professor in Electrical Engineering, Professor, Signal Image and Video Processing, Communications, Biomedical Imaging, Computer Vision

Ferat E. Sahin, BS, Istanbul Technical University (Turkey); MS, Ph.D., Virginia Polytechnic Institute and State University—Professor, Artificial Intelligence, Control Systems, Robotics

Gill R. Tsouri, B.Sc., M.Sc., Ph.D., Ben-Gurion University (Isreal)—Associate Professor, MIMO, OFDM/OFDMA Systems, Wireless Sensor Networks, Diversity Methods

Jayanti Venkataraman, BS, MS, Bangalore University (India); Ph.D., Indian Institute of Science (India)—Professor, Electromagnetics, Microwaves and Antennas

Jing Zhang, BS, Huazhong University (China); Ph.D., Lehigh University—Assistant Professor, Devices fabrication of III-Nitride semiconductors for photonics

Industrial and Systems Engineering

Scott E. Grasman, BS, MS, Ph.D., University of Michigan—Department Head, Professor, Operations Research, Production/Logistics

Ronald L. Aman, BS, MS, Ph.D., North Carolina State University—Assistant Professor, Manufacturing, Rapid Prototyping

Denis R. Cormier, BS, University of Pennsylvania; MS, State University of New York at Buffalo; Ph.D., North Carolina State University—Earl W. Brinkman Professor, Manufacturing, Rapid Prototyping

Marcos Esterman, BS, MS, Massachusetts Institute of Technology; Ph.D., Stanford University—Associate Professor, Systems Engineering, Product Development

Michael E. Kuhl, BS, Bradley University; MS, Ph.D., North Carolina State University—Professor, Systems Simulation

Katie McConky, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Assistant Professor, Applied Statistics, Analytics, Operations Research

Matthew M. Marshall, BS, Rochester Institute of Technology; MS, Ph.D., University of Michigan—Associate Professor, Biomechanics, Ergonomics, Human Factors

Ruben A. Proaño, BS, Universidad San Francisco de Quito (Ecuador); MS, Ph.D., University of Illinois at Urbana-Champaign—Associate Professor, Operations Research, Logistics/Supply Chain Management

Rachel Silvestrini, BS, Northwestern University; MS, Ph.D., Arizona State University—Kate Gleason Associate Professor, Applied Statistics, Mathematical Modeling, Simulation

Brian K. Thorn, BS, Rochester Institute of Technology; MS, Ph.D., Georgia Institute of Technology—Associate Professor, Applied Statistics, Sustainable Design and Development, Life Cycle Assessment and Costing

Mechanical Engineering

Risa J. Robinson, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Department Head, Professor, Bioengineering, Respiratory Device Technologies, Aerosol Transport in Biological Systems

Margaret Bailey, BS, Pennsylvania State University; Ph.D., University of Colorado at Boulder, PE—Senior Faculty Associate to the Provost for ADVANCE; Professor, Energy Systems, Thermodynamics, Building Systems

Stephen Boedo, BA, State University of New York at Buffalo; MS, Ph.D., Cornell University—Associate Professor, Tribology and Lubrication

Agamemnon L. Crassidis, BS, MS, Ph.D., State University of New York at Buffalo—Graduate Coordinator, Associate Professor, Aerospace Engineering, Nonlinear Dynamics and Controls

Steven Day, BS, Ph.D., University of Virginia—Associate Professor, Bioengineering, Implantable Devices, Fluids in Biosystems

Alfonso Fuentes-Aznar, MS, University of Murcia, Spain, Ph.D., National University of Distance Education (UNED) in Madrid, Spain—Associate Professor, Gear Transmission, Enhanced Design Technologies for all Types of Gear Drives

Hany A. Ghoneim, BS, MS, Cairo University (Egypt); Ph.D., Rutgers University—Professor, Finite Elements, Vibrations

Amitabha Ghosh, B.Tech., M.Tech., Indian Institute of Technology (India); Ph.D., Mississippi State University—Professor, Computational Fluid Dynamics, Aerodynamics, Aerospace Engineering

Mario W. Gomes, BsE, Cornell University; MS, Georgia Institute of Technology; Ph.D., Cornell University—Assistant Professor, Sustainable Energy Systems

Surendra K. Gupta, B.Tech., Indian Institute of Technology (India); MS, University of Notre Dame; Ph.D., University of Rochester—Professor, Materials Science, Computer Software, Image Processing

Patricia Iglesias Victoria, BSE, Ph.D., Polytechnic University of Cartagena (Spain)—Assistant Professor, Friction and Wear, Tribology, Material Science

Satish G. Kandlikar, BE, Marathwada University (India); M.Tech., Ph.D., Indian Institute of Technology (India)—James E. Gleason Professor; Professor, Thermal Systems and Energy

Mark Kempski, BS, Purdue University; MS, Ph.D., State University of New York at Buffalo—Professor, Biomechanics, Bioengineering, Systems and Controls

Jason R. Kolodziej, BS, MS, Ph.D., State University of New York at Buffalo—Associate Professor, Hybrid Vehicle Technology and Renewable Energy

Margaretha J. Lam, BS, MS, State University of New York at Buffalo; Ph.D., Virginia Polytechnic Institute and State University—Senior Lecturer, Vibrations, Optimization

Kathleen Lamkin-Kennard, BS, Worcester Polytechnic Institute; MS, Ph.D., Drexel University—Associate Professor, Biomedical Engineering, Multi-physics Systems Modeling

Alexander Liberson, BS, MS, Ph.D., State University of Aerospace Technology (Moscow)—Lecturer, Multiphase Flow, Combustion, Mathematical Modeling

Alan H. Nye, BS, MS, Clarkson College; Ph.D., University of Rochester—Associate Department Head for Outreach; Professor, Automotive Engineering, Design of Systems

Ali Ogut, B.Ch.E., Hacettepe University (Turkey); MS, Ph.D., University of Maryland—Professor, Fluid Mixing, Thermal Fluid Sciences, Energy and Environment

Michael Schertzer, B.Eng.Mgt., M.A.Sc., McMaster University (Canada); Ph.D., University of Toronto (Canada)—Assistant Professor, Lab on a Chip, Medical Diagnosis Devices, Energy Harvesting

Michael Schrlau, BS, University of Pittsburgh; Ph.D., University of Pennsylvania—Assistant Professor, Bioengineering and Microsystems, Nanobiotechnology

Robert Stevens, BS, Swarthmore College; MS, North Carolina State University; Ph.D., University of Virginia—Associate Professor, Energy and Environment, MEMS, Thermal Properties, Energy Conversion, Thermoelectrics

Benjamin Varela, BS, Institute of Technology of Juarez (Mexico); MS, Ph.D., New Mexico State University—Associate Professor, Innovative Materials, Automation and Fluid Power, Dynamics

Panchapakesan Venkataraman, B.Tech., Indian Institute of Technology (India); MS, Ph.D., Rice University—Associate Professor, Optimal Control, Fluid Mechanics, Optimal Design, Aerospace Engineering

Wayne W. Walter, BS, State University of New York Maritime College; MS, Clarkson College; Ph.D., Rensselaer Polytechnic Institute, PE—Professor, Applied Mechanics, Robotics, Vibrations

The John D. Hromi Center for Quality and Applied Statistics

Mark W. Smith, BS, University of Virginia; MS, University of Rochester—Director

Peter Bajorski, MS, University of Wroclaw (Poland); Ph.D., Technical University of Wroclaw (Poland)—Professor, Regression Models, Multivariate Analysis, Nanparametrics, Imaging Science Applications

Vincent Buonomo, BS, ME, Rochester Institute of Technology—Sr. Program Manager, ASQ Certified Quality Engineer, Master Black Belt in Lean Six Sigma

Marcos Esterman, BS, MS, Massachusetts Institute of Technology; Ph.D., Stanford University—Associate Professor, Systems Engineering, Product Development

John T. Kaemmerlen, BS, ME, Rochester Institute of Technology—Senior Lecturer, Lean Manufacturing, Process Improvement, Engineering Design

Margaret Ochs, BA, Georgetown University; MBA, University of Rochester—Sr. Program Manager, Black Belt in Lean Six Sigma

Ruben A. Proano, BS, Universidad San Francisco de Quito (Ecuador); MS, Ph.D., University of Illinois at Urbana-Champaign—Assistant Professor, Operations Research, Logistics/Supply Chain Management

Rachel Silvestrini, BS, Northwestern University; MS, Ph.D., Arizona State University - Applied Statistics, Mathematical Modeling, Simulation

Brian Thorn, BS, Rochester Institute of Technology; MS, Ph.D., Georgia Institute of Technology - Associate Professor, Applied Statistics, Sustainable Design and Development, Life Cycle Assessment and Costing

Joseph G. Voelkel, BS, Rensselaer Polytechnic Institute; MS, Northwestern University; Ph.D., University of Wisconsin-Madison—Professor; experimental Design, Process Modeling and Improvement, Multivariate Analysis, Reliability, Nonparametrics

Microsystems Engineering

Bruce W. Smith, BS, MS, Ph.D., Rochester Institute of Technology—Director; Professor, Microlithography, Nanopatterning and Nanomaterials, Thin Films Materials and Processes

Mustafa A. G. Abushagur, BS, Tripoli University (Libya); MS, Ph.D., California Institute of Technology—Professor, Micro-optical Systems, Micro- and Nano-photonic Devices

David Borkholder, BS, Rochester Institute of Technology; MS, Ph.D., Stanford University—Bausch and Lomb Professor, Professor, Electrical and Microelectronic Engineering; Biosensors (electromagnetic and chemical), Biomedical Instrumentation MEMS Fabrication, Systems Engineering

Christopher Collison, BS, Ph.D., Imperial College of London (United Kingdom)—Associate Professor, Chemistry; Physical Chemistry: polymer chemistry

Denis R. Cormier, BS, University of Pennsylvania; MS, State University of New York at Buffalo; Ph.D., North Carolina State University— Earl W. Brinkman Professor of Screw Machine Technology; Associate Professor, Industrial Engineering

Lynn F. Fuller, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Professor, Microelectronic Engineering; IC Design, Semiconductor Manufacturing, MEMS and Microsystems

Thomas R. Gaborski, BS, Cornell University; MS, Ph.D., University of Rochester—Assistant Professor, Nanomaterials, Separations, Cellular Mechanics

Behnaz Ghoraani, B.Sc., Sharif University of Technology (Iran); M.Sc., Amirkabir University of Technology (Iran); Ph.D., Ryerson University (Canada)—Assistant Professor, Biomedical Signal Analysis, Pattern Recognition in Cardiac Electrophysiology, Biomedical Instrumentation

Karl D. Hirschman, BS, MS, Rochester Institute of Technology; Ph.D., University of Rochester—Director, Semiconductor and Microsystems Fabrication Laboratory; Professor, Electrical and Microelectronic Engineering; Semiconductor Process Integration, Photonic Devices

Seth M. Hubbard, BS, Drexel University; MS, Case Western Reserve University; Ph.D., University of Michigan—Associate Professor, Physics, Epitaxial Crystal Growth, Growth and Characterization of Nanomaterials, High-efficiency Photovoltaic Devices, Semiconductor Device Design and Fabrication, Thin Films

Satish G. Kandlikar, BE, Marathwada University (India); M.Tech., Ph.D., Indian Institute of Technology (India)—James E. Gleason Professor; Professor, Mechanical Engineering; Thermal Systems and Energy

Mehran Mozaffari Kermani, BS, University of Tehran (Iran); M.S.E.Sc, Ph.D, Univervisity of Western Ontario—Assistant Professor Electrical and Microelectronic Engineering; Embedded Systems, Cryptographic Hardware, VLSI, FPGA, ASIC

Dhireesha Kudithipudi, BS, Nagarjuna University (India); MS, Wright State University; Ph.D., University of Texas at San Antonio—Associate Professor, Nanoscale Circuits and Systems, Low-power Systems, Nontraditional CMOS Technologies

Santosh Kurinec, BS, MS, Ph.D., University of Delhi (India)—Professor, Electrical and Microelectronic Engineering; Electronic Materials and Devices, IC Processing, Quantum and Nanoscale Devices

Kathleen Lamkin-Kennard, BS, Worcester Polytechnic Institute; MS, Ph.D., Drexel University—Associate Professor, Biomedical Engineering, Multi-physics Systems Modeling

Brian J. Landi, BS, MS, Ph.D., Rochester Institute of Technology—Associate Professor, Chemical Engineering, Carbon Nanotubes, Batteries, Wires

Blanca Lapizco-Encinas, BS, MS, Instituto Tecnologico de Sonora (Mexico), Ph.D., University of Cincinnati—Associate Professor, Microfluidics, Microscale Electrokinetics and Bioseparations

Zhaolin Lu, BS, Changqing University (China); MS, Michigan Technological University; Ph.D., University of Delaware—Associate Professor, Photonics and Metamaterials, Electromagnetics, and Nanoelectronics

Parsian Katal Mohseni, BS, Ph.D., McMaster University—Assistant Professor, Nanomaterials Growth and Characterixation, III-V Epitaxy, Nanofabrication, Optoelectronics, Photovoltaics, MacEtch

Stefan Preble, BS, Rochester Institute of Technology; Ph.D., Cornell University—Associate Professor, Nanophotonics, Silicon Photonics, and Optics

Ryne Raffaelle, BS, MS, Southern Illinois University; Ph.D., University of Missouri-Rolla—Vice President for Research and Associate Provost, Professor

Christiaan Richter, BA, BSc, University of Pretoria (South Africa); MS, University of Nebraska at Lincoln; Ph.D., Northeastern University—Assistant Professor, Solar Energy, Nanomaterials, Terahertz Spectroscopy

Reginald Rogers, BS, Massachusetts Institute of Technology; MS, Northeastern University; Ph.D., University of Michigan—Assistant Professor, Chemical Engineering; Carbon Nanotubes, Chemical and Biological Sensors, Battery Materials, Novel Nanomaterials

Sean L. Rommel, BS, Ph.D., University of Delaware—Associate Professor, Electrical and Microelectronic Engineering; Emerging Semiconductor Devices, Photonic Devices, Integration

Ferat E. Sahin, BS, Istanbul Technical University (Turkey); MS, Ph.D., Virginia Polytechnic Institute and State University—Associate Professor, Electrical Engineering; Artificial Intelligence, Control Systems, Robotics

Michael Schrlau, BS, University of Pittsburgh; Ph.D., University of Pennsylvania—Assistant Professor, Bioengineering and Microsystems

Thomas W. Smith, BS, John Carroll University; Ph.D., University of Michigan—Professor, Chemistry; Organic/Polymer Chemistry: synthesis and device applications of block copolymer systems and nano composites

Jiandi Wan, BS, MS, Wuhuan University (China); Ph.D., Boston University—Assistant Professor, Microfluidics, Signaling Dynamics of the Microvascular System, Microemulsion-based Functional Materials, Photocatalytic Multiphase Reactions

Jing Zhang, BS, Huazhong University of Science and Technology (China); Ph.D., Lehigh University - Kate Gleason Assistant Professor, Electrical and Microelectronic Engineering; II-N Semiconductors, Light Emitters, Thermoelectric Devices

College of Health Sciences and Technology

Daniel Ornt, Dean
rit.edu/healthsciences

Programs of Study

Online learning option available.

The United States faces a looming shortage of many types of health care professionals, including nurses, physicians, dentists, pharmacists, and allied health workers. The college, housed in the Institute of Health Sciences and Technology, serves as an independent academic and research entity designed to provide a focused, interdisciplinary, and systems approach to innovative health care education, applied/translational research, and community outreach. The institute incorporates three major thrusts: the College of Health Sciences and Technology, a Health Science Research Center, and a Health Science Community Collaboration and Outreach Center.

The college offers clinically related and biomedical research-based programs to meet both the present and future needs of the health care system. The college's faculty and staff are committed to delivering high quality educational programs. Building on a foundation of liberal arts and basic sciences, students will gain advanced knowledge in theoretical science and practical applications in experiential learning environments. These experiences prepare students to serve as practitioners, scientists, and leaders through their contribution to, and the provision of, high-quality patient care, health care service, and/or applied, translational biomedical research.

Admission requirements

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

Financial aid and scholarships

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

Faculty

Faculty members in the college have considerable experience in their respective fields of discipline. Basic science and clinical faculty work side-by-side to provide students with a comprehensive learning experience to prepare them for their chosen health care related career.

Facilities and resources

In addition to facilities shared with the College of Science and the College of Imaging Arts and Sciences, the Center for Bioscience Education and Technology (CBET) provides a comprehensive environment to support academic, community, and career-training programs in the emerging life and medical sciences. The facility consists of multi-purpose, high-tech laboratories and classrooms for work-force development, academic programs, continuing education programs, research, K-12 student workshops, and secondary school training programs.

Health Care Finance, Adv. Cert.

rit.edu/healthsciences/graduate-programs/health-systems-administration
Kristen Waterstram-Rich, Interim Graduate Program Director
(585) 475-5117, kmw4088@rit.edu

Program overview

The advanced certificate in health care finance assists professionals in updating a set of skills or pursuing a career change. The advanced certificate may serve as a stand-alone credential, or, at a later date if a student decides to pursue the MS program in health systems administration, courses may be applied toward the requirements of the MS program. To meet the needs of working professionals, courses are available online.

Curriculum

Health care finance, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
HLTH-735	Management of Risk in Health Care	3
HLTH-737	Lean Six Sigma in Health Care	3
HLTH-730	Finance for Health Care Professionals	3
HLTH-732	Health Insurance and Reimbursement	3
Total Semester Credit Hours		**12**

Additional information

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/healthcarefinance.

Health Systems Administration, MS

rit.edu/healthsciences/graduate-programs/health-systems-administration
Kristen Waterstram-Rich, Interim Graduate Program Director
(585) 475-5117, kmw4088@rit.edu

Program overview

The master of science in health systems administration provides strategic skills for today's health care management professionals. Now, as never before, health care is rapidly transforming. The pace of technology and innovation are changing how, when, and where healthcare is provided, and who is providing it. Concurrently, health care consumers have high expectations for quality and responsiveness to their needs—delivered in a cost-effective manner. To provide these strategic skills, this post-graduate degree builds on a foundation of courses in policy and law formation, healthcare economics, finance, insurance reform, innovation, information technology, systems, operations and leadership. The course work is built on a foundation of skills and knowledge sets identified and endorsed by national health care leadership organizations. Graduates of the program are prepared to assume clinical and business leadership roles across the diverse healthcare industry.

The health care industry is changing rapidly due to healthcare reform and the Affordable Care Act. The MS degree encompasses course work that provides the graduate with a breadth of knowledge in areas key required for effective management of healthcare organizations: research, governance and economics, finance, health insurance, process improvement, project management and informatics. The curriculum also provides graduates a broad view of health care issues that administrators and leaders must be prepared to deal with effectively: change and innovation, leadership theory and application, bioethics, and human resources. Finally, the curriculum prepares the graduate to develop and implement plans designed to create and steer health care organizations of the future. Graduates will not only lead today's healthcare organizations, they will create patient-centered facilities of the future.

Plan of study

The program requires 39 credit hours at the graduate level and can be completed in two years or less. Students may complete the program on a part-time basis. Students must maintain a 3.0 grade point average. Toward the end of their program of study, students complete a capstone project consisting of a community research experience. Upon matriculation, each student works with the program director to develop a plan of study for their research experience.

Curriculum

Health systems administration, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HLTH-700	Research Methods	3
HLTH-715	Reinventing Health Care	3
HLTH-736	Health Care Operations Management	3
HLTH-717	Bioethics	3
HLTH-737	Lean Sigma in Health Care (summer)	3
Second Year		
HLTH-723	Human Resources in Health Care	3
HLTH-730	Finance for Health Care Professionals	3
HLTH-732	Health Insurance and Reimbursement	3
HLTH-760	Health Care Informatics	3
	Elective (summer)	3

COURSE		SEMESTER CREDIT HOURS
Third Year		
HLTH-740	Health Care Leadership	3
HLTH-796	Health Systems Planning	3
HLTH-797	Capstone	3
Total Semester Credit Hours		**39**

Admission requirements

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

- Hold a baccalaureate degree from a regionally accredited college or university,
- Have a cumulative GPA of 3.0 or above (or superior endorsement),
- Submit two letters of reference from individuals who have the opportunity to observe the applicant's work output,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Complete an interview with the program chair (for those without health care experience), and
- Complete a graduate application.

It is recommended that applicants have a minimum of three years of experience in a health care or health-related organization as either a practitioner or manager. Applicants who do not meet this requirement may be asked to complete certain undergraduate courses as a bridge for the content knowledge required for the graduate program. They may also be required to complete a graduate level internship in health care prior to graduation.

All credentials must be submitted and reviewed by faculty prior to the completion of 12 credit hours of graduate work in the program.

Additional information

Maximum time limit

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

Medical Illustration, MFA

rit.edu/healthsciences/graduate-programs/medical-illustration/
James Perkins, Graduate Program Director
(585) 475-2443, japfaa@rit.edu

Program overview

A medical illustrator is a professional artist with advanced education in the life sciences and visual communication. Collaborating with scientists and physicians, medical illustrators transform complex information into visual images that are used in education, research, patient care, public relations, legal cases, and marketing efforts.

Plan of study

The MFA program provides training in the biomedical sciences, the principles of visual communication, and a variety of digital media including 2D illustration, 3D computer modeling, animation, and interactive media. Students produce a thesis, which involves independent research and visual problem-solving to communicate a complex scientific subject.

Curriculum

Medical illustration, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ILLM-601	Human Gross Anatomy	6
ILLM-602	Anatomic Studies	3
ILLM-603	3D Modeling of Biomedical Forms	3
Choose one of the following:		3
HCIN-660	Fundamentals of Instructional Technology	
HCIN-610	Foundations of Human Computer Interactivity	
VCDE-711	Design Theory and Methods	
ILLM-606	3D Animation of Biomedical Forms	3
ILLM-607	Computer Applications in Medical Illustration	3
ILLM-608	Scientific Visualization	3
	Studio Elective	3
	Science Elective	3
Second Year		
ILLM-615	Interactive Media I	3
ILLM-612	Surgical Illustration	3
	Studio Electives	6
ILLM-616	Interactive Media II	3
ILLM-617	Portfolio and Business Practices	3
ILLM-890	Thesis	9
	Graduate Elective	3
Total Semester Credit Hours		**60**

Admission requirements

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

- Hold a baccalaureate degree in a field of the arts, sciences, or education from a regionally accredited college. The undergraduate degree should include studio art courses, one year of general or introductory biology (for biology majors), and a minimum of three advanced biology courses, such as vertebrate anatomy, physiology, neurobiology, cell biology, molecular biology, immunology, microbiology, genetics, developmental biology, or pathology.
- Demonstrate, through the quality of the undergraduate record and creative production, a genuine, professional potential,
- Demonstrate, through the submission of a portfolio, outstanding drawing skills, particularly the ability to draw subjects from direct observation.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work, and
- Complete a graduate application.

- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 550 (paper-based) or 80 (Internet-based) are required. Scores from the International English Language Testing System may be submitted in place of the TOEFL. A minimum score of 6.5 is required. Those applicants coming from countries where the baccalaureate degree is not awarded for programs in the practice of art may be admitted to graduate study if the diploma or certificate received approximates the standards of the BFA, BA, or BS degrees, and if their academic records and portfolios indicate an ability to meet graduate standards.

Daniel Ornt, BA, Colgate University; MD, University of Rochester—Dean

Health Systems Administration

Kristen Waterstram-Rich, BS, MS, Rochester Institute of Technology—Interim Graduate Program Director; Professor

Medical Illustration

Glen Hintz, BA, Lafayette College; MS, The Medical College of Georgia—Associate Professor

James Perkins, BA, Cornell University; MFA, Rochester Institute of Technology; ABD, University of Rochester—Graduate Program Director; Professor

College of Imaging Arts and Sciences

Lorraine Justice, Dean
cias.rit.edu

Programs of Study

Master of Fine Arts degrees in:	Page
Ceramics	84
Film and Animation *Options available in: 2D, animation, 3D animation, production, and screenwriting.*	92
Fine Arts Studio	88
Furniture Design	85
Glass	86
Imaging Arts	94
Industrial Design	89
Metals and Jewelry Design	87
Visual Communication Design *Options available in: communication design, interaction design, and motion and 3D digital design.*	90

Master of Science for Teachers degree in:	
Art Education (Visual Arts—All Grades)	89

Master of Science degree in:	
Print Media	91

Advanced Certificates in:	
Non-toxic Printmaking	88
User Experience Design and Development	90

Online learning option available.

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

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

- Photojournalism alumni have won 12 Pulitzer Prizes.
- Students have won the Graduate Film Honorarium of the Princess Grace Award.
- A computer graphics design alumnus was awarded a Golden Globe.
- An emerging filmmaker received the overall grand prize in the Adobe Flash Point Student Design Contest for multimedia projects.
- Computer graphics design students have won Adobe Design Achievement Awards.
- Computer graphics design alumni won an Emmy at the 31st Annual Sports Emmy awards.
- Graphic design alumni have received awards of excellence from the Society of Technical Communications, both locally and internationally.
- A computer graphics design graduate received honors from *Communication Arts* and *I.D.* magazines for her interactive thesis project.
- An industrial design student received an award from Volvo of North America for his winning child car seat in the Design for Automobile Safety Competition at the World Traffic Safety Symposium.
- Students from the School of Media Sciences have published and presented papers nationally and won the best paper award from Technical Association of the Graphic Arts.
- Current students and alumni have been peer-selected speakers at the Society for Photographic Education's national conference.
- A fine arts studio alumna won the Dedalus Fellowship in painting and sculpture.
- Fine arts studio students and alumni have been selected for Artist in Residencies at Salem Art Works.
- Fine arts studio students and alumni have presented at the National Conference for Cast Iron Art.

Admission requirements

Admission to graduate programs in CIAS requires a combination of academic performance and creative visual skills that are

evaluated via a portfolio review. Faculty review each student's portfolio to evaluate creative visual skills as well as the potential for success in the student's selected program.

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

Financial aid and scholarships

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

Faculty

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

Policy regarding student work

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

Facilities

The college has extensive facilities and resources:

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

Study options

Nonmatriculated students:

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

School for American Crafts

Ceramics, MFA

cias.rit.edu/schools/american-crafts/graduate-ceramics-graduate
Jane Shellenbarger, Assistant Professor
(585) 475-6114, sac@rit.edu

Program overview

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

Curriculum

Ceramics, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CCER-701	Ceramics Graduate Studio I	6
CCER-702	Ceramics Graduate Studio II	6
ARTH-605	Thinking About Making: The Practice of Art in a Global Society	3
FNAS-702	Fine Art Research	3
	Free Electives	9
CGEN-702	Crafts Graduate Seminar	3
Second Year		
CCER-790	Ceramics Thesis Initiation	6
CGEN-703	Thesis Implementation	3
CGEN-704	Thesis Review	3
CCER-890	Ceramic Thesis Resolution	9
	Free Elective	3
	CIAS Studio Electives	6
Total Semester Credit Hours		**60**

Admission requirements

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

- Hold a baccalaureate degree in a field of arts, sciences, or education from a regionally accredited institution in the United States,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work (the undergraduate degree should include 50 semester hours in studio courses),
- Demonstrate, through the quality of the undergraduate record and creative production, a genuine, professional potential,
- Submit a portfolio, and
- Complete a graduate application.
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 550 (paper-based) or 80 (Internet-based) are required. Scores from the International English Language Testing System (IELTS) are accepted in place of the TOEFL. A minimum score of 6.5 is required. Applicants coming from countries where the baccalaureate degree is not awarded for programs in the practice of art may be admitted to graduate study if the diploma or certificate received approximates the standards of the BFA, BA, or BS degrees, and if their academic records and portfolios indicate an ability to meet graduate standards.

Additional information

Studio residency program

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

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

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

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

Furniture Design, MFA

cias.rit.edu/schools/american-crafts/graduate-woodworking-graduate
Andy Buck, Professor
(585) 475-6114, sac@rit.edu

Program overview

The MFA program in furniture design is structured around the individual student's needs, interests, and background. As such, the program seeks to strengthen students' techniques, advance their aesthetic and design sensibilities, and hone their personal expression. The first year of the program exposes students to a broad range of critical issues related to the conception and production of art, serves to inspire and provoke their critical reflection, and facilitate the development of a preliminary thesis topic. In the second year students propose and fully engage in a thesis project, which culminates in a major exhibition in the spring.

Curriculum

Furniture design, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CWFD-701	Furniture Design Graduate Studio I	6
CWFD-702	Furniture Design Graduate Studio II	6
ARTH-605	Thinking About Making	3
FNAS-702	Fine Arts Research	3
CGEN-702	Crafts Graduate Seminar	3
	Free Electives	9
Second Year		
CWFD-790	Furniture Design Thesis Initiation	6
CWFD-890	Furniture Design Thesis Resolution	9
CGEN-703	Thesis Implementation	3
CGEN-704	Thesis Review	3
	Free Elective	3
	CIAS Studio Electives	6
Total Semester Credit Hours		**60**

Admission requirements

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

- Hold a baccalaureate degree in a field of art, science, or education from a regionally accredited institution in the United States,
- Demonstrate, through the quality of the undergraduate record and creative production, a genuine, professional potential,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work (undergraduate degree should include 50 semester hours of studio courses),
- Submit a portfolio, and
- Complete a graduate application
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 550 (paper-based) or 80 (Internet-based) are required. Scores from the International English Language Testing System are accepted in place of the TOEFL. An IELTS score of 6.5 is required. For international students coming from countries where the baccalaureate degree 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 if their academic records and portfolios indicate an ability to meet graduate standards.

Additional information

Studio Residency program

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

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

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

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

Glass, MFA

cias.rit.edu/schools/american-crafts/graduate-glass
Michael Rogers, Professor
(585) 475-6114, sac@rit.edu

Program overview

The MFA in glass is a two-year program of study that develops students personal creative voice through intensive research, discussion, critique, and experimentation. Students are provided full access to a complete glass facility and individual studio space to strengthen their technique and to practice designing pieces that flourish their personal expression of the medium. Graduate studio courses, seminar courses, and in-depth critiques are offered in conjunction with thesis planning and implementation to provide students with a deep understanding of this personal craft. Students are exposed to a broad range of critical issues related to the conception and production of art, to inspire and provoke critical reflection and facilitate the development of a thesis exhibition and supporting documentation.

Curriculum

Glass, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CGLS-701	Glass Graduate Studio I	6
CGLS-702	Glass Graduate Studio II	6
FNAS-702	Fine Arts Research	3
ARTH-605	Thinking About Making	3
CGEN-702	Crafts Graduate Seminar	3
	Free Electives	9
Second Year		
CGLS-790	Glass Studio Thesis Initiation	6
CGLS-890	Glass Studio Thesis Resolution	9
CGEN-703	Thesis Implementation	3
CGEN-704	Thesis Review	3
	CIAS Studio Electives	6
	Free Elective	3
Total Semester Credit Hours		**60**

Admission requirements

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

- Hold a baccalaureate degree in a field of arts, sciences, or education from a regionally accredited institution in the United States,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work (the undergraduate degree should include 50 semester hours in studio courses),
- Demonstrate, through the quality of the undergraduate record and creative production, a genuine, professional potential,
- Submit a portfolio, and
- Complete a graduate application.
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 550 (paper-based) or 80 (Internet-based) are required. Scores from the International English Language Testing System (IELTS) will be accepted in place of the TOEFL. A minimum score of 6.5 is required. Applicants coming from countries where the baccalaureate degree is not awarded for programs in the practice of art may be admitted to graduate study if the diploma or certificate received approximates the standards of the BFA, BA, or BS degrees, and if their academic records and portfolios indicate an ability to meet graduate standards.

Additional information

Studio Residency program

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

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

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

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

Metals and Jewelry Design, MFA

cias.rit.edu/schools/american-crafts/graduate-metalcrafts-graduate
Leonard Urso, Professor
Carlos Caballero-Perez, Professor
(585) 475-6114, sac@rit.edu

Program overview

The MFA is a professional degree for practicing artists, craftspeople, or designers who desire to leave a lasting impression on their fields by devotion to their work and high standards of discipline and artistic ideals. The MFA is generally a two-year, full-time program that involves the presentation of a thesis, which includes written documentation and a formal exhibition of a body of work.

Plan of study

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

Curriculum

Metals and jewelry design, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CMTJ-701	Metals and Jewelry Design Graduate Studio I	6
CMTJ-702	Metals and Jewelry Design Graduate Studio II	6
FNAS-702	Fine Art Research	3
ARTH-605	Thinking About Making	3
CGEN-702	Crafts Graduate Seminar	3
	Free Elective	9
Second Year		
CMTJ-790	Metals and Jewelry Design Thesis Initiation	6
CMTJ-890	Metals and Jewelry Design Thesis Resolution	9
CGEN-703	Thesis Implementation	3
CGEN-704	Thesis Review	3
	Free Elective	3
	CIAS Studio Electives	6
Total Semester Credit Hours		**60**

Admission requirements

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

- Hold a baccalaureate degree in a field of art, science, or education from a regionally accredited institution in the United States,
- Demonstrate, through the quality of the undergraduate record and creative production, a genuine, professional potential,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work (undergraduate degree should include 50 semester hours in studio courses),
- Submit a portfolio, and
- Complete a graduate application.
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 550 (paper-based) or 80 (Internet-based) are required. Scores from the International English Language Testing System are accepted in place of the TOEFL. A minimum score of 6.5 is required. For those applicants applying from countries where the baccalaureate degree is not awarded for programs in the practice of art may be admitted to graduate study if the diploma or certificate received approximates the standards of the BFA, BA, or BS degrees, and if their academic records and portfolios indicate an ability to meet graduate standards.

Additional information

Studio Residency program

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

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

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

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

School of Art

Fine Arts Studio, MFA

cias.rit.edu/schools/art/graduate-fine-arts-studio
Elizabeth Kronfield, Professor, Graduate Director
(585) 475-7562, edkfaa@rit.edu

Program overview

The MFA in fine arts studio is a rigorous two-year program comprised of major studio courses chosen from painting, sculpture, non-toxic printmaking, and expanded forms. The program also includes studio electives in areas such as film, ceramics, photography, industrial design, and glass in addition to theory, and contemporary art history, A thesis is required.

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

Curriculum

Fine arts studio, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
	Fine Art Studio Major Courses	15
ARTH-605	Thinking About Making	3
FNAS-702	Fine Art Research	3
	Art History (Contemporary) Course	3
FNAS-606	Business Practices	3
	CIAS Studio Elective	3
	Free Elective	3
Second Year		
	Fine Art Studio Major Courses	9
FNAS-890	Research and Thesis	10
	CIAS Studio Elective	3
	Free Electives	6
Total Semester Credit Hours		**61**

Admission requirements

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

- Hold a bachelor of fine arts degree (or equivalent) from an accredited college or university,
- Submit a portfolio containing a cohesive body of artwork that demonstrates both technical skill and visualization of conceptual thought,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit two letters of recommendation,
- Submit a letter of intent, which should include a candidate's interest in obtaining an MFA, the selection of RIT for the MFA degree, and professional goals to be achieved,
- Submit an artist's statement explaining the intention behind the portfolio submitted, and
- Complete a graduate application.
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 550 (paper-based) or 80 (Internet-based) are required. Scores from the International English Language Testing System are accepted in place of the TOEFL. A minimum score of 6.5 is required.

Non-toxic Printmaking, Adv. Cert.

Glen Hintz, Administrative Chair
(585) 475-2161, grhfad@rit.edu

Program overview

The advanced certificate in non-toxic printmaking offers technical training and retraining for artists and printmaking professionals seeking a comprehensive working knowledge of non-toxic printmaking techniques, including a study of methodology and aesthetic applications.

Curriculum

Non-toxic printmaking, advanced certificate, typical course sequence

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

Admission requirements

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

- Hold a BFA, MFA, or be recognized as a master printer or professional print maker,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a letter of intent,
- Submit a current resume,
- Submit a slide portfolio (between 10–20 slides),
- Submit three references with contact information, and
- Complete a graduate application.

Visual Arts–All Grades (Art Education), MST

cias.rit.edu/schools/art/graduate-teaching-visual-arts
Lauren Ramich, Graduate Director
(585) 475-7562, facpgd@rit.edu

Program overview

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

Curriculum

Visual arts-all grades (art education), MST degree, typical course sequence

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

Admission requirements

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

- Hold a baccalaureate degree in an art field from a regionally accredited college or university in the United States, with a major concentration in art, art education, or industrial arts education,
- Have a minimum of 36 semester credit hours in drawing, painting, design, or the crafts. If the applicant holds a BA or BFA degree and seeks the MST degree in visual arts, the undergraduate program must have adhered to the studio course distribution required by the New York State Department of Education.
- Submit a portfolio.
- Complete a graduate application.

Portfolio

Portfolios submitted to the Schools of American Crafts and The School of Art should consist of at least 20 examples of an applicant's work.

School of Design

Industrial Design, MFA

cias.rit.edu/schools/art/graduate-industrial-design
Alex Lobos, Graduate Director
(585) 475-7417, aflfaa@rit.edu

Program overview

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

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

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

Curriculum

Industrial design, MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
IDDE-701	Design Laboratory I	6
IDDE-703	Function of Form	3
IDDE-705	2D Ideation and Visualization	3
VCDE-701	Design History Seminar	3
IDDE-702	Design Laboratory II	6
IDDE-704	Form of Function	3
IDDE-706	Integrated Design Visualization	3
IDDE-711	Design Research and Proposal	3
Second Year		
	Free Electives	15
	Art History Elective	3
IDDE-790	Thesis: Research and Planning	6
IDDE-890	Thesis: Implementation and Evaluation	6
Total Semester Credit Hours		**60**

Admission requirements

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

- Hold a baccalaureate degree (or equivalent) from an accredited college or university,
- Present a portfolio of work that demonstrates strong design skills, visual sophistication, and aesthetic awareness,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit three letters of recommendation,
- Submit a personal statement of purpose detailing the attributes a candidate brings to graduate study, including expectations and professional goals they wish to achieve,
- Complete a graduate application.

Portfolio

A portfolio, along with written records of achievements and recommendations, serves to inform the faculty of the applicant's readiness for advanced graduate study. It provides a visual statement of the applicant's performance to date of a candidate's design skills, aesthetic development, and maturity.

User Experience Design and Development, Adv. Cert.

Adam Smith, Graduate Program Director
(585) 475-4552, aesfaa@rit.edu

Program overview

The advanced certificate in user experience design and development provides working professionals an opportunity to learn and develop user-centered visual design skills for current and/or emerging industry and career demands. Students learn the fundamentals of design creation, applied skills, and aesthetics for interface, user experience design and basic interaction development. Students incorporate industry best practices and principles through the design and production of applied visual design projects.

The goal of the program is to assist professionals in developing design skills and aesthetic principles to achieve job mobility in the fields of visual digital design, user-experience design, interaction design, Web and mobile design, marketing, advertising, and project planning, to name a few.

Curriculum

User experience design and development, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
UXDE-721	User Experience Design	3
	Free Elective	3
UXDE-711	User Interface Design	3
UXDE-722	Interaction Design and Development	3
Total Semester Credit Hours		**12**

Admission requirements

To be considered for admission to the advanced certificate in user experience design and development, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited institution,
- Have a minimum undergraduate GPA of 3.0,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume,
- Submit a personal statement,
- Submit two letters of recommendation, and
- Complete a graduate application.

Additional information

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/user_experience.

Visual Communication Design, MFA

cias.rit.edu/schools/design/graduate-visual-communication-design
Chris Jackson, Graduate Program Director
(585) 475-5823, cbjpgd@rit.edu

Program overview

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

Plan of study

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

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

Curriculum

Visual communication design (communication design option), MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
VCDE-701	Design History Seminar	3
VCDE-706	3D Modeling and Motion	3
VCDE-707	Web and UI Design	3
VCDE-708	Typography	3
VCDE-709	Digital Design in Motion	3
IDDE-711	Design Research and Proposals	3
VCDE-717	Design Systems	3
VCDE-718	Project Design and Implementation	3
VCDE-723	Interaction Design	3
	Free Elective	3
Second Year		
VCDE-732	Branding and Identity Design	3
VCDE-741	Environmental Graphic Design	3
VCDE-742	Information Design	3
VCDE-746	Professional Practices	3
VCDE-790	Thesis Research and Planning	3
VCDE-890	Thesis Implementation and Evaluation	6
	Free Electives	9
Total Semester Credit Hours		**60**

Visual communication design (interaction design option), MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
VCDE-701	Design History Seminar	3
VCDE-706	3D Modeling and Motion	3
VCDE-707	Web and UI Design	3
VCDE-708	Typography	3
VCDE-709	Digital Design in Motion	3
IDDE-711	Design Research and Proposals	3
VCDE-718	Project Design and Implementation	3
VCDE-723	Interaction Design	3
IGME-609	Programming for Designers	3
	Free Elective	3

COURSE		SEMESTER CREDIT HOURS
Second Year		
VCDE-733	Digital Media Integration	3
VCDE-741	Experiential Graphic Design	3
VCDE-736	UX Design Strategies	3
VCDE-746	Professional Practices	3
VCDE-790	Thesis Research and Planning	3
VCDE-890	Thesis Implementation and Evaluation	6
	Free Electives	9
Total Semester Credit Hours		**60**

Visual communication design (motion and 3D digital design option), MFA degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
VCDE-701	Design History Seminar	3
VCDE-706	3D Modeling and Motion	3
VCDE-707	Web and UI Design	3
VCDE-708	Typography	3
VCDE-709	Digital Design in Motion	3
IDDE-711	Design Research and Proposals	3
VCDE-628	3D Particles and Dynamics	3
VCDE-718	Project Design and Implementation	3
VCDE-728	Motion Graphics	3
VCDE-731	3D Visual Design	3
Second Year		
VCDE-636	3D Motion Design	3
VCDE-746	Professional Practices	3
VCDE-790	Thesis Research and Planning	3
VCDE-890	Thesis Implementation and Evaluation	6
	Professional Elective*	3
	Free Electives	12
Total Semester Credit Hours		**60**

* Professional Elective may be any VCDE studio elective course.

Admission requirements

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

- Hold a baccalaureate degree (or equivalent) from an accredited college or university,
- Present a portfolio of work that demonstrates strong design skills, visual sophistication, and aesthetic awareness,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit three letters of recommendation,
- Submit a personal statement of purpose detailing the attributes a candidate brings to graduate study, including expectations and professional goals they wish to achieve,
- Complete a graduate application.

Portfolio

A portfolio, along with written records of achievements and recommendations, serves to inform the faculty of the applicant's readiness for advanced graduate study. It provides a visual statement of the applicant's performance to date of a candidate's design skills, aesthetic development, and maturity.

The portfolio must demonstrate a strong understanding of design principles and visual computer skills using Adobe products, including Photoshop, Illustrator, and InDesign. A portfolio of 10-15 examples representing a cohesive body or bodies of recent work should be uploaded to rit.slideroom.com, the college's portfolio website, or via a personal website.

Examples must demonstrate a good sense of design, typography, and digital illustration in addition to the applicant's interests in and aptitudes for advanced study and, specifically, potential for success at RIT. Applicants are encouraged to submit only their best original work. Applicants should not submit work copies from film, television, photographs, magazine/book illustrations, or other sources.

School of Media Sciences

Print Media, MS

cias.rit.edu/schools/media-sciences/graduate-graduate-print-media
Christine Heusner, Graduate Director
(585) 475-4627, cxhppr@rit.edu

Program overview

The MS program in print media offers students an opportunity to explore new areas of research in the graphic communications field. The program's faculty and curriculum focus on establishing quality and efficiencies pertaining to business, technology, and processes in graphic communications. Our faculty are experts in many different areas, including print, business, color management, web and IT, digital publishing, imaging, and typography. Students have the opportunity to get hands-on experience by working with faculty as graduate assistants either in the classroom or assisting with faculty research. Graduates are employed as industry leaders in advertising, publishing, business operations, communication processes, and product developments.

Plan of study

The program requires 36 semester credit hours of study and includes six core courses, four electives, and a thesis.

Electives

Students may focus their studies through elective courses. Electives are comprised of selected courses offered by the College of Imaging Arts and Sciences or other RIT colleges. All courses must be pre-approved by the graduate program chair.

Thesis

All students are required to complete a research thesis that demonstrates original thinking and creativity in the search for new knowledge in the graphic communication industry. Students work with expert faculty and focus on a particular topic of thesis research in areas including content management, publishing workflows, typography and layout, business trends, color management, and applications of printing.

Curriculum

Print media, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PPRT-601	Materials and Processes in Printing	3
PPRT-602	Tone and Color Analysis	3
PPRT-603	Operations Management in Graphic Arts	3
PPRT-703	Cross Media Workflow	3
PPRT-704	Research Methods and Trends in Graphic Media	3
DECS-782	Statistical Analysis and Decision Making	3
	Free Electives	6
Second Year		
PPRT-790	Thesis	6
PPRT-892	Continuation of Thesis	0
	Free Electives	6
Total Semester Credit Hours		**36**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have a minimum undergraduate GPA of 3.0,

- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume,
- Submit a personal statement,
- Submit GRE scores,
- Submit two letters of recommendation, and
- Complete a graduate application.

School of Film and Animation

Film and Animation, MFA

cias.rit.edu/schools/film-animation/graduate-film-and-animation
Thomas Gasek, Graduate Director
(585) 475-7403, tdgpph@rit.edu

Program overview

The MFA program in film and animation enjoys state-of-the-art facilities. Students can create live-action production, scripts, 2D, 3D or stop motion animation that is unique. The program is housed in a School of Film and Animation with full production facilities, as well as the additional support of highly specialized faculty in photography, imaging science, computer science, information technology, and printing.

Goals

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

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

Plan of study

The MFA in film and animation offers four options:

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

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

A minimum of 63 semester credit hours of graduate work is outlined below.

Electives

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

Thesis

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

Curriculum

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

COURSE		SEMESTER CREDIT HOURS
First Year		
SOFA-601	Graduate Production	3
SOFA-605	Basic Sound Recording	3
SOFA-610	Graduate Seminar	2
SOFA-611	History and Aesthetics of Animation	3
Choose one of the following:		3
SOFA-617	Stop Motion Puppet Fundamentals	
SOFA-615	3D Animation Fundamentals	
SOFA-622	30-Second Film	3
SOFA-603	2D Animation I: Fundamentals	3
SOFA-625	Animated Acting Principles	3
SOFA-627	Pre-production for Animators	3
Choose one of the following:		3
SOFA-748	Concept and Character Design	
SOFA-623	Stop Motion Master Class	
SOFA-628	Animation Writing and Visual Storytelling	3
SOFA-630	Animation Film Language	2
Second Year		
SOFA-717	Animation Workshop	4
SOFA-618	Business Careers and Animation	3
SOFA-780	Thesis Preparation Seminar	1
SOFA-604	2D Animation II: Mechanics	3
	SOFA Electives	9
Third Year		
SOFA-790	Research and Thesis I	4
SOFA-890	Research and Thesis II	4
Total Semester Credit Hours		**68**

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

COURSE		SEMESTER CREDIT HOURS
First Year		
SOFA-605	Basic Sound Recording	3
SOFA-610	Graduate Seminar	2
SOFA-611	History and Aesthetics of Animation	3
Choose one of the following:		3
SOFA-603	2D Animation I: Fundamentals	
SOFA-617	Stop Motion Puppet Fundamentals	
SOFA-622	30-Second Film	3
SOFA-625	Animated Acting Principles	3
SOFA-627	Pre-production for Animators	3
SOFA-628	Animation Writing and Visual Storytelling	3
SOFA-630	Animation Film Language	2
SOFA-695	Advanced 3D Animation	3
SOFA-615	3D Animation Fundamentals	3
Second Year		
SOFA-675	3D Lighting and Texturing	3
SOFA-717	Animation Workshop	4
SOFA-618	Business Careers and Animation	3
SOFA-780	Thesis Preparation Seminar	1
	SOFA Electives	9
	Free Electives	6
Third Year		
SOFA-790	Research and Thesis I	4
SOFA-890	Research and Thesis II	4
Total Semester Credit Hours		**65**

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

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

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

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

Admission requirements

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

- Hold a baccalaureate degree from an accredited college or university,
- Submit an on-line portfolio of work that demonstrates the applicant's skills, visual sophistication, and aesthetic awareness,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a 2 to 3 minute on-line self portrait video,
- Submit two letters of recommendation,
- Submit a personal statement of purpose detailing why the candidate wants to attend graduate school and what they will bring to the program, and
- Complete a graduate application.

Scores from the Graduate Record Exam (GRE) are not required for admission. International students are required to submit English language test scores such as TOEFL. 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 makes recommendations based on the above interlocking criteria.

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

All correspondence concerning applications or catalogs should be addressed to the Office of Graduate Enrollment Services. Students inter-

ested in the program should have their application process completed by January 15. Applications received later than January 15 are considered on a space-available basis.

Portfolio

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

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

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

Applicants are also required to produce a 2 to 3 minute video self-portrait to accompany the online portfolio. This should include information about the applicant such as why you want to attend the School of Film and Animation, which concentration you wish to pursue, and why. Please include information about one significant accomplishment you have made. Sound and picture quality should be clear. The online portfolio and self-portrait must be mounted on Slideroom.com once a Slideroom account is established.

For more information about portfolio guidelines as well as assistance in uploading an online portfolio, contact Graduate Enrollment Services.

Transfer credit

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

Grades

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

Maximum time limit

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

Screenings

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

School of Photographic Arts and Sciences

Imaging Arts, MFA

photography.rit.edu

Christine Shank, MFA Director, School of Photographic Arts and Sciences
(585) 475-2884, crspph@rit.edu

Program overview

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

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

Program goals

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

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

Plan of study

Distribution of work within these guidelines is subject to modification based upon the candidate's background, abilities, and interests. An individualized course of study is prepared with the advice of the graduate faculty and made a matter of record. Modifications in this prescribed program thereafter must be approved and recorded.

Electives

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

Thesis

Matriculation from the MFA program is obtained when the student has completed and mounted their graduate thesis exhibition, successfully passed their thesis defense, and completed and submitted their thesis publication. The thesis must be an original body of work appropriate to the major commitment of the degree. The thesis publication is a professional, published presentation of the thesis project, which must be submitted, in both print and digital form. It must contain an extended artist statement and a presentation of the majority of thesis artwork. It is prepared for inclusion in the Wallace Library, the School's Archive, and the Graduate Annex Space. The verbal defense requires a public address by the student, discussion of the thesis project, and exhibition in a digital presentation format.

Accreditation

The MFA program in imaging arts and the BFA program in photographic and imaging arts are accredited by the National Association of Schools of Art and Design (NASAD).

Curriculum

Imaging arts, MFA degree, typical course sequence

COURSES		SEMESTER CREDIT HOURS
First Year		
PHGR-701	Histories and Aesthetics of Photography I	3
PHGR-702	Histories and Aesthetics of Photography II	3
PHGR-703	Imaging Core I	3
PHGR-704	Imaging Core II	3
PHGR-711	Graduate Seminar	3
ARTH-605	Thinking about Making: The Practice of Art in a Global Society	3
	Free Electives	6
	Professional Electives	6
Second Year		
PHGR-721	Research Core I	3
PHGR-723	Research Core II	3
PHGR-724	Professional Development for the Emerging Artist	3
PHGR-890	Thesis	12
	Free Electives	9
Total Semester Credit Hours		**60**

Admission requirements

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

- Hold a baccalaureate degree (or equivalent) from an accredited college or university,
- Submit a portfolio containing a focused body of artwork that demonstrates visual sophistication, aesthetic awareness, skill, and craft, as well as a commitment to a purpose and idea.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Submit three letters of recommendation.
- Submit a Letter of Intent, which should include a candidate's interest in obtaing an MFA, the selection of RIT for the MFA degree, and professional goals to be achieved.
- Submit an Artist Statement explaining the intention behind the portfolio submitted.
- Complete a graduate application through the Graduate Admission Website.
- Participate in an interview (optional).

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

Portfolio

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

Applicants should submit a portfolio of 20 images representing a cohesive body or bodies of recent work. Images must be uploaded to rit.slideroom.com. Through Slideroom and the Graduate Admissions website, applicants will submit their Letter of Intent and an Artist's Statement.

The application deadline is Jan 15. Admission selection for the fall semester is made in the spring from among all portfolios and completed applications received. Acceptance occurs only once a year for a fall admission.

Portfolio instructions to SlideRoom:

- Submit a portfolio of no more than 20 images to the college's portfolio website: rit.slideroom.com. (Size restrictions can be found through SlideRoom.) SlideRoom supplies space for titling and additional information about each image, such as: title of the work, date, size, and medium.
- Number images 1 to 20 in the order the applicant wishes them to be viewed.
- Include a numbered page detailing portfolio image information.
- Include a one-page Artist's Statement discussing submitted work and applicant's creative process.
- Include a one-page Letter of Intert explaining why the applicant is interested in obtaining an MFA and specifically why RIT would be a successful fit for pursuit of a professional study degree.

Additional information

Faculty

Thirteen full-time faculty members, all critically regarded for their artistic work in exhibition and publication, contribute to the MFA program. The faculty brings individual expertise and dedication to their work with graduate students, encouraging intellectual inquiry of contemporary art-making practices and aesthetics. The MFA program is supported by a staff of 30 full-time faculty members from the schools of Art and Photographic Arts and Sciences, faculty from the art history department, adjunct faculty members from George Eastman Museum, as well as noted regional, national, and international practitioners, critics, and historians. To learn about the MFA faculty, facilities, equipment cage, MFA events and curriculum, please visit the school's website at https://photography.rit.edu.

Scholarships and graduate assistantships

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

Transfer credit

Graduate-level course work completed prior to admission should be submitted for approval upon entrance into the program. Up to 8 semester hours of graduate work with a minimum grade of a B (3.0) or higher is transferable toward the degree, with the approval of the Graduate Director.

Grades and maximum time limit

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

Policy regarding student work

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

William Harris Gallery

William Harris Gallery (http://cias.rit.edu/spas-gallery/) supports the exhibition of graduate thesis work, student work, and the works of contemporary image-makers. It maintains a calendar of exhibitions, public lectures, and receptions. Importantly, it also provides real world experience for interested graduate students, where they learn firsthand about gallery operations, installation, and communications as a gallery manager or staff member.

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

Twyla Cummings, BS, MS, Wright State University; Ph.D., The Union Institute and University—Senior Associate Dean, Graduate Studies and Faculty Research; Professor

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

School for American Crafts

Andy Buck, BA, Virginia Commonwealth University; MFA, Rhode Island School of Design—Professor

Juan Carlos Caballero-Perez, BFA, MFA, Rochester Institute of Technology—Professor

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

Wendell Castle, BFA, MFA, University of Kansas—Professor; Artist-in-Residence, Chair in Contemporary Crafts

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

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

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

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

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

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

School of Art

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

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

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

Denton Crawford, BFA, University of South Florida; MFA, University of Georgia—Visiting Assistant Professor

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

William Finewood, BA, State University College at Geneseo; MFA, Syracuse University—Associate Professor

Emily Glass, BFA, State University College at Postsdam; MFA, Kansas State University—Visiting Assistant Professor

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

Glen R. Hintz, BA, Lafayette College; MS, The Medical College of Georgia—Administrative Chair, School of Art; Program Chair, Medical Illustration; Associate Professor

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

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

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

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

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

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

School of Design

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

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

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

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

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

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

Shaun Foster, BBA, University of Wisconsin; MFA, Rochester Institute—Associate Professor

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

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

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

Joyce Hertzson, BFA, Rhode Island School of Design; MFA, Indiana University—Professor

Chris B. Jackson, BFA, Alfred University; MFA, Rochester Institute of Technology—Graduate Director, Visual Communication Design; Professor

Alex Lobos, BA, Universidad Rafael Landivar (Guatemala); MFA, University of Notre Dame—Graduate Director, Industrial Design; Associate Professor

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

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

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

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

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

Marla Schweppe, BA, University of Kansas; MA, The Ohio State University—Program Chair, 3D Digital Design; Professor

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

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

Adam Smith, BFA, MFA, Rochester Institute of Technology—Graduate Director, User Experience Design and Development; Associate Professor

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

School of Film and Animation

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

Jack Beck, BA, Denison University; MFA, University of Iowa—Program Chair, Live Production; Associate Professor

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

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

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

Mark Foggetti, BFA, Rochester Institute of Technology—Senior Lecturer

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

Brian Larson, BFA, Colorado State University; MFA, Miami International University—Associate Professor

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

Peter Murphey, BFA, Massachusetts College of Art; MFA, The Art Institute of Boston—Assistant Professor

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

Mark Reisch, BFA, Savannah College of Art and Design; Certificate in Advanced Studies of Animation, AnimationMentor.com—Lecturer

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

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

School of Media Sciences

Barbara Birkett, BA, Aquinas College; MBA, Rochester Institute of Technology; CPA, Maryland; Ph.D., Capella University—Associate Processor

Christopher Bondy, BS, New York Institute of Technology; MS, Rochester Institute of Technology—Gannett Distinguished Professor

Shu Chang, BS, Bevea College; Ph.D., University of Minnesota—Melbert B. Cary Distinguished Professor

Twyla Cummings, BS, MS, Wright State University; Ph.D., The Union Institute and University—Senior Associate Dean, Graduate Studies and Faculty Research; Professor

Gregory D'Amico, BA, State University of New York at Stony Brook; MA, Ph.D., New York University—Administrative Chair, School of Media Sciences; Associate Professor

Robert Eller, AB, MA, University of Missouri—Gravure Research Professor

Elena Fedorovskaya, MSc., Ph.D., Lomonosov Moscow State University (Russia)—Paul & Louise Miller Distinguished Professor

Christine Heusner, BA, Elmira College; MFA, Rochester Institute of Technology—Graduate Director Print Media; Senior Lecturer

Myrtle Jones, BA, University of Illinois; MS, New York University—Assistant Professor

Bruce Myers, BFA, Montclair State University; MA, Ph.D., New York University—Assistant Professor

Michael P. Riordan, BS, State University College at New Paltz; MS, Rochester Institute of Technology—Program Chair, Media Arts and Technology; Lecturer

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

School of Photographic Arts and Sciences

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

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

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

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

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

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

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

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

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

Christine Shank, BFA, Miami University; MFA, Texas Woman's University—Graduate Director, Imaging Arts MFA; Associate Professor

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

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

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

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

School of Individualized Study

James C. Hall, Executive Director
rit.edu/sois

Programs of Study

Online learning option available.

Oftentimes, students are interested in more than one area of study, making the selection of a traditional master's degree difficult. Through the School of Individualized Study students can combine their interests to create a singular master's degree program, the MS in professional studies, that relates directly to a student's interests and career aspirations. The school also offers an advanced certificate in project management.

Admission requirements

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

Financial aid and scholarship

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

Faculty

The school's faculty is comprised of faculty members from a wide range of disciplines. A core faculty oversees the center and guides students in creating a personalized degree program.

Study options

Most graduate programs offer a variety of study options, including full-time, part-time, and online study. Please refer to each individual program for specific information regarding these options.

Professional Studies, MS

rit.edu/academicaffairs/sois/getting-started/graduate/graduate-degrees-programs
James C. Hall, Executive Director and Professor
(585) 475-2295 jchcms@rit.edu
Peter Boyd, Graduate Coordinator
(585) 475-6320 plbcms@rit.edu

Program overview

The professional studies program is specifically designed to enable students to create an individualized plan of graduate study tailored to their personal and professional goals. This degree offers students the opportunity to draw on more than 50 graduate programs in order to gain the advanced knowledge and skills necessary to respond successfully to new and emerging career opportunities. The professional studies degree can be completed on campus or online.

For example, students interested in integrating sustainability into their career as a facilities manager might combine courses from the sustainability and facility manangement programs. Educators may be interested in combining courses from the school psychology and secondary education of students who are deaf or hard of hearing programs to improve their knowledge of special learning populations and the social issues students face in today's educational environments. Communication pro-

fessionals interested in employment in government offices might choose concentrations in communication and media technologies and public policy to enhance their knowledge of media relations, public relations, government operations, and policy formation. There are a wide range of concentrations that can be created based on each student's professional career aspirations.

The degree also includes a capstone project. This applied, hands-on project is directly related to the student's individualized plan of study.

Concentration areas

Students create two or three concentrations with courses selected from a wide range of graduate programs at RIT. Some common concentration areas include:

- Applied and Computational Mathematics
- Applied Statistics/Quality
- Bioinformatics
- Business (Marketing, Management, etc.)
- Chemistry
- Color Science
- Communication and Media Technology
- Computer Engineering
- Computer Science
- Criminal Justice
- Electrical Engineering
- Environmental, Health and Safety Management
- Facilities Management
- Health Systems Administration
- Human Resource Development
- Imaging Science
- Industrial and Systems Engineering Industrial Design
- Information Sciences and Technologies
- Microelectronics Manufacturing Engineering
- Packaging Science
- Product Development and Design
- Project Management
- Public Policy
- School Psychology
- Secondary Education of Students Who Are Deaf or Hard of Hearing
- Service Management
- Software Development
- Software Engineering
- Sustainability
- Training, Design and Assessment
- Visual Communication Design

Plan of study

The program requires the completion of 33 credit hours and can be completed through full or part-time study. Students begin their studies with Contexts and Trends (PROF-705), the program's foundation course. Throughout this course students explore their personal career objectives and research RIT's portfolio of graduate programs to identify courses that best match their professional and personal goals.

Students create two or three concentrations that make up their required course work for the degree program. Each concentration is a selection of courses drawn from existing RIT graduate programs and can range from 9 to 15 credit hours. Graduate credits earned in other programs may be used in completing a concentration, upon approval.

Credit hours not required to fulfill a concentration area may be used for electives. All elective and transferred graduate courses need to be integrated into the proposed plan of study. With certain concentrations, the degree may be completed entirely through online learning.

Required courses

Context and Trends (PROF-705)

This course introduces students to interdisciplinary thinking, personal self-assessment, problem solving, goal setting, and research techniques using electronic information resources. Students work toward selecting concentrations and finalizing a plan of study for their graduate program.

The Capstone Project (PROF-775)

This course is a supervised, hands-on experience in which students apply the skills and knowledge developed through their individualized plans of study, concluding with oral and written presentations. Before students can engage in theri capstoe porject, they must first complete the Capstone Proposal Seminar course (PROF-770).

Curriculum

Professional studies, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PROF-705	Context and Trends	3
	Concentration A courses	9
	Concentration B courses	6
Second Year		
	Concentration A or elective courses	6
	Concentration B course	3
	Concentration B or elective course	3
PROF-770	Capstone Proposal Seminar	0
PROF-775	Capstone Project	3
Total Semester Credit Hours		**33**

Admission requirements

To be considered for the MS program in professional studies, candidates must fulfill the following requirements:

- Hold a baccalaureate degree at a regionally accredited college or university,
- Have a minimum undergraduate cumulative grade point average of 3.0 (or superior endorsements),
- Submit letters of reference from two individuals who have served recently as either the applicant's supervisor or instructor,
- Submit a statement of career objectives and a description of the skills and knowledge sought through graduate study,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 550 (paper-based) or 79 (Internet-based) are required. Scores from the International English Language Testing System (IELTS) are accepted in place of the TOEFL exam. Minimum acceptable scores will vary; however, the absolute minimum score for an unconditional acceptance is 6.5. The TOEFL requirement is waived for native speakers of English or for those submitting educational transcripts and diplomas from American colleges and universities.

All applicants are urged to discuss their course ideas with a professional studies graduate adviser before submitting a formal application.

Project Management, Adv. Cert.

rit.edu/academicaffairs/sois/getting-started/graduate/advanced-certificates
School of Individualized Study
(585) 475-2234, sois@rit.edu

Program overview

In today's business-oriented society, project-based organizations and project management have become much more than just a way of conducting business. New growth within these organizations has changed the shape of project management to reveal what is becoming an exciting new career path for many individuals. Project managers have quickly become a necessary asset for many businesses.

The goal of a project manager is to successfully plan, organize, and accomplish a specific project or one-time effort. Encountering the challenges of cultural and social differences, along with an assortment of industrial focuses, the project manager must be aware of a project's goals on a daily and, sometimes, hourly basis. Completion of any project is achieved via a well thought-out project plan. The advanced certificate in project management teaches students how to plan, develop, and implement successful projects from initiation to completion.

RIT's School of Individualized Study is a Project Management Institute (PMI) Registered Education Provider.

Plan of study

The program consists of three core courses and one elective.

Curriculum

Project management, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
BUSI-710	Project Management	3
	Approved Graduate Elective	3
BUSI-711	Advanced Project Management	3
BUSI-712	International Project Management	3
Total Semester Credit Hours		**12**

Electives

COURSE	
Center for Multidisciplinary Studies	
TCOM-621	Proposal Writing
College of Applied Science and Technology	
HRDE-720	Theory of Organizational Development
HRDE-722	Talent Development
HRDE-731	Team Process and Facilitation Skills
HRDE-750	Theories of Career Development
SERQ-710	Evolving Contexts in Service
SERQ-712	Breakthrough Thinking, Creativity and Innovation
SERQ-722	Customer Centricity
Saunders College of Business	
BLEG-745	Legal and Ethical Issues in Technology-intensive Environments
MGIS-715	Information Technology and Globalization
MGMT-740	Organizational Behavior and Leadership
MGMT-741	Managing Organizational Change
MGMT-745	Social and Political Environment of Business
MGMT-755	Negotiations
MGMT-756	Power and Influence
MGMT-762	Managing New Process and Product Development
MGMT-775	Business Ethics

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have a course or background in statistics
- Have a minimum undergraduate GPA of 3.0,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume,
- Submit a personal statement,
- Submit two letters of recommendation, and
- Complete a graduate application.

Additional information

Study options

The certificate can be completed entirely online, on campus, or through a combination of both options.

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/projectmanagement/.

Peter Boyd, BA, Nazareth College; MA, Columbia University—Graduate Coordinator

James Hall, BA, Wilfrid Laurier University (Canada); MS, Ph.D., University of Iowa—Executive Director; Professor

Thomas Hanney, Certificate, Rochester Institute of Technology; BA, St. John Fisher College; MPA, State University College at Brockport—Lecturer

Leonie Fernandes, BS, University of Michigan; MS, Rochester Institute of Technology; PMI—Project Management Coordinator

College of Liberal Arts

James J. Winebrake, Dean
rit.edu/cla

Programs of Study

Online learning option available.

The College of Liberal Arts offers master of science degrees in the following areas: communication and media technologies; criminal justice; experimental psychology; science, technology, and public policy; and school psychology. The college also offers three advanced certificates in communication and digital media, engineering psychology, and school psychology.

Elective graduate courses complement the professional emphasis of our degree programs by exploring the broader knowledge and social implications embodied in these areas of study. By providing this humanistic perspective, these courses play an integral role in professional education, making a direct and distinct contribution to the student's preparation for a specialized career.

The college also provides a number of graduate courses that serve as electives for graduate degree programs offered by other RIT colleges.

Admission requirements

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

Financial aid and scholarships

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

Faculty

Members of the faculty serve as students' advisers as well as their professors. Their backgrounds in their fields, in the classroom, and in their research are the basis for academic standards and expertise that anticipate graduates' career requirements.

Study options

Most graduate programs offer a variety of study options, including full-time, part-time, and online study. Please refer to each individual program for specific information regarding these options.

Communication and Digital Media, Adv. Cert.

Grant Cos, Graduate Program Director
(585)475-6646, gccgpt@rit.edu

Program overview

The advanced certificate in communication and digital media is comprised of courses focusing on digital media that have both career and scholarly applications. The certificate combines both academic and pragmatic perspectives and will assist students and practitioners in better understanding the research and theory of digital media, in message creation, and in the analysis of these dynamic new channels. Collectively, courses also enhance critical thinking, global interconnectedness, ethical reasoning, integrative literacies (digital, technical, communication, and aesthetic), and creative and innovative thinking.

Plan of study

The curriculum is designed for those who need to update or upgrade their skills, certify their competence, add to their credentials, or improve their understanding of media. The courses are taught online in eight-week sessions, (two per semester) to accommodate students who would like to complete the four-course certificate in one academic year (or two semesters).

Curriculum

Communication and digital media, advanced certificate, typical course sequence

COURSE	
Required Courses	
COMM-705	Technology-mediated Communication
COMM-706	Crafting the Message
COMM-710	Visual Communication
Electives	
Choose one of the following:	
COMM-707	International Media
COMM-711	Persuasion in a Digital Age
UXDE-721	User Experience Design
UXDE-711	User Interface Design
UXDE-722	User Interaction Design and Development

Additional information

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/communication_digital_media.

Communication and Media Technologies, MS

rit.edu/cmt

Grant Cos, Graduate Program Director
(585) 475-6646, gccgpt@rit.edu

Program overview

Communication and the technologies for message creation and dissemination are at the center of dramatic economic, social, and cultural changes occurring as a result of technological development and global connectedness. The master of science degree in communication and media technologies is an interdisciplinary advanced program of study combining liberal arts courses in communication with course work in an applied or professional program. Graduates will be adept at the analysis of communication problems, the development of solutions, and the creation of messages as a result of their combined training in the social sciences, humanities, and applied technologies.

Communication courses rooted in the humanities and social sciences provide students with the opportunity to gain a broad, historical understanding of issues in communication, including the ethical, legal, and social dimensions. Additional courses give students advanced guidance in the creation of written and visual message content. Courses in applied technologies or professional programs provide opportunities for implementation and application. The required thesis combines knowledge, practice, original research, and application under the guidance of a graduate advisement committee.

Graduates are prepared for careers as communication experts in commerce, industry, education, entertainment, and government, as well as for graduate work toward a doctoral degree.

Plan of study

The degree requires the completion of 36 credit hours of graduate course work. The program consists of five required courses, three communication electives, three applied professional or technical courses, and a thesis or project.

Graduate committee

Full-time students create a graduate advisement committee by the end of their first semester of study. The committee will be comprised of at least one faculty member from the department of communication and one faculty member from outside the department. The outside member should have a terminal degree. The committee advises and guides the student's elective course selection and course sequencing. With the guidance and approval of the graduate advising committee, students design and conduct a thesis or project appropriate to their course of study and their career goals.

Master's thesis/project

A thesis or project is an option for all students in the program. The topic should complement the student's academic graduate interests and scholarly training. Topic selection and methods for implementing the thesis/project occur in consultation with the student's graduate advisement committee.

Comprehensive examinations

Comprehensive examinations may be taken in lieu of a thesis or project. Students are eligible to take these examinations after all coursework has been completed. The Graduate Committee chooses the Exam Committee members from two areas: Theory and Methods. The student selects a specialty area within the communication elective courses with the consent of the faculty member who taught the course and will administer and grade the exam question(s). Specialization areas include the following:

Electronic, Visual, International, Electronic, Strategic, and Education. Exams will take place at two times: Intersession and June. If students fail any portion of the exam, they get one rewrite.

Curriculum

Communication and media technologies, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
COMM-701	History of Media Technologies	3
COMM-702	Communication Theories	3
	Communication Electives	9
	Professional Core	9
COMM-703	Research Methods in Communication	3
COMM-704	Media Law and Ethics	
COMM-800	Communication thesis/project	6
Total Semester Credit Hours		**36**

Communication electives

Students select three of the following communication electives:

COURSE		SEMESTER CREDIT HOURS
COMM-705	Technology-Mediated Communication	3
COMM-706	Crafting the Message	3
COMM-707	International Media	3
COMM-708	Communication Education	3
COMM-709	Online Advertising	3
COMM-710	Visual Communication	3
COMM-711	Persuasion in a Digital Age	3
COMM-713	Classic Media	3
COMM-725	Special Topics in Communication	3

Applied professional or technical courses

Students select three of the following applied professional or technical courses:

COURSE		SEMESTER CREDIT HOURS
Print Media (College of Imaging Arts and Sciences)		
PPRT-703	Cross Media Workflow I	3
PPRT-741	Digital Printing and Publishing	3
PPRT-742	Printing Industry Trends and Issues	3
PPRT-743	Perspectives on Contemporary Publishing	3
Marketing (Saunders College of Business)		
MGMT-740	Organizational Behavior and Leadership	3
MGMT-741	Managing Organizational Change	3
MGMT-742	Introduction to Technology Management	3
MKTG-761	Marketing Concepts	3
MKTG-767	Advertising and Marketing Communications	3
MKTG-772	Marketing on the Internet	3
MKTG-778	Commercializing and Marketing of New Products	3
Health Systems (College of Applied Science and Technology)		
HLTH-700	Research Methods and Data Analysis	3
HLTH-710	Health Governance and Economics	3
HLTH-717	Bioethics	3
HLTH-720	Health Systems Planning	3
HLTH-725	Marketing Within Health Care	3
SERQ-712	Breakthrough Thinking, Creativity, and Innovation	3
Public Policy (College of Liberal Arts)		
PUBL-610	Technological Innovation and Public Policy	3
PUBL-620	Information and Communication Policy	3
PUBL-700	Readings in Public Policy	3
PUBL-709	Public Administration and Management	3

Admission requirements

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

- Hold a baccalaureate degree from an accredited college or university,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Have a minimum cumulative undergraduate GPA of 3.0,
- Submit three letters of reference from academic advisers, major professors, and/or supervisors or managers,
- Submit a writing portfolio consisting of at least three writing samples, such as academic papers written for class, work-related brochures and pamphlets, or newspaper or magazine articles, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from either the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). Minimum scores of 570 (paper-based) or 88-89 (Internet-based) are required on the TOEFL. A minimum score of 6.5 is required on the IELTS. This requirement may be waived for students who submit undergraduate transcripts from American colleges and universities.

Criminal Justice, MS

rit.edu/cla/criminaljustice
Jason Scott, Graduate Program Director
(585) 475-2383, jxsgcj@rit.edu

Program overview

The master of science degree in criminal justice emphasizes a multidisciplinary approach to urban studies with a focus on public safety. The program stresses training in policy analysis and practice, particularly as it is relevant to community and urban issues.

The program builds on a foundation of locally relevant policy research by providing students with the critical skills to carry out such work and the experience to assure success in employment or in pursuit of further graduate studies. The program provides students with a strong foundation in criminological, criminal justice theory, and social scientific research skills, thus enabling graduates to have successful careers in the policy analysis arena or to be prepared to pursue advanced study beyond the master's degree.

Plan of study

A minimum of 30 semester credit hours is required for completion of the MS in criminal justice.

Students applying to the program should have a strong undergraduate foundation in criminology and research methods. Students that do not possess these skills may be required to complete additional undergraduate course work (e.g., Criminology, Theories of Crime, and Research Methods) or demonstrate that they have equivalent skills for completion of the degree.

Curriculum

Criminal justice (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
CRIM-700	Professional Seminar In Criminal Justice Theory	3
CRIM-701	Statistics	3
CRIM-702	Professional Seminar in Research Methods	3
CRIM-703	Advanced Criminology	3
CRIM-704	Crime, Justice and Community	3
CRIM-705	Interventions and Change in Criminal Justice	3
	Electives	6
CRIM-800	Thesis in Criminal Justice	6
Total Semester Credit Hours		**30**

Criminal justice (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
CRIM-700	Professional Seminar In Criminal Justice Theory	3
CRIM-701	Statistics	3
CRIM-702	Professional Seminar in Research Methods	3
CRIM-703	Advanced Criminology	3
CRIM-704	Crime, Justice and Community	3
CRIM-705	Interventions and Change in Criminal Justice	3
	Electives	9
CRIM 775	Capstone in Criminal Justice	3
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree from an accredited college or university,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit two writing samples, one of which is a personal statement,
- Complete a personal interview,
- Have completed a statistics course (students may be required to take a data analysis or a statistics course if not taken previously),
- Submit two letters of recommendation (letters should be from faculty familiar with the applicant's academic work),
- Submit scores from the Graduate Record Examination (GRE),
- Have a minimum cumulative GPA of 3.0 (on a 4.0 scale), and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 570 (paper-based) or 88 (Internet-based) are required.

Engineering Psychology, Adv. Cert.

rit.edu/cla/psychology/advanced-certificates/engineering-psychology
Esa Rantanen, Associate Professor
(585) 475-4412, esa.rantanen@rit.edu

Program overview

The advanced certificate in engineering psychology provides students with core knowledge in the key areas of engineering psychology, as well as an opportunity to study particular topics in greater depth through electives. The advanced certificate provides students with a formal acknowledgment of their knowledge in engineering psychology and credentials for seeking a career in the human factors/ergonomics field. The program consists of five courses. Students must earn at least a B in each course to earn the certificate. Students enrolled in the MS degree in experimental psychology can be awarded the advanced certificate by taking the required courses as part of their master's program.

Curriculum

Engineering psychology, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
PSYC-712	Graduate Cognition	3
PSYC-714	Graduate Engineering Psychology	3
PSYC-715	Graduate Perception	3
	Electives	6
Total Semester Credit Hours		**15**

Electives*

COURSE	
HCIN-610	Foundations of Human-Computer Interaction
HCIN-620	Information and Interaction Design
HCIN-630	Usability Testing
HCIN-700	Current Topics in Human-Computer Interaction
HCIN-705	Topics in Human-Computer Interaction for Biomedical Informatics
HCIN-715	Agent-based and Cognitive Modeling
HCIN-720	Designing User Experiences for Internet-enabled Devices
HCIN-722	Human Computer Interaction with Mobile Devices
HCIN-730	User-Centered Design Methods
HCIN-735	Collaboration, Technology, and the Human Experience
ISEE-730	Biomechanics
ISEE-731	Advanced Topics Human Factors
ISEE-732	Systems Safety Engineering
PSYC-716	Graduate Social Psychology

* With approval of the advanced certificate coordinator, other relevant graduate courses may also be chosen as electives.

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution
- Have a minimum of 15 semester hours of course work in undergraduate psychology or a related field (e.g., engineering, computer science, information technology), including one course in experimental psychology and one course in statistics,
- Have a minimum undergraduate GPA of 3.0,
- Submit a personal statement describing the applicant's experience and goals regarding the certificate,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work, and
- Complete a graduate application.
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL).

Scores from the Graduate Record Exam (GRE) are not required, however they may be beneficial for some students.

Additional information

Prerequisite courses

Students may meet the prerequisite requirements either by taking the designated prerequisite courses at RIT, by having sufficient background from their undergraduate education, or if prerequisite requirements are explicitly waived by the course instructor.

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/engineering_psychology.

Experimental Psychology, MS

rit.edu/cla/psychology/graduate/ms-experimental-psych/overview

Andrew Herbert, Department Chair
(585) 475-4554, amhgss@rit.edu

Program overview

The master of science degree in experimental psychology builds on the strengths of faculty research and student interests in experimental psychology broadly defined. The program as a whole provides a foundation for further advanced academic study in human factors and/or experimental psychology.

Plan of study

The program includes 30 credit hours of core courses, elective courses, and a thesis. It also offers students two tracks to choose from: experimental psychology and engineering psychology.

The experimental psychology track embraces the application of the scientific method to the study of behavior. Faculty are experts in a variety of fields including addiction, attention, cognition, development, evolutionary psychology, forensic psychology, perception, psychopathology, and social psychology, among others.

The engineering psychology track examines human capabilities to sense, perceive, store, and process information and how these human factors impact interactions with technology. This knowledge is applied to the design, use, and maintenance of human-machine systems. Courses emphasize the role of human behavior and performance in both simple and complex human-machine systems. Students are trained in both research methods of experimental psychology and application of the results to contemporary problems in industry. This track prepares students to function as effective engineering psychologists in industrial, governmental, or consulting organizations.

Electives

Students in the engineering psychology track must select two electives (students should check for course prerequisites or if permission of the instructor is required). Any graduate course at RIT can be taken as an elective, assuming prerequisites are met.

Thesis

Students select a thesis adviser during the first year. Selection of an adviser, thesis topic, and research proposal must be completed in the second semester of the first year of the program. Ongoing research activity is expected through the summer term of the program. At the completion of the thesis, students will publically present their findings and defend their research before a thesis committee.

Curriculum

Experimental psychology, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PSYC-640	Graduate Statistics	3
Choose one of the following:		3
PSYC-714	Graduate Engineering Psychology	
	PSYC Elective	
PSYC-751	Graduate Research Seminar	0
PSYC-642	Graduate Research Methods	3
PSYC-752	Thesis Proposal	3
	PSYC Elective	3
	Free Electives	6
Second Year		
PSYC-753	Thesis	3
	PSYC Elective	3
Choose one of the following:		3
	PSYC Elective	
	Free Elective	
Total Semester Credit Hours		**30**

Electives

COURSE	
HCIN-610	Foundations of Human-Computer Interaction
HCIN-620	Information and Interaction Design
HCIN-630	Usability Testing
HCIN-700	Current Topics in HCI
HCIN-705	Topics in HCI for Biomedical Informatics
HCIN-715	Agent-based and Cognitive Modeling
HCIN-720	Designing User Experiences for Internet-enabled Devices
HCIN-730	User-Centered Design Methods
HCIN-735	Collaboration, Technology, and the Human Experience
ISEE-730	Biomechanics
ISEE-731	Advanced Topics Human Factors
ISEE-732	Systems Safety Engineering

Admission requirements

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

- Have a minimum of 15 semester hours of course work in undergraduate psychology or a related field (e.g., engineering, computer science, information technology), including one course in experimental psychology and one course in statistics,
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work,
- Have a minimum GPA of 3.0 (for undergraduate work),
- Submit scores from the Graduate Record Examination (GRE),
- Submit at least two letters of reference from professors or supervisors,
- Submit a personal statement describing the applicant's goals for the program focusing on their research interests and possible thesis research (including possible thesis mentors), and
- Complete a graduate application.

Additional information

Cooperative education

The program includes an optional cooperative education component. Co-op is generally completed in the summer after the first year of the program. The co-op experience provides experiential learning that integrates with classroom education and allows students to apply psychological principles to problems in a variety of work environments. Co-op may be completed in any business or industrial setting.

School Psychology, MS

rit.edu/cla/psychology/graduate/ms-school-psych/overview
Suzanne Bamonto, Graduate Program Director
(585) 475-2765, sbggsp@rit.edu

Program overview

The master of science degree in school psychology is approved by the National Association of School Psychologists and prepares students for provisional New York state certification as school psychologists. Designed to provide students with a strong background in psychological foundations, the program develops professional skills and competencies in assessment, counseling, consultation, and program evaluation.

A school psychologist works with young children (birth to age five); elementary, junior high, and high school students; teachers and administrators; parents; and professionals to offer services that lead to the amelioration of existing student difficulties and attempts to prevent school problems. Through diagnostic testing, counseling, consultation, and intervention, school psychologists help students deal with learning and behavioral difficulties and help improve students' adjustment to school and their community.

The master of science degree is awarded after students have completed all course work, an internship, and have passed a portfolio review.

Plan of study

A minimum of 66 semester credit hours are required for completion of the program. Before registering for the internship, students must pass a portfolio review. A cumulative GPA of 3.0 or above is required.

Curriculum

School psychology, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SPSY-640	Statistics	3
SPSY-630	Academic Assessment	3
SPSY-620	Interpersonal Intervention Skills	3
SPSY-610	Advanced Developmental Psychology	3
SPSY-600	Field Experience I: Professional School Psychology Foundations	3
SPSY-632	Social-Emotional Assessment	3
SPSY-721	Academic Intervention	3
SPSY-631	Cognitive Assessment	3
SPSY-650	Applied Behavior Analysis	3
SPSY-601	Field Experience II: Professional School Psychology Foundations	3
Second Year		
SPSY-730	Comprehensive Assessment Integration	3
SPSY-722	Advanced Counseling	3
SPSY-720	Advanced Consultation	3
SPSY-710	Developmental Psychopathology	3
SPSY-701	Advanced Practicum I: Issues in Diversity	3
SPSY-641	Research Methods	3
SPSY-723	Systems and Organizational Interventions	3
SPSY-611	Biopsychology	3
SPSY-603	Ethical and Legal Issues	3
SPSY-702	Advanced Practicum II: Issues in Diversity	3
Third Year		
SPSY-750	Internship	6
Total Semester Credit Hours		**66**

Admission requirements

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

- Hold a baccalaureate degree at an accredited college or university,
- Have a minimum undergraduate cumulative GPA of 3.0,
- Have completed at least 18 semester hours in behavioral sciences with a grade of B (3.0) or above,
- Have completed prerequisite undergraduate courses in general psychology, elementary statistics, child or developmental psychology, and abnormal psychology,
- Submit scores from the Graduate Record Exam (GRE),
- Submit letters of reference,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit an essay outlining the candidate's goals and related experience that shows evidence of a professional commitment and the potential for developing effective relationships with children, youth, and adults,
- Complete an individual interview, and
- Complete an application for graduate study.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. A minimum score of 580 (paper-based) is required. This requirement is waived for native speakers of English and those submitting transcripts from American universities.

All credentials must be submitted and reviewed before the student completes 9 semester credit hours of graduate work in the program. Applications are due by February 1. Later applications will be reviewed on a space-available basis.

School Psychology, Adv. Cert.

rit.edu/cla/psychology/advanced-certificates/school-psychology
Suzanne Bamonto, Graduate Program Director
(585) 475-2765, sbggsp@rit.edu

Program overview

The advanced certificate in school psychology is designed for students who are interested in learning aspects of school psychology, but may not want to pursue an advanced degree. The advanced certificate may be completed as a stand-alone program, or courses may be applied later for students who wish to complete a master's degree. Students who complete the MS program in school psychology automatically earn this certificate.

Curriculum

School psychology, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
SPSY-630	Academic Assessment	3
SPSY-620	Interpersonal Intervention Skills	3
SPSY-650	Applied Behavior Analysis	3
SPSY-641	Research Methods	3
Second Year		
SPSY-640	Statistics	3
SPSY-720	Advanced Consultation	3
SPSY-723	Systems and Organizational Interventions	3
Total Semester Credit Hours		**21**

Additional information

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/schoolpsychology.

Science, Technology and Public Policy, MS

rit.edu/cla/publicpolicy
Franz A. Foltz, Graduate Program Director
(585) 475-5368, fafgsh@rit.edu

Program overview

This innovative master of science degree in science, technology, and public policy enables students to work at the intersection of engineering, science, and public policy. The program builds on RIT's strengths as a technological university, enabling students to interact with faculty members and researchers who are working on scientific developments and technological innovations that drive new public policy considerations.

The program is interdisciplinary and draws significantly from disciplines and courses of study in RIT's colleges of Applied Science and Technology, Business, Engineering, Liberal Arts, and Science. The program is geared toward producing graduates who will make significant contributions in the private, public, and not-for-profit sectors.

All students take a set of policy core courses that emphasize analysis, problem solving, and interdisciplinary approaches. Students work with an adviser to choose electives that focus their policy studies in a particular area, such as environmental policy, climate change policy, healthcare policy, STEM education policy, telecommunications policy, or energy policy. Typical students include those with science or engineering backgrounds seeking to broaden their career opportunities in government or business settings, as well as those with liberal arts undergraduate degrees (e.g., economics) interested in science, technology, and policy issues. Full-time students can typically finish the program in one to two years. The program prides itself on working one-on-one with students to ensure that their educational needs and academic goals are attained.

Plan of study

The program requires a minimum of 30 credit hours and consists of five required core courses, three elective courses, and the completion of a thesis or comprehensive exam. The thesis option allows students to work with a faculty adviser on an independent research project in their area of interest.

Electives

Students choose three elective courses based on their interests and career goals. Courses may be offered in various colleges throughout the university, including the colleges of Applied Science and Technology, Business, Engineering, and Science. Course selection is completed jointly with a faculty adviser and typically aims to develop a specialized area of interest for the student (e.g., biotechnology policy, environmental policy, energy policy, communications policy, etc.).

Curriculum

Science, technology and public policy (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PUBL-700	Readings	3
PUBL-701	Graduate Policy Analysis	3
STSO-710	Science and Technology Policy Seminar	3
PUBL-702	Graduate Decision Analysis	3
PUBL-703	Program Evaluation and Research Design	3
	Graduate Electives	9
PUBL-790	Thesis	6
Total Semester Credit Hours		**30**

Science, technology and public policy (comprehensive exam option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
PUBL-700	Readings	3
PUBL-701	Graduate Policy Analysis	3
STSO-710	Science and Technology Policy Seminar	3
PUBL-702	Graduate Decision Analysis	3
PUBL-703	Program Evaluation and Research Design	3
	Graduate Electives	15
	Comprehensive Exam	0
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in science, technology and public policy, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited college or university,
- Have a minimum 3.0 overall GPA,
- Submit two writing samples, one of which should be a statement of interest,
- Submit scores from the Graduate Record Examination (GRE),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Have completed course work in calculus and statistics (students may be required to take a data analysis or statistics course and an introductory calculus course, if not taken previously),
- Submit two formal letters of reference, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language TOEFL). Minimum scores of 570 (paper-based) or 88 (Internet-based) are required.

James J. Winebrake, BS, Lafayette College; MS, Massachusetts Institute of Technology; Ph.D., University of Pennsylvania—Dean; Professor

Babak Elahi, BA, San Diego State University; MA, University of California at San Diego; Ph.D., University of Rochester—Associate Dean; Professor

Laverne McQuiller Williams, BS, Rochester Institute of Technology; MA, Buffalo State College; JD, Albany Law School of Union University; Ph.D., University at Buffalo—Associate Dean; Professor

School of Communication

Andrea Hickerson, BA, Syracuse University; MA, University of Texas at Austin; Ph.D., University of Washington—Director, Associate Professor

Bruce A. Austin, BA, Rider College; MS, Illinois State University; Ph.D., Temple University—Professor

Grant C. Cos, BA, University of Massachusetts at Amherst; MA, Emerson College; Ph.D., Kent State University—Director of Graduate Programs, Associate Professor

Keith B. Jenkins, BA, University of Arkansas; MA, Ph.D., Florida State University—Professor

Ammina Kothari, BA, North Central College; MA, University of Oregon; Ph.D., Indiana University—Assistant Professor

Hinda Mandell, BA, Brandeis University; MA, Harvard University; Ph.D., Syracuse University—Assistant Professor

Kelly Norris Martin, BA, John Carroll University; MS, Ph.D., North Carolina State University—Assistant Professor

David R. Neumann, BA, Ithaca College; MA, Ph.D., Bowling Green State University—Professor

Rudy Pugliese, BA, State University College at Oneonta; MA, State University College at Brockport; Ph.D., Temple University—Professor

Patrick M. Scanlon, BA, State University of New York at Albany; MA, Ph.D., University of Rochester—Professor

Jonathan E. Schroeder, BA, University of Michigan; MA, Ph.D., University of California at Berkeley—William A. Kern Professor in Communications

Wang, Xiao, BA, Beijing University of Aeronautics and Astronautics (China); MA, Marquette University; Ph.D., Florida State University—Associate Professor

Tracy R. Worrell, BA, Otterbein College; MA, University of Cincinnati; Ph.D., Michigan State University—Associate Professor

Criminal Justice

John McCluskey, BA, MA, Ph.D., State University of New York at Albany—Department Chair; Professor

Irshad Altheimer, BA, Alabama State University; MA, Ph.D., Washington State University—Associate Professor

John Klofas, BA, College of the Holy Cross; MA, Ph.D., State University of New York at Albany—Professor

LaVerne McQuiller Williams, BS, Rochester Institute of Technology; MS, State University of New York College at Buffalo; JD, Albany Law School; Ph.D., University at Buffalo—Professor

Judy Porter, BA, University of Northern Colorado; MA, New Mexico State University; Ph.D., University of Nebraska at Omaha—Associate Professor

Christopher Schrek, BA, University of Florida; MA, University of Arizona; Ph.D., Pennsylvania State University—Professor

Jason Scott, BS, Roberts Wesleyan College; MA, Ph.D., State University of New York at Albany—Graduate Director; Associate Professor

Tony Smith, BA, MA, Ph.D., State University of New York at Albany—Associate Professor

Economics

M. Jeffrey Wagner, BA, University of Missouri; MA, Ph.D., University of Illinois—Department Chair; Professor

Amit Batabyal, BS, Cornell University; MS, University of Minnesota; Ph.D., University of California at Berkeley—Arthur J. Gosnell Professor of Economics

Javier Espinosa, BS, Miami University; MA, Ph.D., University of Maryland at College Park—Associate Professor

Humanities

Timothy H. Engström, BA, MA, Ph.D., University of Edinburgh (United Kingdom)—Professor, Philosophy

Jessica Lieberman, BA, University of Pennsylvania; Ph.D., University of Michigan—Associate Professor, Visual Culture

Cecillia Ovesdotter Alm, BA, Universitat Wien (Austria); MA, Ph.D., University of Illinois—Assistant Professor, English

Katie Terezakis, BA, Central Connecticut State University; MA, Ph.D., New School for Social Research—Associate Professor

David B. Suits, BA, Purdue University; MA, Ph.D., University of Waterloo (Canada)—Professor, Philosophy

Psychology

Andrew M. Herbert, B.Sc., McGill University (Canada); MA, Ph.D., University of Western Ontario (Canada)—Department Chair; Professor

Suzanne Bamonto, AA, Finger Lakes Community College; BA, State University College at Geneseo; Ph.D., University of Oregon—Graduate Program Director; Associate Professor

Joseph Baschnagel, BA, MA, Ph.D., State University of New York at Buffalo—Associate Professor

Kirsten Condry, BA, Swarthmore College; Ph.D., University of Minnesota—Associate Professor

Caroline DeLong, BA, New College of Florida; MA, Ph.D., University of Hawaii—Associate Professor

Nicholas DiFonzo, AB, Lafayette College; MA, Rider College; MA, Ph.D., Temple University—Professor

John E. Edlund, BS, MA, Ph.D., Northern Illinois University—Associate Professor

Stephanie A. Godleski, BA, Hamilton College; MS, Ph.D., University of Buffalo—Assistant Professor

Jennifer Lukomski, BA, Williams College; MA, Gallaudet University; Ph.D., University of Arizona—Professor

Scott P. Merydith, BA, M.Ed., Ph.D., Kent State University—Professor

Vincent Pandolfi, BA, Lafayette College; MA, Ph.D., Hofstra University—Associate Professor

Esa Rantenen, BS, MS, Embry-Riddle Aeronautical University; MS, Ph.D., Pennsylvania State University—Associate Professor

Lindsay Schenkel, BA, St. John Fisher College; MA, Ph.D., University of Nebraska at Lincoln—Associate Professor

Paula Schneider, BA, Michigan State University; MS, Rochester Institute of Technology—Lecturer

Audrey Smerbek, BA, University of Rochester; Ph.D., State University of New York at Buffalo—Assistant Professor

Tina Sutton, BS, Union College; MA; Ph.D., State University of New York at Albany—Assistant Professor

Public Policy

Sandra Rothenberg, BS, Syracuse University; MS, Ph.D., Massachusetts Institute of Technology—Department Chair, Professor

Eric Hittinger, BS, MS, Case Western Reserve University; Ph.D., Carnegie Mellon University—Assistant Professor

James J. Winebrake, BS, Lafayette College; MS, Massachusetts Institute of Technology; Ph.D., University of Pennsylvania—Dean; Professor

Josephine Wolff, AB, Princeton; Ph.D., Massachusetts Institute of Technology—Assistant Professor

Science, Technology and Society

Deborah Blizzard, BA, Smith College; MS, Ph.D., Rensselaer Polytechnic Institute—Department Chair; Professor

Thomas Cornell, BA, Rhodes College; MS, Georgia Institute of Technology; Ph.D., Johns Hopkins University—Professor

Franz A. Foltz, BS, MS, Pennsylvania State University; Ph.D., Rensselaer Polytechnic Institute—Public Policy Graduate Program Director; Associate Professor

M. Ann Howard, BS, Cornell University; JD, Rutgers University—Professor

Christine Keiner, BA, Western Maryland College; Ph.D., Johns Hopkins University—Associate Professor

Qing Miao, BA, Nanjing University; MS, University of Michigan; Ph.D., Syracuse University—Assistant Professor

Richard Shearman, BA, Western State College of Colorado; MS, Eastern New Mexico University; Ph.D., State University of New York College of Environmental Science and Forestry—Associate Professor

Kristoffer J.Whitney, BS, Rochester Institute of Technology; Ph.D., University of Pennsylvania—Assistant Professor

National Technical Institute for the Deaf

Gerard Buckley, President, NTID; Vice President and Dean, RIT
ntid.rit.edu

Programs of Study

The National Technical Institute for the Deaf (NTID) is the world's largest technological college for deaf and hard-of-hearingstudents. Among RIT's more than 18,600 full- and part-time students are more than 1,200 undergraduate and graduate deaf and hard-of-hearing students from across the United States and 22 foreign countries.

NTID offers a master of science degree in secondary education of students who are deaf or hard of hearing. All full-time students in the MS program are eligible for graduate assistantships. NTID also offers a master of science degree in health care interpretataion. Students also can pursue master's degrees through RIT's other eight mainstream colleges and degree-granting units.

Admission requirements

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

Health Care Interpretation, MS

ntid.rit.edu/aslie/mshci/overview
Kathleen Miraglia, Program Director
(585) 475-5441 (voice), kamnss@rit.edu

Program overview

The master of science in health care interpretation is designed to meet the demand for nationally-certified sign language interpreters who wish to work in health care environments.

Health care interpreters work in various health care settings where hearing people and deaf or hard-of-hearing people need to interact and communicate. Interpreters may assist deaf patients and their families in understanding medical testing, treatments, and diagnoses; facilitate communication for deaf health care professionals with colleagues and patients; and/or provide interpretation for deaf individuals who are enrolled in health care-related degree programs or training courses designed to educate and prepare them for careers in health care-related professions. This unique program also prepares interpreters to work in administrative roles ensuring language access to patients in hospital settings. Successful completion of this program could lead to employment as a sign language health care interpreter and/or a language access coordinator of sign and spoken language interpreting services in one of the most important new fields of health care.

The program may be completed on a full- or part-time basis.

Curriculum

Health care interpretation, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
HCIA-705	Professional Seminar (summer)	3
HCIA-715	Human Body Systems/Diseases I (summer)	3
HCIA-719	Theories of Translation and Interpretation (summer)	3
HCIA-720	Health Care Practical Interpreting I	3
HCIA-730	Human Body Systems/Diseases II	3
HLTH-700	Research Methods	3
HCIA-740	Health Care Practical Interpreting II	3
HLTH-710	Health Care Governance and Economics	3
HLTH-723	Human Resources in Health Care	3
Second Year		
HCIA-750	Health Care Interpreting Within a Diverse Deaf Community (summer)	3
HCIA-770	Capstone Professional Project or Research Paper (summer)	3
Total Semester Credit Hours		**33**

Admission requirements

To be considered for admission to the MS in health care interpretation, candidates must fulfill the following requirements:

- Hold a certification from the National Registry of Interpreters for the Deaf (RID), or equivalent,
- Have a baccalaureate degree from a regionally accredited college or university,
- Have a cumulative undergraduate GPA of 3.0 or above (or superior endorsement),
- Submit an ASL interpretation sample (audio/video file or text translation will be provided),

- Submit two letters of reference from individuals who have had the opportunity to observe the applicant's interpreting work,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a completed graduate application,
- Submit a personal statement describing the applicant's educational objectives, and
- Provide proof of completion of a course in medical terminology. (This is required after admission to the program is offered. The course must be completed prior to the beginning of the summer session. This $99 self-paced online course is called Language of Medicine.)

Secondary Education of Students Who Are Deaf or Hard of Hearing, MS

ntid.rit.edu/msse
Gerald C. Bateman, Director
(585) 475-6776 (voice), (585) 286-4282 (VP), gcbnmp@rit.edu

Program overview

The master of science degree in secondary education of students who are deaf or hard of hearing prepares students to meet the national need for teachers of secondary students who are deaf or hard of hearing. The program prepares teachers not only as effective and ethical practitioners but also as scholars and leaders in the profession.

Faculty members are international leaders in research and are highly skilled in the education of deaf people. A carefully designed system of faculty advisement is a prominent feature of the program. On-campus facilities, state-of-the-art technology, and a well-established system of educational access services combine to make this a vital program for both deaf and hearing students who desire careers as professional educators of deaf students.

Plan of study

Course work requires a minimum of four semesters. A cumulative GPA of at least 3.0 must be maintained. Before graduation, students are expected to have at least intermediate-level signing skills as determined by a Sign Language Proficiency Interview.

Curriculum

Secondary education for students who are deaf or hard of hearing, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MSSE-700	History of Deaf Educational Thought and Practice	3
MSSE-701	Psychology and Human Development	3
MSSE-703	Special Education in the Social Context	3
MSSE-704	Teaching Deaf Learners with Special Educational Needs	3
MSSE-710	General Instructional Methods	3
MSSE-712	Practicum	2
MSSE-715	Issues in Mainstream Education	3
MSSE-725	Structures of ASL and English	3
MSSE-726	Language Acquisition and Learning	3
MSSE-727	ASL in Instructional Delivery	3
MSSE-785	Foundations of Educational Research	3
Second Year		
MSSE-702	Educational and Cultural Diversity	3
MSSE-713	Assessment Principles and Practices	3
MSSE-714	Curriculum Content and Methods of Instruction	3
MSSE-722	Educational Audiology and Spoken Language Development	3
MSSE-728	Literacy and the Deaf Adolescent	3
MSSE-760	Student Teaching I*	6
MSSE-761	Student Teaching II*	6
MSSE-790	Professional Portfolio	3
MSSE-794	Inquiry in Teaching (elective)	(3)
Total Semester Credit Hours		**62**

* Students are required to complete a minimum of 250 hours of supervised student teaching, working with deaf and hard-of-hearing students at the secondary (7–12) grade level. In addition, 100 hours of field experience must be completed before the first student teaching placement.

Admission requirements

To be considered for admission to the MS program in secondary education of students who are deaf or hard of hearing, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited college or university,
- Have a cumulative grade point average of 3.0 or higher,

- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Have a basic knowledge of American Sign Language as measured by a departmental skill assessment, or willingness to take American Sign Language I (or its equivalent) at NTID or another college prior to beginning the program,
- Have a level of writing proficiency appropriate to graduate study as indicated by a review of undergraduate writing-intensive courses and an expository essay,
- Submit letters of reference and an expository essay that indicates evidence of professional commitment and potential for success in the program,
- Submit scores from Graduate Record Exam (GRE),
- Participate in an individual interview, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 550 (paper-based) or 213 (Internet-based) are required.

Additionally, 30 semester credit hours in a content area are required by the New York State Education Department for initial certification to teach a secondary (grades 7–12) content area. Students who do not have the required number of hours must complete the additional credits before applying for New York State certification. Secondary academic subjects include American Sign Language, English, mathematics, social studies, or science. Please note: The social studies content area includes economics and government, and at least 21 semester hours in the history and geography of the United States and the world.

Additional information

Financial Aid

NTID graduate tuition rates are less than one-half of RIT's tuition. Approximately 70 percent of students enrolled in the MS program in secondary education receive some type of financial assistance each year. Students complete only the Free Application for Federal Student Aid (FAFSA) to apply for financial aid. In addition, federal loan programs may be available.

Gerard J. Buckley, BS, Rochester Institute of Technology; MSW, University of Missouri; Ed.D., University of Kansas—President, NTID and Vice President and Dean, RIT; Associate Professor

Health Care Interpretation

Kim B. Kurz, BS, MS, Rochester Institute of Technology; Ph.D., University of Kansas—Chairperson; Associate Professor

Kathleen Miraglia, BS, State University College at Brockport; MS, Rochester Institute of Technology—Coordinator Health Care Programs; Director, Senior Lecturer

Robyn K. Dean, BA, Maryville College; MA, Colgate Rochester Crozer Divinity School; Ph.D., Heriot-Watt University—Assistant Professor, Health Care Interpretation

Denise Fitzgerald Burgen, BS, Keuka College; MS, MBA, University of Rochester—Adjunct Professor, Research Methods

Kimberly S. Kelstone, BS, State University College at Empire State College; BS, University of Rochester—Adjunct Professor, Human Body Systems and Diseases

Jeremiah Kirkland, BS, State University College at Brockport; MS, Roberts Wesleyan College—Adjunct Professor, Human Resources in Health Care

Campbell A. McDermid, BA, Carleton University; MA, Gallaudet University; M.Ed., Ph.D., York University (Canada)—Assistant Professor, Translation and Interpretation

Scott Smith, BS, MD, East Carolina University; MPH, Harvard University—Research Associate Professor, MD Adviser

William W. Walence, BA, MA, Kent State University; Ph.D., Ohio University—Program Director, Health Systems Administration RIT, Health Governance Economics

Secondary Education of Students Who are Deaf and Hard of Hearing

Gerald C. Bateman, BS, MS, State University College at Geneseo; Ed.D., University of Rochester—Professor; Director, Curriculum and Teaching

Susan B. Foster, BA, Northwestern University; BS, University of Maine; M.Ed., Bridgewater State College; Ph.D., Syracuse University—Professor, Special Education and Rehabilitation

Melinda J. Hopper, BS, MS, Illinois State University; Ph.D., University of Rochester—Lecturer, Special Education

Ronald R. Kelly, BS, M.Ed., Ph.D., University of Nebraska at Lincoln—Professor, Educational Psychology and Measurements

Baldev Kaur Khalsa, BA, M.Ed., Western Maryland College—Associate Professor, Education of Deaf Students

Christopher A. N. Kurz, BS, Rochester Institute of Technology; MS, Ph.D., University of Kansas—Associate Professor, Special Education: Education of Deaf Students

Ila Parasnis, BA, MS, Nagpur University (India); MA, Ph.D., University of Rochester—Professor, Psychology

Thomastine Sarchet, BS, MS, Rochester Institute of Technology—Research Associate , Assessment

Sara Schley, BA, Reed College; MA, Northeastern University; Ed.D., Harvard University—Associate Professor, Human Development and Language Acquisition

Michael Skyer, BFA, MS, Rochester Institute of Technology—Lecturer, English

Michael S. Stinson, BA, University of California at Berkeley; MA, Ph.D., University of Michigan—Professor, Educational Psychology

Jessica W. Trussell, BS, University of Georgia; M.Ed., Ph.D., Georgia State University—Assistant Professor, Deaf Education

College of Science

Sophia Maggelakis, Dean
rit.edu/science

Programs of Study

Doctor of Philosophy in:	Page
Astrophysical Sciences and Technology *Tracks available in: astrophysics, astro-informatics and computational astrophysics, astro-informatics and computational astrophysics (general relativity concentration), and astronomical instrumentation.*	131
Color Science	120
Imaging Science	123

Master of Science degrees in:	
Applied and Computational Mathematics *Options available in: discrete mathematics, dynamical systems, and scientific computing.*	128
Applied Statistics	130
Astrophysical Sciences and Technology	133
Bioinformatics	126
Chemistry	115
Color Science	122
Environmental Science	127
Imaging Science	125
Materials Science and Engineering	117

Advanced Certificate in:	
Applied Statistics	119
Materials Science	

Online learning option available.

The College of Science offers a unique complement of graduate programs featuring curricula designed with sufficient flexibility to prepare students for direct entry into a variety of careers or further study toward a more advanced graduate degree in a chosen discipline. The college also houses three doctorate programs featuring internationally-recognized, cutting-edge research activities. Whether the focus is on the foundations of matter, the origins of the universe, applications of mathematics, the role of chemists in our daily lives, the encoding of life within DNA, the specialized properties of advanced materials, our impact on the environment, or the science and technology of advanced imaging systems, the college's graduate faculty provide a valuable and integrated understanding of today's most important fundamental problems, applied research issues, and industrial applications.

Admission requirements

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

Financial aid and scholarship

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

School of Chemistry and Materials Science

rit.edu/science/scms
Paul Craig, School Head
(585) 475-6145, paul.craig@rit.edu

The School of Chemistry and Materials Science offers MS programs in chemistry and in materials science and engineering.

Chemistry, MS

rit.edu/science/programs/ms/chemistry
Joseph P. Hornak, Graduate Program Director
(585) 475-2904, jphsch@rit.edu

Program overview

The master of science degree in chemistry is offered on a full- or part-time basis. The program is designed to fill the needs of the traditional student or the practicing chemist who is employed full time and wishes to pursue a graduate degree on a part-time basis.

The School of Chemistry and Materials Science has research- and teaching-oriented faculty, as well as excellent equipment and facilities that enable full-time graduate students to carry on a program of independent study and develop the ability to attack scientific problems at the fundamental level. The research can result in either a thesis or a project report.

Through course work and research activities, the program strives to increase the breadth and depth of the student's background in chemistry. Students develop the ability to attack scientific problems with minimal supervision.

Plan of study

The program offers two options: a thesis option and a project option. Concentrations are available in organic chemistry, analytical chemistry, inorganic chemistry, physical chemistry, polymer chemistry, materials science, and biochemistry. Customized concentrations are available to

accommodate specific student interests and needs relating to graduate study in chemistry.

Each student, together with an adviser, chooses courses to create a customized curriculum that best meets their interests, needs, and career aspirations. Each student's curriculum is subject to the approval of the director of the graduate program.

A deliberate effort is made to strengthen any areas of weakness indicated by the student's undergraduate records and the placement examinations. The MS degree consists of the following requirements:

1. A minimum of 30 semester credit hours beyond the bachelor's degree.
Courses in chemistry consist of core and focus area courses. Core courses are designed to increase a student's breadth of chemical knowledge, while focus area courses increase depth. Core courses include four semester credit hours in Graduate Chemistry Seminar (CHEM-771, 772, 773, 774) and one credit hour in Chemistry Writing (CHEM-670). Focus area courses are chosen to address the student's career goals and any undergraduate deficiencies in chemistry. Focus area courses must be at the graduate level and are chosen in consultation between the student and graduate adviser. Focus area courses outside of chemistry are acceptable provided they are approved by the student's graduate adviser.

2. Research
Ten semester credit hours of research are required with the thesis option. For students who opt for the project option, four semester hours of project research are required.

3. Capstone
Students enrolled in the thesis option are expected to complete an independent research thesis and pass an oral defense. Typically, all requirements are met within two years. Students enrolled in the project option have numerous ways of satisfying the capstone requirement for their project. These include but are not limited to conference presentations, papers, journal articles, patents, and seminars.

Curriculum

Chemistry (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CHEM-771, 772	Graduate Chemistry Seminars	2
	Graduate Chemistry Focus Courses	12
CHEM-670	Graduate Chemistry Writing	1
CHEM-790	Research and Thesis Guidance	5
Second Year		
CHEM-773, 774	Graduate Chemistry Seminars	2
	Graduate Chemistry Focus Course	3
CHEM-790	Research and Thesis Guidance	5
Total Semester Credit Hours		**30**

Chemistry (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CHEM-771, 772	Graduate Chemistry Seminars	2
	Graduate Chemistry Focus Courses	12
CHEM-670	Graduate Chemistry Writing	1
Second Year		
CHEM-773, 774	Graduate Chemistry Seminars	2
	Graduate Chemistry Focus Courses	9-12
CHEM-780	Chemistry Project	1-4
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree in chemistry from an accredited college or university. Applicants with an undergraduate degree in another scientific discipline and the equivalent of a full year's course work in analytical chemistry, organic chemistry, physical chemistry, physics, and calculus also will be considered for admission.
- Submit official transcripts (in English) for all previously completed undergraduate or graduate course work.
- Submit scores from the Graduate Record Exam (GRE). It is recommended that candidates also submit scores from the chemistry GRE.
- Submit two letters of reference.
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). International English Language Testing System (IELTS) scores will be accepted in place of the TOEFL exam. Minimum scores will vary; however, the absolute minimum score required for unconditional acceptance is 6.5. For additional information about the IELTS, please visit www.ielts.org. This requirement may be waived for students submitting transcripts from American universities, or those at which the language of instruction is English. Foreign students with English language deficiencies may be required to take the Michigan Test of English Language Proficiency, given by the RIT English Language Center. If a student's score is below standard, additional course work may be recommended. Successful completion of this work is a requirement of the program. This may mean that the student will need additional time and financial resources to complete the degree program.

As a supplement to the normal application process, it is strongly recommended that students visit RIT.

Additional information

Assistantships
All candidates for teaching assistantships must participate in a personal interview with the department head and/or the Director of the Chemistry MS Program. International students can complete the interview by phone or internet.

Nonmatriculated students
An applicant with a bachelor's degree from an approved undergraduate institution and the background necessary for specific courses is permitted to take graduate courses as a nonmatriculated student. If the student is subsequently admitted to the graduate program, courses taken for credit usually can be applied toward the master's degree. A maximum of 6 semester credit hours (from courses taken at RIT as a nonmatriculated student) may be transferred to the degree program.

Any applicant who wishes to register for a graduate course as a nonmatriculated student must obtain permission from the chair of the graduate program and the course instructor.

Part-time study
Courses are offered in the late afternoons and evenings to encourage practicing chemists to pursue the MS degree without interrupting their employment. Part-time students may take the project option, which includes a capstone project in place of a thesis. Students employed full time normally take one course each semester. At this pace, course work can be completed within four to five years.

Equipment and resources
The School of Chemistry and Materials Science has modern instrumentation in the areas of spectroscopy (NMR, IR, UV-vis, fluorescence, atomic absorption, fluorimetry), chromatography (gas chromatography, high-performance liquid chromatography, capillary electrophoresis, etc.),

mass spectrometry (high-performance lc- and gc-mass spectrometry and electrospray mass spectrometry), and materials characterization (rheometry, thermal gravimetric analysis, differential scanning calorimetry, hot-stage microscopy and contact angle goniometry). Visit the school's website for a complete list of equipment and instrumentation.

External research credit
For students currently employed as chemists, the Chemistry MS Program provides the opportunity to utilize research conducted at their place of employment as project research credit. A maximum of 4 semester credits of research are required. Please consult with the Director of the Chemistry MS Program for more information and approval.

Cooperative education
Students at the master's level who have, or are able to obtain, industrial employment may be able to earn cooperative education credit for their work experiences. Semesters of co-op can be interspersed with semesters of full-time academic work. Research credits may be obtained through external research credit. If industrial employment does not permit research, then research credits may be obtained within the School of Chemistry and Materials Science.

Materials Science and Engineering, MS

rit.edu/programs/ms/materials-science-and-engineering
Casey Miller, Program Director
(585) 475-4148, cwmsch@rit.edu

Program overview

The master of science degree in materials science and engineering, offered jointly by the College of Science and the Kate Gleason College of Engineering, is designed with a variety of options to satisfy individual and industry needs in the rapidly growing field of materials.

The objectives of the program are threefold:

- With the advent of new classes of materials and instruments, the traditional practice of empiricism in the search for and selection of materials is rapidly becoming obsolete. Therefore, the program offers a serious interdisciplinary learning experience in materials studies, crossing over the traditional boundaries of such classical disciplines as chemistry, physics, and electrical, mechanical, and microelectronic engineering.
- The program provides extensive experimental courses in diverse areas of materials-related studies.
- The program explores avenues for introducing greater harmony between industrial expansion and academic training.

Plan of study
A minimum of 30 semester credit hours is required for the completion of the program. This includes three required core courses, graduate electives, and either a thesis or project. The core courses are specially designed to
establish a common base of materials-oriented knowledge for students with baccalaureate degrees in chemistry, chemical engineering, electrical engineering, mechanical engineering, physics, and related disciplines, providing a new intellectual identity to those involved in the study of materials.

The program has an emphasis on experimental techniques, with one required experimental course as part of the core. Additional experimental courses are available for students who wish to pursue course work in this area. These courses are organized into appropriate units covering many aspects of the analysis of materials. This aspect of the program enhances a student's confidence when dealing with materials-related problems.

Electives
Elective courses may be selected from advanced courses offered by the School of Chemistry and Materials Science or, upon approval, from courses offered by other RIT graduate programs. Elective courses are scheduled on a periodic basis. Transfer credit may be awarded based on academic background beyond the bachelor's degree or by examination, based on experience.

Thesis/Project
Students may choose to complete a thesis or a project as the conclusion to their program. Students who pursue the thesis option take four graduate electives, complete nine semester credit hours of research, and produce a thesis paper. The project option includes six graduate electives and a 3 credit hour project.

Curriculum

Materials science and engineering (thesis option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MTSE-601	Materials Science	3
MTSE-705	Experimental Techniques	3
MTSE-704	Theoretical Methods	3
MTSE-790	Research and Thesis Guidance	6
	Graduate Electives	12
Second Year		
MTSE-790	Research and Thesis Guidance	3
Total Semester Credit Hours		**30**

Materials science and engineering (project option), MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MTSE-601	Materials Science	3
MTSE-705	Experimental Techniques	3
MTSE-704	Theoretical Methods	3
MTSE-777	Graduate Project	2
	Graduate Electives	12
Second Year		
	Graduate Electives	6
MTSE-777	Graduate Project	1
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in materials science and engineering, candidates must fulfill the following requirements:

- Hold a baccalaureate degree in chemistry, physics, chemical engineering, electrical engineering, mechanical engineering, or a related field from an accredited college or university,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Submit two letters of recommendation, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL) and the Test of Written English (TWE). A minimum TOEFL score of 575 (paper-based) or 88-89 (Internet-based) is required. A 4.0 is required on the TWE. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL exam. Minimum scores will vary; however, the absolute minimum score required for unconditional acceptance is 6.5. For additional information about the IELTS, please visit www.ielts.org.

Candidates not meeting the general requirements may petition for admission to the program. In such cases, it may be suggested that the necessary background courses be taken at the undergraduate level. However, undergraduate credits that make up deficiencies may not be counted toward the master's degree.

Any student who wishes to study at the graduate level must first be admitted to the program. However, an applicant may be permitted to take graduate courses as a nonmatriculated student if they meet the general requirements mentioned above.

Additional information

Part-time study

The program offers courses in the late afternoon and evenings to encourage practicing scientists and engineers to pursue the degree program without interrupting their employment. (This may not apply to courses offered off campus at selected industrial sites.) Students employed full time are normally limited to a maximum of two courses, or 6 semester credit hours, each semester. A student who wishes to register for more than 6 semester credit hours must obtain the permission of his or her adviser.

Maximum limit on time

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

Materials Science and Engineering, Adv. Cert.

Casey Miller, Program Director
(585) 475-4148, cwmsch@rit.edu

Program overview

The advanced certificate in materials science and engineering is specially designed to establish a common base of materials-oriented knowledge for students with baccalaureate degrees in chemistry, chemical engineering, electrical engineering, mechanical engineering, physics, and related disciplines. The program provides a new intellectual identity to those interested in the study of advanced materials and offers a serious interdisciplinary learning experience in materials studies, crossing over the traditional boundaries of such classical disciplines as chemistry, physics, and electrical, mechanical, and microelectronic engineering.

Curriculum

Materials science and engineering, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
MTSE-601	Materials Science	3
MTSE-617	Material Degradation	3
MTSE-704	Theoretical Methods	3
MTSE-703	Solid State Science	3
MTSE-702	Polymer Science	3
	Elective	3
Total Semester Credit Hours		**18**

Admission requirements

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

- Hold a baccalaureate degree in chemistry, physics, chemical engineering, electrical engineering, mechanical engineering, or a related field from an accredited college or university,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Submit two letters of recommendation, and
- Complete a graduate application.

International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL) and the Test of Written English (TWE). A minimum TOEFL score of 575 (paper-based) or 88 (Internet-based) is required. A 4.0 is required on the TWE. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL exam. Minimum scores will vary; however, the absolute minimum score required for unconditional acceptance is 6.5. For additional information about the IELTS, please visit www.ielts.org.

Candidates not meeting the general requirements may petition for admission to the program. In such cases, it may be suggested that the necessary background courses be taken at the undergraduate level. However, undergraduate credits that make up deficiencies may not be counted toward the advanced certificate.

Any student who wishes to study at the graduate level must first be admitted to the program. However, an applicant may be permitted to take graduate courses as a nonmatriculated student if they meet the general requirements mentioned above.

Additional information

Part-time study

Students employed full time are normally limited to a maximum of two courses, or 6 credit hours, each semester.

Program of Color Science

Color Science, Ph.D.

rit.edu/cos/colorscience/
Mark D. Fairchild, Graduate Program Director
(585) 475-2784, mark.fairchild@rit.edu

Program overview

Color has been a topic of intense interest and inquiry for hundreds if not thousands of years. As a generalization, color science can be defined as the quantification of our perception of color. Its mastery requires a multidisciplinary educational approach encompassing physics, chemistry, physiology, statistics, computer science, neuroscience, and psychology. Color science is used in the design and control of most man-made colored materials including textiles, coatings, and polymers and to specify such diverse materials as soil and wine. It is used extensively in color reproduction including digital photography, desktop and projection display, and printing. Color science is ubiquitous.

Color science research at RIT encompasses such diverse fields as medical data visualization, computer graphics and animation, art conservation, spectral and spatial measurements of materials, color printing, digital photography, motion picture and television, and modeling of our perceptions for use in defining color quality. RIT has a long history of research and scholarship in color science dating back half a century.

The program is designed for students whose undergraduate degrees are in physics, biology, chemistry, mathematics, computer science, engineering, neuroscience, experimental psychology, imaging, or any applied discipline pertaining to the quantitative description of color, for example, textiles, graphic arts, animation, material science, and polymer science. All students must earn 60 credit hours as a graduate student. For full-time students, entering with a baccalaureate degree, the program requires about four years of study at the graduate level. The curriculum is a combination of required courses in color science, elective courses appropriate for the candidate's background and interests, a research project during the second year of study, and a research dissertation. Students must pass a qualifying examination during their second year of study and a candidacy examination at least one year prior to completing their dissertation. Candidates who wish to enter the program, but lack adequate preparation, might be required to complete undergraduate foundation courses in mathematics, statistics, computer science, and general science before matriculating with graduate status.

Plan of study

Core courses
The following core courses are completed during the first year of study: Principles of Color Science (CLRS-601), Computational Vision Science (CLRS-720), Color Physics and Applications (CLRS-602), Modeling Visual Perception (CLRS-820), Historical Research Perspectives (CLRS-750), and Research and Publication Methods (CLRS-751).

Electives
Elective courses are selected depending on the student's interests and background. The program director must approve all electives.

Second year project
During the second year, students engage in graduate-level research under the supervision of a graduate program faculty member. The topic may or may not be the same as the dissertation topic. One of the purposes of this project is to evaluate the student's research capabilities and suitability for doctorate-level research.

Years three and beyond
After completing the program's required courses, students follow their study plan which consists of research credits, thesis credits, and elective courses.

Qualifying examination
All students must pass a qualifying examination, which determines whether the student has a sufficient depth of knowledge in color science and the ability to perform research at the doctoral level.

The qualifying exam consists of a written test and an evaluation of the second-year research project. The written test is given twice each year and is based on the core curriculum in color science and any material deemed appropriate by the committee. Note that the required readings for these courses include textbooks and current literature. An evaluation of the second-year research project includes depth of research, productivity, quality, analytical skills, and the ability to communicate results. A written document is submitted in the style of a published proceeding.

Students must successfully pass the qualifying examination to continue in the program. Those who do not pass the qualifying examination may make a written request to the color science graduate coordinator to change their program to the MS program. Requests must be received before the end of the semester in which the second written test is taken. Students with permission to enter the MS program will use their second year research project as an MS research thesis topic. A written thesis is required. Students can then graduate with an MS in color science.

Dissertation research adviser and committee
After students pass the qualifying examination, a dissertation research adviser is selected from the graduate program faculty based on the student's research interests, faculty research interests, and discussions with the color science graduate coordinator. A four-member dissertation committee is appointed for the duration of the student's tenure in the program. The committee includes the dissertation research adviser, one other member of the color science faculty, and an external chair appointed by the dean of graduate studies. The external chair must be a tenured member of the RIT faculty who is not a current member of the color science faculty. The fourth member may be an RIT faculty member or a professional affiliated with industry or another institution. The color science graduate program director must approve committee members who are not RIT faculty.

The dissertation committee prepares and administers the examination for admission to candidacy; assists in planning and coordinating research; provides research advice; supervises the writing of the dissertation; and conducts the final examination of the dissertation.

Developing a study plan
During the first semester of study, students work with the color science graduate program director to develop a study plan. This plan may be revised as necessary, subject to approval by the graduate program director. For example, the dissertation research adviser or the dissertation committee might recommend a revised study plan to include specific graduate electives.

Admission to candidacy
When the student thoroughly understands the dissertation research topic, the dissertation committee administers an examination to determine if the student can be admitted to candidacy for the doctoral degree in color science. The purpose of the examination is to ensure the student has the necessary intellectual skills and background knowledge to carry out their specific doctoral-level research project. The dissertation research adviser defines the type of examination and any requirements prior to the examination. Requirements include a dissertation proposal and may additionally include a review of literature, preliminary experi-

ments, and the preparation of an oral presentation. The examination must be administered no later than one year prior to defending the dissertation.

Final examination of dissertation
Once the dissertation has been written, distributed to the dissertation committee, and the committee agrees to administer the final examination, the doctoral candidate can schedule the final examination.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The dissertation committee may also elect to privately question the candidate following the presentation. The dissertation committee immediately notifies the candidate and the color science graduate program director of the result of the examination.

Teaching experience
All candidates for the Ph.D. must serve as a teaching assistant for a minimum of one course before scheduling the final examination of the dissertation. Candidates are encouraged to serve as a teaching assistant for two or more courses.

Public presentation experience
All candidates for the Ph.D. must present research in a public forum before scheduling the final examination of the dissertation. The preferred public forum is a technical conference.

Curriculum

Color science, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CLRS-601	Principles of Color Science	3
CLRS-720	Computational Vision Science	3
CLRS-750	Historical Research Perspectives	1
CLRS-602	Color Physics and Applications	3
CLRS-820	Modeling Visual Perception	3
CLRS-751	Research and Publication Methods	2
	Electives	6
Second Year		
	Research or Electives	18
Third Year		
	Research	18
Fourth Year		
	Research	3
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the Ph.D. program in color science, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited university,
- Submit scores from the Graduate Record Examination (GRE),
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work,
- Have a GPA of 3.0 or higher (or a minimum GPA of 3.0 in foundation course work),
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral candidates must be confidential and must be submitted directly from referee to RIT.
- Submit a persoanl statement of educational objectives which addresses research interests.
- Submit a current resume or curriculum vitae.
- Participate in an on-campus interview (when possible), and
- Complete a graduate application,
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 94 (Internet-based) are required. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL exam. Minimum scores vary; however, the absolute minimum score required for unconditional acceptance is 7.0. For additional information about the IELTS, please visit www.ielts.org.

Candidates without adequate undergraduate work in related sciences must take foundation courses prior to matriculation into the graduate program. A written agreement between the candidate and the program coordinator will identify the required foundation courses. Foundation courses must be completed with an overall B average before a student can matriculate into the graduate program.

The foundation courses, representative of those often required, are as follows: one year of calculus, one year of college physics (with laboratory), one course in computer programming, one course in matrix algebra, one course in statistics, and one course in introductory psychology. Other science courses (with laboratory) might be substituted for physics.

Additional information

Assistantships
Students receiving fully funded assistantships tend to have minimum undergraduate cumulative grade point averages of 3.5 and exceptional GRE scores. International applicants who must submit TOEFL scores, must have scores above 100 (internet-based). Students who submit IELTS scores must have a minimum score of 7.0. Applicants seeking financial assistance must submit all application documents to the Office of Graduate Enrollment Services by January 15 for the following academic year.

Residency
All students in the program must spend at least three consecutive semesters (summer may be excluded) as resident full-time students to be eligible to receive the Ph.D.

Time limitations
All candidates for the Ph.D. must maintain continuous enrollment during the research phase of the program. The maximum number of research credits that apply to the degree does not limit such enrollment. Normally, full-time students complete the course of study for the doctorate in approximately four years. Requirements for the degree must be completed within seven years of the date students pass the qualifying examination.

Color science MS graduates
Graduates from the MS program in color science, who are interested in the doctoral program, should contact the color science graduate program director to discuss their suitability for doctoral-level research. Before matriculating into the program, students must pass the qualifying examination. Once the examination has been passed successfully, students can be admitted into the doctoral program. The doctoral degree can be completed on a full- or part-time basis as long as the residency requirements are met.

MS and MA graduates from related disciplines
Because of the interdisciplinary nature of color science, students with MS and MA degrees often apply to the Ph.D. program. Graduate courses in related disciplines can be used as elective courses toward the degree. Furthermore, for degrees that required a research thesis, the second year research project might be waived. Thus, it might be possible for students with graduate degrees in a related discipline to take the qualifying examination during their first year of study. The color science graduate program director determines the specific courses and credit hours that can be applied toward the Ph.D. in color science.

Color Science, MS

rit.edu/cos/colorscience/

Mark D. Fairchild, Graduate Program Director
(585) 475-2784, mark.fairchild@rit.edu

Program overview

Color science is broadly interdisciplinary, encompassing physics, chemistry, physiology, statistics, computer science, and psychology. The curriculum, leading to a master of science degree in color science, educates students using a broad interdisciplinary approach. This is the only graduate program in the country devoted to this discipline and it is designed for students whose undergraduate majors are in physics, chemistry, imaging science, computer science, electrical engineering, experimental psychology, physiology, or any discipline pertaining to the quantitative description of color.

Graduates are in high demand and have accepted industrial positions in electronic imaging, color instrumentation, colorant formulation, and basic and applied research. Companies that have hired graduates include Apple Inc., Benjamin Moore, Canon Corp., Dolby Laboratories, Eastman Kodak Co., Hallmark, Hewlett Packard Corp., Microsoft Corp., Pantone, Qualcomm Inc., Ricoh Innovations Inc., Samsung, and Xerox Corp.

The color science degree provides graduate-level study in both theory and practical application. The program gives students a broad exposure to the field of color and affords them the unique opportunity of specializing in an area appropriate for their background and interest. This objective will be accomplished through the program's core courses, selection of electives, and completion of a thesis or graduate project.

The program revolves around the activities of the Munsell Color Science Laboratory within the College of Science. The Munsell Laboratory is the pre-eminent academic laboratory in the country devoted to color science. Research is currently under way in color appearance models, lighting, image-quality, color-tolerance psychophysics, spectral-based image capture, archiving, reproduction of artwork, color management, computer graphics; and material appearance. The Munsell Laboratory has many contacts that provide students with summer and full-time job opportunities across the United States and abroad.

Plan of study

Students must earn 30 semester credit hours as a graduate student to earn the master of science degree. For full-time students, the program requires three to four semesters of study. Part-time students generally require two to four years of study. The curriculum is a combination of required courses in color science, elective courses appropriate for the candidate's background, and either a research thesis or graduate project. Students require approval of the program director if they wish to complete a graduate project, rather than a research thesis, at the conclusion of their degree.

Prerequisites: The foundation program

The color science program is designed for the candidate with an undergraduate degree in a scientific or other technical discipline. Candidates with adequate undergraduate work in related sciences start the program as matriculated graduate students.

Candidates without adequate undergraduate work in related sciences must take foundation courses prior to matriculation into the graduate program. A written agreement between the candidate and the program coordinator will identify the required foundation courses.

Foundation courses must be completed with an overall B average before a student can matriculate into the graduate program. A maximum of 9 graduate-level credit hours may be taken prior to matriculation into the graduate program.

The foundation courses, representative of those often required, are as follows: one year of calculus, one year of college physics (with laboratory), one course in computer programming, one course in matrix algebra, one course in statistics, and one course in introductory psychology. Other science courses (with laboratory) might be substituted for physics.

Curriculum

Color science, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
CLRS-601	Principles of Color Science	3
CLRS-720	Computational Vision Science	3
CLRS-750	Historical Research Perspectives	1
CLRS-602	Color Physics and Applications	3
CLRS-820	Modeling Visual Perception	3
CLRS-751	Research and Publication Methods	2
	Electives	6
Second Year		
CLRS-890	Research	6
	Elective	3
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Submit scores from the Graduate Record Examination (GRE),
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work,
- Submit two professional recommendations,
- Submit a persoanl statement of educationla objectives,
- Submit a current resume or curriculum vitae,
- Complete an on-campus interview (when possible),
- Have an average GPA of 3.0 or higher,
- Have completed foundation course work with GPA of 3.0 or higher (if required), and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 94 (internet-based) are required. International English Language Testing System (IELTS) scores will be accepted in place of the TOEFL exam. Minimum scores will vary; however, the absolute minimum score required for unconditional acceptance is 7.0. For additional information about the IELTS, please visit www.ielts.org.

Additional information

Scholarships and assistantships

Students seeking RIT-funded scholarships and assistantships should apply to the Color Science Ph.D. program (which is identical to the MS program in the first two years). Currently, assistantships are only available for qualified color science applicants to the Ph.D. program. Applicants seeking financial assistance from RIT must submit all application documents to the Office of Graduate Enrollment Services by January 15 for the next academic year.

Chester F. Carlson Center for Imaging Science

cis.rit.edu
David W. Messinger, Director
(585) 475-4538, messinger@cis.rit.edu

The Chester F. Carlson Center for Imaging Science offers masters and doctoral degrees in imaging science. The science of imaging encompasses a wide range of subject areas, from the physics of light sources to the psychophysics of high-level visual perception. From how light is generated to how the world is perceived, imaging science addresses questions about every aspect of systems and techniques that are used to create, perceive, analyze, and optimize images. Application areas of imaging are equally diverse. Thus, imaging science is interdisciplinary in its content and multidisciplinary in its applications. The center conducts research and prepares students for challenging and rewarding careers in a range of imaging application areas.

Imaging Science, Ph.D.

cis.rit.edu/graduate-programs/phd
John Kerekes, Graduate Program Coordinator
(585) 475-6996, kerekes@cis.rit.edu

Program overview

The doctor of philosophy degree in imaging science signifies high achievement in scholarship and independent investigation in the diverse aspects of imaging science. Graduates will contribute to an increase in the fundamental body of knowledge associated with imaging science. They will acquire the capabilities, skills, and experience to continue to expand the limits of the discipline, and to meet future scholarly, industrial, and government demands on the field.

Candidates for the doctoral degree must demonstrate proficiency by:

- Successfully completing course work, including a core curriculum, as defined by the student's plan of study;
- Passing a series of examinations; and
- Completing an acceptable dissertation under supervision of the student's research adviser and dissertation committee.

Plan of study

All students must complete a minimum of 60 credit hours of course work and research. The core curriculum includes courses that span and integrate a common body of knowledge essential to an understanding of imaging processes and applications. Courses are defined by the student's study plan and must include core course sequences plus a sequence in a topical area such as remote sensing, digital image processing, color imaging, digital graphics, electro-optical imaging systems, medical imaging, and microlithographic imaging technologies.

Students may take a limited number of credit hours in other departments and must complete research credits including two credits of research associated with the research seminar course, Graduate Seminar (IMGS-606, 607).

Graduate elective courses offered by the Center for Imaging Science (and other RIT academic departments in fields closely allied with imaging science) allow students to concentrate their studies in a range of imaging science research and imaging application areas, including electro-optical imaging, digital image processing, color science, perception and vision, electrophotography, lithography, remote sensing, medical imaging, electronic printing, and machine vision.

Advancement to candidacy
Advancement to candidacy will proceed through the following steps:

- Adviser selection
- Submission and approval of preliminary study plan
- Passing a written qualifying exam
- Study plan revision based on outcome of qualifying exam and adviser recommendation
- Research committee appointment
- Candidacy exam based on thesis proposal

Following the qualifying exam, faculty decide whether a student will continue on the doctoral program or if the pursuit of an MS degree or other program option is more acceptable. For students who continue in the doctoral program, the student's plan of study will be revised, a research committee is appointed, candidacy/proposal exams are scheduled, and, finally, a dissertation defense is presented.

Research committee
Prior to the candidacy exam, the student, in consultation with an adviser, must present a request to the graduate program coordinator for the appointment of a research committee. The committee is composed of at least four people: an adviser, at least one faculty member who is tenured (or tenure-track) and whose primary affiliation is the Carlson Center for Imaging Science (excluding research faculty), a person competent in the field of research who is an RIT faculty member or affiliated with industry or another university and has a doctorate degree, and the external chair. The external chair must be a tenured member of the RIT faculty who is not a faculty member of the center and who is appointed by the dean of graduate studies. The committee will supervise the student's research, beginning with a review of the research proposal and concluding with the dissertation defense.

Research proposal
The student and their research adviser select a research topic for the dissertation. Proposed research must be original and publishable. Although the topic may deal with any aspect of imaging, research is usually concentrated in an area of current interest within the center. The research proposal is presented to the student's research committee during the candidacy exam at least six months prior to the dissertation defense.

Final examination of the dissertation
The research adviser, on behalf of the student and the student's research committee, must notify the graduate program coordinator of the scheduling of the final examination of the dissertation by forwarding to the graduate program coordinator the title and abstract of the dissertation and the scheduled date, time, and location of the examination. The final examination of the dissertation may not be scheduled within six months of the date on which the student passed the candidacy exam (at which the thesis proposal was presented and approved).

Barring exceptional circumstances (requiring permission from the graduate program coordinator), the examination may not be scheduled sooner than four weeks after formal announcement (i.e. center-wide hallway postings and email broadcast) has been made of the dissertation title and abstract and the defense date, time, and location.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The research committee may also elect to privately question the candidate following the presentation. The research committee will immediately notify the candidate and the graduate program coordinator of the examination result.

Curriculum

Imaging science, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
IMGS-616	Fourier Methods for Imaging	3
IMGS-619	Radiometry	3
IMGS-620	The Human Visual System	3
IMGS-609, 610	Graduate Laboratory I, II	2
IMGS-606, 607	Graduate Seminar I, II	2
IMGS-682	Image Processing and Computer Vision	3
IMGS-633	Optics for Imaging	3
	Specialty Track Course	3
Second Year		
IMGS-613	Probability, Noise and System Modeling	3
	Specialty Track Course	3
	Graduate Electives	6
IMGS-890	Research and Thesis	1
Third Year		
IMGS-890	Research and Thesis	10
Fourth Year		
IMGS-890	Research and Thesis	10
Fifth Year		
IMGS-890	Research and Thesis	5
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the Ph.D. program in imaging science, candidates must fulfill the following requirements:

- Hold a baccalaureate degree in engineering, computer science, applied mathematics, or one of the natural sciences from an accredited institution,
- Have completed courses in calculus, university physics (one year), modern physics, and a computer language,
- Submit scores from the Graduate Record Exam (GRE) (if seeking financial assistance),
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Submit a current resume or curriculum vitae,
- Submit a one to two page personal statement of educational objectives addressing research interests,
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral students must be confidential and must be submitted directly from the Referee to RIT.
- Complete a graduate application.
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 600 (paper-based) or 100 (Internet-based) are required. Students may also submit scores from the International English Language Testing System (IELTS). A minimum score of 7.0 is required.

Imaging science encompasses a wide variety of scientific disciplines. Exceptional candidates from other fields and with diverse backgrounds are accepted into the program.

Admission decisions are made by a committee comprised of graduate faculty of the Center for Imaging Science.

Students with an MS degree in a related field may be granted credit toward the doctoral degree after successful completion of the qualifying examination and approval of their study plan. (Students should consult their academic adviser for more information.) The required research credits may not be waived by experience or examination.

Additional information

Residency

All students in the program must spend at least two consecutive semesters (summer excluded) as resident full-time students to be eligible to receive the doctoral degree. If circumstances warrant, the residency requirement may be waived via petition to the graduate program coordinator, who will decide on the student's petition in consultation with the adviser and graduate faculty. The request must be submitted at least nine months prior to the thesis defense.

Maximum time limit

University policy requires that doctoral programs be completed within seven years of the date of the student passing the qualifying exam. Bridge courses are excluded.

All candidates must maintain continuous enrollment during the research phase of the program. Such enrollment is not limited by the maximum number of research credits that apply to the degree. Normally, full-time students complete the course of study for the doctorate in approximately three to five years. A total of seven years is allowed to complete the degree after passing the qualifying exam.

Financial aid, scholarships, and assistantships

Graduate assistantships and tuition remission scholarships are available to qualified students. Applicants seeking financial assistance from the center must have all application documents submitted to the Office of Graduate Enrollment Services by January 15 for the next academic year. Students whose native language is not English are advised to obtain as high a TOEFL or IELTS score as possible if they wish to apply for a teaching or research assistantship. These candidates also are encouraged to take the Test of Spoken English in order to be considered for financial assistance.

Imaging Science, MS

cis.rit.edu/graduate-programs/master-science
John Kerekes, Graduate Program Coordinator
(585) 475-6996, kerekes@cis.rit.edu

Program overview

The master of science program in imaging science prepares students for positions in research in the imaging industry or in the application of various imaging modalities to problems in engineering and science. Formal course work includes consideration of the physical properties of radiation-sensitive materials and processes, the applications of physical and geometrical optics to electro-optical systems, the mathematical evaluation of image forming systems, digital image processing, and the statistical characterization of noise and system performance. Technical electives may be selected from courses offered in imaging science, color science, engineering, computer science, science, and mathematics. Both thesis and project options are available. In general, full-time students are required to pursue the thesis option, with the project option targeted to part-time and online students who can demonstrate that they have sufficient practical experience through their professional activities.

Faculty within the Center for Imaging Science supervise thesis research in areas of the physical properties of radiation-sensitive materials and processes, digital image processing, remote sensing, nanoimaging, electro-optical instrumentation, vision, medical imaging, color imaging systems, and astronomical imaging. Interdisciplinary efforts are possible with other colleges across the university.

The program can be completed on a full- or a part-time basis. Some courses are available online, specifically in the areas of color science, remote sensing, medical imaging, and digital image processing.

Plan of study

All students must earn 30 credit hours as a graduate student. The curriculum is a combination of required core courses in imaging science, elective courses appropriate for the candidate's background and interests, and either a research thesis or graduate paper/project. Students must enroll in either the research thesis or graduate paper/project option at the beginning of their studies.

Core courses
Students are required to complete the following core courses: Fourier Methods for Imaging (IMGS-616), Image Processing and Computer Vision (IMGS-682), Optics for Imaging (IMGS-633), and either Radiometry (IMGS-619) or The Human Visual System (IMGS-620).

Speciality track courses
Students choose two courses from a variety of tracks such as: digital image processing, medical imaging, electro-optical imaging systems, remote sensing, color imaging, optics, hard copy materials and processes, and nanoimaging. Tracks may be created for students interested in pursuing additional fields of study.

Research thesis option
The research thesis is based on experimental evidence obtained by the student in an appropriate field, as arranged between the student and their adviser. The minimum number of thesis credits required is four and may be fulfilled by experiments in the university's laboratories. In some cases, the requirement may be fulfilled by work done in other laboratories or the student's place of employment, under the following conditions:

1. The results must be fully publishable.
2. The student's adviser must be approved by the graduate program coordinator.
3. The thesis must be based on independent, original work, as it would be if the work were done in the university's laboratories.

A student's thesis committee is composed of a minimum of three people: the student's adviser and two additional members who hold at least a master's dgeree in a field relevant to the student's research. Two committee members must be from the graduate faculty of the center.

Graduate paper/project option
Students with demonstrated practical or research experience, approved by the graduate program coordinator, may choose the graduate project option (3 credit hours). This option takes the form of a systems project course. The graduate paper is normally performed during the final semester of study. Both part- and full-time students may choose this option, with the approval of the graduate program coordinator.

Curriculum

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

COURSE		SEMESTER CREDIT HOURS
First Year		
IMGS-616	Fourier Methods for Imaging	3
Choose one of the following:		3
IMGS-619	Radiometry	
IMGS-620	The Human Visual System	
	Elective	3
IMGS-606, 607	Imaging Science Seminar I, II	2
IMGS-682	Image Processing and Computer Vision	3
IMGS-633	Optics for Imaging	3
	Specialty Track Course	3
Second Year		
	Specialty Track Course	3
Choose one of the following:		3
IMGS-790	Research and Thesis	
	Elective	
IMGS-790	Research and Thesis	4
Total Semester Credit Hours		**30**

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

COURSE		SEMESTER CREDIT HOURS
First Year		
IMGS-616	Fourier Methods for Imaging	3
Choose one of the following:		3
IMGS-619	Radiometry	
IMGS-620	The Human Visual System	
	Elective	3
IMGS-682	Image Processing and Computer Vision	3
IMGS-633	Optics for Imaging	3
	Specialty Track Course	3
Second Year		
	Specialty Track Course	3
	Electives	6
IMGS-740	MS Systems Project Paper	3
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution (undergraduate studies should include the following: mathematics, through calculus and including differential equations; and a full year of calculus-based physics, including modern physics. It is assumed that students can write a common computer program),
- Submit a one- to two-page personal statement of educational objectives,

- Submit official transcripts (in English) of all previously completed undergraduate or graduate course work,
- Submit letters of recommendation from individuals familiar with the applicant's academic or research capabilities,
- Submit scores from the Graduate Record Exam (GRE) (requirement may be waived for those not seeking funding from the Center for Imaging Science),
- Submit a current resume or ciurriculum vitae, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 600 (paper-based) or 100 (Internet-based) are required. Students may also submit scores from the International English Language Testing System. The minimum IELTS score is 7.0. International students who are interested in applying for a teaching or research assistantship are advised to obtain as high a TOEFL or IELTS score as possible. These applicants also are encouraged to take the Test of Spoken English in order to be considered for financial assistance.

Applicants seeking financial assistance from the center must have all application documents submitted to the Office of Graduate Enrollment Services by January 15 for the next academic year.

Additional information

Bridge courses

Applicants who lack adequate preparation may be required to complete bridge courses in mathematics or physics before matriculating with graduate status.

Maximum time limit

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

Thomas H. Gosnell School of Life Sciences

rit.edu/ science/gsols
Larry Buckley, Head
(585) 475-7507, ljbsbi@rit.edu

The School of Life Sciences offers MS degrees in bioinformatics and environmental science.

Bioinformatics, MS

rit.edu/science/programs/ms/bioinformatics
Michael V. Osier, Director
(585) 475-4392, mvoscl@rit.edu

Program overview

The master of science degree in bioinformatics provides students with a strong foundation in biotechnology, computer programming, computational mathematics, statistics, and database management. Graduates of the program are well-prepared for careers in the biotechnology, bioinformatics, pharmaceutical, and vaccine industries.

Based on consultation with individuals within the industry nationwide, the job market is rich with opportunities for those who obtain a graduate degree in bioinformatics, particularly when coupled with industry-sponsored research as thesis work. This research provides exposure to real-world problems—and their solutions—not otherwise attainable in an academic setting.

The program provides students with the capability to enter the bioinformatics workforce and become leaders in the field. The curriculum is designed to fulfill the needs of students with diverse educational and professional backgrounds. Individuals entering the program typically have degrees in biology, biotechnology, chemistry, statistics, computer science, information technology, or a related field. The program accommodates this diversity in two ways. First, a comprehensive bridge program exists for students who need to supplement their education before entering the program. Second, the program itself consists of two tracks, one for students with backgrounds in the life sciences and one for those with backgrounds in the computational sciences. Regardless of the track pursued, students are prepared to become professional bioinformaticists upon graduation.

The program is offered on a full- or part-time basis to fulfill the needs of traditional students and those currently employed in the field.

Plan of study

A minimum of 30 semester credit hours is required for completion of the program. A number of graduate electives are offered for students to pursue areas of personal or professional interest. In addition, every student is required to complete a research project that addresses a relevant and timely topic in bioinformatics, culminating in a thesis. Graduate electives may be chosen from relevant RIT graduate courses.

Curriculum

Bioinformatics, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
BIOL-635	Bioinformatics Seminar	3
BIOL-630	Graduate Bioinformatics Algorithms	3
BIOL-625	Graduate Ethics in Bioinformatics	3
Choose one of the following:		3
BIOL-671	Database Management for the Sciences	
BIOL-700	Cell and Molecular Genetics	
	Graduate Elective*	3
BIOL-670	Graduate Statistical Analysis for Bioinformatics	3
BIOL-694	Graduate Molecular Modeling and Proteomics	3
	Graduate Elective*	3
Second Year		
BIOL-790	Thesis	6
Total Semester Credit Hours		**30**

* Any graduate level course deemed related to the field of bioinformatics by the program director.

Admission requirements

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

- Hold a baccalaureate degree in biology, biotechnology, biochemistry, chemistry, computer science, information technology, statistics, or related disciplines from an accredited institution,
- Have an undergraduate GPA of 3.2 or higher (on a 4.0 scale),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Record Examination (GRE), and
- Complete a graduate application.
- International applicants whose primary language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 79 (Internet-based) is required. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL exam. Minimum scores will vary; however, the absolute minimum score required for unconditional acceptance is 6.0. For additional information about the IELTS, please visit www.ielts.org.

Environmental Science, MS

rit.edu/cos/environmental/
Christy Tyler, Director
(585) 475-5042, actsbi@rit.edu

Program overview

Habitat loss, global climate change, water and air pollution, ozone depletion, species invasions, loss of biodiversity, and the accumulation of toxic wastes are among the many environmental dilemmas our society faces.

These complex problems pit environmental limits against economic development, diverse cultures, ethics, values, and social stability and therefore require an understanding of science, policy, society, history, and economics. Environmental scientists must use integrated and holistic approaches to understand and find sustainable solutions to these problems. Graduates of the environmental science program are well prepared for a variety of environmental careers including consulting, research, policy, and outreach, or further graduate work towards a doctoral degree.

Plan of study

Built on the concept that environmental issues are inherently interdisciplinary, the program is offered in collaboration with the College of Liberal Arts. The curriculum provides students with a deep understanding of the science behind our environmental problems, the complex set of circumstances that impact environmental issues, and how environmental decisions and policies must attempt to find a balance between environmental conservation, human well-being, and economic development. Students augment their hands-on classroom work with in-depth experiential learning through an individual thesis or project that provides students with the chance to work on real-world environmental problems under the guidance of skilled environmental scientists.

The program includes a core curriculum and electives chosen to reflect the student's background and career goals. A minimum of 34 semester credit hours beyond the bachelor's degree is required. All students must propose, conduct, and report on an original research thesis or project.

Curriculum

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

COURSE		SEMESTER CREDIT HOURS
First Year		
ENVS-601	Environmental Science Graduate Studies	3
MATH-655	Biostatistics or Equivalent Course	3
	Graduate Public Policy Core Elective	3
	Graduate Science, Technology and Society Core Elective	3
	Graduate Science Core Elective	3
ENVS-670	Advanced Concepts of Environmental Chemistry	3
BIOL-675	Advanced Conservation Biology	3
ENVS-650	Hydrologic Applications of GIS	4
	Graduate Public Policy Core Elective	3
Second Year		
	Professional Elective	3
ENVS-790	Environmental Science Thesis	6
Total Semester Credit Hours		**34**

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

COURSE		SEMESTER CREDIT HOURS
First Year		
ENVS-601	Environmental Science Graduate Studies	3
MATH-655	Biostatistics or Equivalent Course	3
	Graduate Public Policy Core Elective	3
	Graduate Science Core Elective	3
ENVS-670	Advanced Concepts of Environmental Chemistry	3
BIOL-675	Advanced Conservation Biology	3
	Graduate Science, Technology and Society Core Elective	3
ENVS-650	Hydrologic Applications of GIS	4
Second Year		
	Professional Elective	3
ENVS-780	Environmental Science Project	6
Total Semester Credit Hours		**34**

Admission requirements

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

- Hold a baccalaureate degree in environmental science, biological sciences, or a related field of study,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Have a minimum GPA of 3.0 (overall and in science/math),
- Submit a statement outlining the candidate's research/project interests, career goals, and suitability to the program,
- Submit three letters of recommendation, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 600 (paper-based) is required. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL exam. Minimum scores will vary; however, the absolute minimum score required for unconditional acceptance is 7.0. For additional information about the IELTS, please visit www.ielts.org.
- The Graduate Record Examination (GRE) is recommended but not required for applicants with an undergraduate degree from a US institution. The GRE is required for International applicants.

Students are strongly encouraged to contact program faculty before applying to discuss thesis topics and research projects. Students will be matched with a potential thesis advisor at the time of admission.

Additional information

Facilities and equipment

The program provides a wide range of research opportunities. Many faculty members are engaged in field-based projects and the college boasts excellent laboratory facilities that support field research, including wet laboratories and computer facilities (traditional and geographic information systems). For a list of past and present projects, and faculty research interests, please visit the program website.

Monitoring, mapping, and field equipment: ArcGIS and IDRISI GIS software, ENVS and ERDAS Remote Sensing software, Garmin and Trimble GPS receivers, soil sampling and analysis equipment, water sampling devices, multisonde water quality probes and dissolved oxygen meters, SCT meter, ponar dredges, Li-Cor light meter, plankton samplers, macroinvertebrate nets/samplers, and a library of field reference texts.

Other equipment: Fluorimeter, Raman Spectrometer, UV-Vis-IR, GC-MS, ICP, atomic absorption, polarimeter, centrifuge, electrochemical equipment, gas chromatographs, HPLC, viscometer, ESR (built in-house), confocal microscope, infrared carbon dioxide analyzer, Unisense microelectrode system, Lachat autoanalyzer, incubators, capillary electrophoresis, DSCs, DMA, NMR, drying oven, Wiley mill.

School of Mathematical Sciences

math.rit.edu
Mihail Barbosu, Head, School of Mathematical Sciences
(585) 475-5440

Responding to the growing demand from industry, government, and academia for mathematicians and statisticians with strong quantitative and computing skills, the School of Mathematical Sciences offers an MS degree in applied and computational mathematics, and both an MS and an advanced certificate in applied statistics. Constant feedback from various sources, including alumni, has enabled the school to update its courses, programs, and equipment in order to make sure students are well-trained in current techniques, technology, and applications. Students utilize symbolic mathematical and statistical software in many courses. Our workshop classrooms and statistics labs provide support for all of our programs. Industrial needs and trends are carefully discussed with employers in order to update our curricula, and graduates find that their RIT mathematics and statistics education is tailor-made for their professional careers.

Applied and Computational Mathematics, MS

rit.edu/science/programs/ms/applied-and-computational-mathematics
Tamas Wiandt, Graduate Program Director
(585) 475-5776, tiwsma@rit.edu

Program overview

The ideas of applied mathematics pervade several applications in a variety of businesses and industries as well as government. Sophisticated mathematical tools are increasingly used to develop new models, modify existing ones, and analyze system performance. This includes applications of mathematics to problems in management science, biology, portfolio planning, facilities planning, control of dynamic systems, and design of composite materials. The goal is to find computable solutions to real-world problems arising from these types of situations.

The master of science degree in applied and computational mathematics provides students with the capability to apply mathematical models and methods to study various problems that arise in industry and business, with an emphasis on developing computable solutions that can be implemented. The program offers concentration options in discrete mathematics, dynamical systems, and scientific computing. Students complete a thesis, which includes the presentation of original ideas and solutions to a specific mathematical problem. The proposal for the thesis work and the results must be presented and defended before the advisory committee.

Curriculum

Applied and computational mathematics, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
Choose four of the following core courses:		12
MATH-601	Methods of Applied Mathematics	
MATH-602	Numerical Analysis I	
MATH-605	Stochastic Processes	
MATH-622	Mathematical Modeling I	
MATH-645	Graph Theory	
MATH-722	Mathematical Modeling II	
	Concentration Course	3
MATH-606, 607	Graduate Seminar	2
	Elective	3

COURSE		SEMESTER CREDIT HOURS
Second Year		
	Concentration Course	3
	Electives	6
MATH-790	Thesis	7
Total Semester Credit Hours		**36**

Concentration courses

COURSE	
Discrete mathematics	
MATH-646	Combinatorics
MATH-671	Number Theory
MATH-771	Mathematics of Cryptography
Dynamical systems	
MATH-631	Dynamical Systems
MATH-741	Partial Differential Equations I
MATH-742	Partial Differential Equations II
Scientific computing	
MATH-702	Numerical Analysis II
MATH-712	Numerical Methods for Partial Differential Equations
	High-performance Computing Course

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution in mathematics or any related field (applicants should have completed course work in multivariable calculus, differential equations, matrix theory, and probability and statistics. Knowledge of a programming language is required),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a personal statement of educational objectives,
- Have an undergraduate cumulative GPA of 3.0 or higher,
- Submit two letters of recommendation, and
- Complete a graduate application.
- International applicants whose primary language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 550 (paper-based) or 79-80 (Internet-based) is required. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL exam. Minimum scores vary; however, the absolute minimum score required for unconditional acceptance is 6.5. For additional information about the IELTS, please visit www.ielts.org. Those who cannot take the TOEFL will be required to take the Michigan Test of English Proficiency at RIT and obtain a score of 80 or higher.

Although Graduate Record Examination (GRE) scores are not required, submitting them may enhance a candidate's acceptance into the program.

A student may also be granted conditional admission and be required to complete bridge courses selected from among RIT's existing undergraduate courses, as prescribed by the student's adviser. Until these requirements are met, the candidate is considered a nonmatriculated student. The graduate program director evaluates the student's qualifications to determine eligibility for conditional and provisional admission.

Additional information

Student's advisory committee

Upon admission to the program, the student chooses an adviser and forms an advisory committee. This committee oversees the academic aspects of the student's program, including the selection of a concentration and appropriate courses to fulfill the program's requirements.

Cooperative education

Cooperative education enables students to alternate periods of study on campus with periods of full-time, paid professional employment. Students may pursue a co-op position after their first semester. Co-op is optional for this program.

Part-time study

The program is ideal for practicing professionals who are interested in applying mathematical methods in their work and enhancing their career options. Most courses are scheduled in the late afternoon or early evening. The program may normally be completed in two years of part-time study.

Nonmatriculated students

A student with a bachelor's degree from an approved undergraduate institution, and with the background necessary for specific courses, may take graduate courses as a nonmatriculated student with the permission of the graduate program director and the course instructor. Courses taken for credit may be applied toward the master's degree if the student is formally admitted to the program at a later date. However, the number of credit hours that may be transferred into the program from courses taken at RIT is limited for nonmatriculated students.

Applied Statistics, MS

rit.edu/science/programs/ms/applied-statistics
Steven LaLonde, Graduate Program Director
(585) 475-5854, smleqa@rit.edu

Program overview

The MS program in applied statistics is available to both full- and part-time students with courses available both on-campus and online. Cooperative education is optional. The program is intended for students who do not wish to pursue a degree beyond the MS. However, a number of students have attained doctorate degrees at other universities.

Plan of study

The program requires 30 credit hours and includes four core courses, five electives, and a capstone or thesis.

Core courses
There are four required core courses. Students, in conjunction with their advisers' recommendations, should take the core courses early in the program.

Concentration areas
- Predictive Analytics
- Data Mining/Machine Learning
- Industrial
- Biostatistics
- Theory

Electives, capstone or thesis
Elective courses are chosen by the student with the help of their adviser. These courses are usually department courses but may include (along with transfer credits) up to 6 credit hours from other departments that are consistent with students' professional objectives.

The capstone course is designed to ensure that students can integrate the knowledge from their courses to solve more complex problems. This course is taken near the end of a student's course of study. Students, with adviser approval, may write a thesis as their capstone. A thesis may be 3 or 6 credit hours. If a student writes a 6 credit hour thesis, they will be required to complete four elective courses instead of five.

Curriculum

Applied statistics, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
STAT-611	Statistical Software	3
STAT-731	Fundamentals of Statistical Theory	3
STAT-741	Regression Analysis	3
STAT-701	Foundations of Experimental Design	3
	Electives	6
Second Year		
	Electives	9
STAT-792	Capstone	3
Total Semester Credit Hours		**30**

Admission requirements

To be considered for admission to the MS program in applied statistics, candidates must fulfill the following requirements:
- Hold a baccalaureate degree from an accredited institution (minimum 3.0 GPA strongly recommended),
- Have a satisfactory background in mathematics (one year of university-level calculus) and statistics (preferably two courses in probability and statistics)
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a current resume,
- Submit two letters of recommendation, and
- Complete a graduate application.
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL).

Scores from the Graduate Record Exam (GRE) are not required, however submitting scores may support the admission of an applicant who is deficient in certain admission requirements.

Additional information

Grades

Students must attain an overall program grade-point average of 3.0 (B) for graduation.

Maximum time limit

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

Applied Statistics, Adv. Cert.

rit.edu/science/programs/adv-cert/applied-statistics
Steven LaLonde, Graduate Program Director
(585) 475-5854, smleqa@rit.edu

Program overview

The advanced certificate in applied statistics is designed for engineers, scientists, analysts, and other professionals who want a solid education in the statistical methods that are most closely related to their work. Courses are available both on-campus and online.

Curriculum

Applied statistics, advanced certificate, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
STAT-741	Regression Analysis	3
STAT-701	Foundations of Experimental Design	3
	Electives	6
Total Semester Credit Hours		**12**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution (3.0 GPA strongly recommended),
- Have a satisfactory background in mathematics and statistics (preferably two courses in probability and statistics),
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit two letters of recommendation,
- Submit a current resume, and
- Complete a graduate application.
- International students whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL).

Scores from the Graduate Record Exam (GRE) are not required, however they may be beneficial for some students.

Additional information

Prerequisites

Students should have basic familiarity with MINITAB, SAS, or R statistical software. This may be obtained through self-study; short courses; or by completing Statistical Software (STAT-611), which covers both SAS and R software.

Grades

Students must attain an overall program grade-point average of 3.0 (B) for graduation.

Maximum time limit

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

Gainful employment

Information regarding costs and the U.S. Department of Labor's Standard Occupational Classification (SOC) code and occupational profiles for this program can be viewed on the ED Gainful Employment Disclosure Template at http://www.rit.edu/programs/gedt/appliedstatistics/.

School of Physics and Astronomy

rit.edu/science/sopa
Michael Kotlarchyk, Head
(585) 475-6115, mnksps@rit.edu

The School of Physics and Astronomy offers MS and doctoral degrees in astrophysical sciences and technology.

Astrophysical Sciences and Technology, Ph.D.

rit.edu/cos/astrophysics/
Andrew Robinson, Graduate Program Director
(585) 475-2726, axrsps@rit.edu

Program overview

There has never been a more exciting time to study the universe beyond the confines of the Earth. A new generation of advanced ground-based and space-borne telescopes and enormous increases in computing power are enabling a golden age of astrophysics. The doctorate program in astrophysical sciences and technology focuses on the underlying physics of phenomena beyond the Earth and on the development of the technologies, instruments, data analysis, and modeling techniques that will enable the next major strides in the field. The program's multidisciplinary emphasis sets it apart from conventional astrophysics graduate programs at traditional research universities.

Plan of study

Students complete a minimum of 60 credit hours of study, consisting of at least 27 credit hours of course work and at least 24 credit hours of research. Students may choose to follow one of three tracks: astrophysics, astro-informatics and computational astrophysics (with the option of a concentration in general relativity), or astronomical instrumentation. All students must complete four core courses and two semesters of graduate seminar. The remaining course credits are made up from specialty track courses and electives. Students must successfully complete a master's-level research project and pass a written qualifying examination prior to embarking on the dissertation research project.

Electives

Electives include additional courses in astrophysics and a wide selection of courses offered in other RIT graduate programs (e.g. imaging science, computer science, engineering), including detector development, digital image processing, computational techniques, optics, and entrepreneurship, among others.

Master's level research project

Typically following the first year, but sometimes initiated during the first year for well prepared students, candidates begin a master's level research project under the guidance of a faculty member who will not necessarily be the dissertation research adviser. The topic may be different from the dissertation topic. Assessment is based on a combination of a written project report and an oral presentation.

Admission to candidacy

Students must pass a qualifying examination after completing the core curriculum and prior to embarking on the doctoral dissertation project. The purpose of the examination is to ensure the student has the necessary background knowledge and intellectual skills to carry out doctoral-level research in the subject areas of astrophysical sciences and technology. The examination consists of two parts: a written examination based on the program's core courses and an oral examination based on

a research portfolio consisting of a written report on the master's-level research project and a record of graduate research seminar activities.

A committee, appointed by the astrophysical sciences and technology director and including the student's research adviser and two additional faculty members, will assess the student's overall qualifications. Students must pass the qualification examination by the beginning of the third year of full-time study or its equivalent, to continue in the program. Students are permitted two attempts to pass each part of the exam.

Dissertation research adviser
After passing the qualifying examination, students are guided by a dissertation research adviser who is approved by the program director. The choice of adviser is based on the student's research interests, faculty research interests, and available research funding.

Research committee
After passing the qualifying examination, a dissertation committee is appointed for the duration of the student's tenure in the program. The committee chair is appointed by the dean of graduate studies and must be a faculty member in a program other than astrophysical sciences and technology. The committee chair acts as the institutional representative in the final dissertation examination. The committee comprises at least four members and in addition to the chair, must also include the student's dissertation research adviser and at least one other member of the program's faculty. The fourth member may be an RIT faculty member, a professional affiliated in industry, or a representative from another institution. The program director must approve committee members who are not RIT faculty.

Ph.D. proposal review
Within six months of the appointment of the dissertation committee, students must prepare a Ph.D. research project proposal and present it to the committee for review. The student will provide a written research proposal and give an oral presentation to the Committee, who will provide constructive feedback on the project plan. The review must take place at least six months prior to the dissertation defense.

Annual review
Each fall, students provide an annual report in the form of an oral presentation, which summarizes progress made during the preceding year. The program director will also monitor student's progress toward meeting the requirements for either the qualifying examination (during the first two years), or the Ph.D. (after passing the qualifying examination). Students may be interviewed, as necessary, to explore any concerns that emerge during the review and to discuss remedial actions.

Final examination of the dissertation
Once the dissertation is written, distributed to the dissertation committee, and the committee agrees to administer the final examination, the doctoral candidate can schedule the final examination. The candidate must distribute a copy of the dissertation to the committee and make the dissertation available to interested faculty at least four weeks prior to the dissertation defense.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The dissertation committee privately questions the candidate following the presentation. The dissertation committee caucuses immediately following the examination and thereafter notifies the candidate and the program director of the results.

Curriculum

Astrophysical sciences and technology, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ASTP-613	Astronomical Observational Techniques and Instrumentation	3
ASTP-617	Astrophysical Dynamics	3
	Elective or Specialty Track Course	3
ASTP-601, 602	Graduate Seminar I, II	2
ASTP-615	Radiative Processes for Astrophysical Sciences	3
Choose one of the following:		3
ASTP-610	Mathematical Methods for the Astrophysical Sciences	
ASTP-611	Statistical Methods for Astrophysics	
	Specialty Track Course	3
Second Year		
	Specialty Track Courses	6
	Elective	3
	Elective or Specialty track course	3
ASTP-890	Research and Thesis	8
Third Year		
ASTP-890	Research and Thesis	10
Fourth Year		
ASTP-890	Research and Thesis	10
Total Semester Credit Hours		**60**

Tracks

Astrophysics

COURSE		SEMESTER CREDIT HOURS
ASTP-730	Stellar Structure and Atmospheres	3
ASTP-740	Galactic Astrophysics	3
ASTP-750	Extragalactic Astrophysics	3

Astro-informatics and computational astrophysics

COURSE		SEMESTER CREDIT HOURS
ASTP-611	Statistical Methods for Astrophysics	3
ASTP-720	Computational Methods for Astrophysics	3

Astro-informatics and computational astrophysics—general relativity concentration

COURSE		SEMESTER CREDIT HOURS
Choose one of the following:		3
ASTP-611	Statistical Methods for Astrophysics	
ASTP-720	Computational Methods for Astrophysics	
ASTP-760	Introduction to Relativity and Gravitation	3
ASTP-861	Advanced Relativity and Gravitation	3
PHYS-611	Classical Electrodynamics I	3
PHYS-612	Classical Electrodynamics II	3

Astronomical instrumentation

COURSE		SEMESTER CREDIT HOURS
IMGS-639	Principles of Solid State Imaging	3
IMGS-642	Testing of Focal Plane Arrays	3
IMGS-628	Design and Fabrication of Solid State Camera	3

Admission requirements

To be considered for admission to the Ph.D. program in astrophysical sciences and technology, candidates must fulfill the following requirements:

- Hold a baccalaureate degree in physical science, mathematics, computer science, or engineering from a regionally accredited college or university (for students with a bachelor's degree in another area or those lacking adequate academic preparation, bridge and foundation course work may be necessary prior to full admission),
- Have a minimum undergraduate GPA of 3.2 (out of 4.0) in course work in mathematical, science, engineering, and computer s ubject areas,
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Submit a current resume or curriculum vitae,
- Submit a personal statement of educational objectives addressing research interests,
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral candidates must be confidential and must be submitted directly from referee to RIT.
- Submit scores from the Graduate Record Exam (GRE), and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A Minimum score of 550 (paper-based) or 79 (Internet-based) is required. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL exam. Minimum scores vary; however, the absolute minimum score required for unconditional acceptance is 6.5. For additional information about the IELTS, please visit www.ielts.org.

Additional information

Residency

All students in the program must spend at least one year (summer term excluded) in residence as full-time students to be eligible to receive the doctorate degree.

Time limitations

All doctoral candidates must maintain continuous enrollment during the research phase of the program. Normally, full-time students complete the course of study in approximately four to five years. A total of seven years is allowed to complete the requirements after first attempting the qualifying examination.

MS to Ph.D. transfer

Depending on each student's progress in their course work and the research project, students enrolled in the astrophysical sciences and technology MS program may seek program approval to attempt the Ph.D. qualifying examination. Upon successfully passing the exam, students may choose to proceed to Ph.D. candidacy rather than accepting a terminal master of science degree. This is contingent on the availability of an adviser and research funding.

Astrophysical Sciences and Technology, MS

rit.edu/cos/astrophysics/

Andrew Robinson, Graduate Program Director
(585) 475-2726, axrsps@rit.edu

Program overview

There has never been a more exciting time to study the universe beyond the confines of the Earth. A new generation of advanced ground-based and space-borne telescopes and enormous increases in computing power are enabling a golden age of astrophysics. The MS program in astrophysical sciences and technology focuses on the underlying physics of phenomena beyond the Earth, and on the development of the technologies, instruments, data analysis, and modeling techniques that will enable the next major strides in the field. The program's multidisciplinary emphasis sets it apart from conventional astrophysics graduate programs at traditional research universities.

Plan of study

The MS program comprises a minimum of 32 credit hours of study. The curriculum consists of four core courses, two to four elective courses, two semesters of graduate seminar, and a research project culminating in a thesis.

Master's thesis

Typically following the first year, but sometimes initiated during the first year for well-prepared students, candidates begin a research project under the guidance of a faculty research adviser. A thesis committee is appointed by the program director and consists of the student's adviser and at least two additional members, one of whom must be a faculty member in the astrophysical sciences and technology program. The final examination of the thesis consists of a public oral presentation by the student, followed by questions from the audience. The thesis committee privately question the candidate following the presentation. The committee caucuses immediately following the examination and thereafter notifies the candidate and the program director of the results.

Curriculum

Astrophysical sciences and technology, MS degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ASTP-613	Astronomical Observational Techniques and Instrumentation	3
ASTP-617	Astrophysical Dynamics	3
ASTP-760	Introduction to Relativity and Gravitation	3
ASTP-601, 602	Graduate Seminar I, II	2
ASTP-615	Radiative Processes for Astrophysical Sciences	3
Choose one of the following:		3
ASTP-610	Mathematical Methods for the Astrophysical Sciences	
ASTP-611	Statistical Methods for Astrophysics	
ASTP-730	Stellar Structure and Atmospheres	3
Second Year		
ASTP-740	Galactic Astrophysics	3
ASTP-790	Research and Thesis	6
ASTP-750	Extragalactic Astrophysics	3
Total Semester Credit Hours		**32**

Admission requirements

To be considered for admission to the MS program in astrophysical sciences and technology, a candidate must fulfill the following requirements:

- Hold a baccalaureate degree in a physical science, mathematics, computer science, or engineering from an accredited college or university,
- Have a minimum undergraduate GPA of 3.2/4.0 in course work in mathematical, science, engineering, or computer subject areas,
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work,
- Submit a personal statement of educational objectives,
- Submit a current resume or curriculum vitae,
- Submit two letters of recommendation,
- Submit scores from the Graduate Record Exam (GRE), and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 550 (paper-based) or 79 (Internet-based) is required. International English Language Testing System (IELTS) scores will be accepted in place of the TOEFL exam. Minimum scores will vary; however, the absolute minimum score required for unconditional acceptance is 6.5.

For candidates lacking adequate academic preparation or for those who hold a bachelor's degree in an area other than those listed above, bridge and foundation course work may be necessary prior to full admission.

Additional information

MS to Ph.D. transfer

Student making good progress in their course work and research project may be permitted, by program approval, to attempt the Ph.D. Qualifying Examination. Upon successfully passing the exam, students may choose to transfer to the Ph.D. program rather than pursue a terminal master of science degree. This is contingent on the availability of an adviser and research funding.

Sophia A. Maggelakis, BS, MS, Ph.D., Old Dominion University—Dean

Bioinformatics

Gregory Babbitt, BA, Ohio Wesleyan University; MS, Ph.D., University of Florida—Assistant Professor: evolution of the biophysical properties of whole genomes and their interactions with DNA binding proteins

Larry Buckley, BA, University of Missouri; MS, Southern Illinois University at Edwardsville; Ph.D., Southern Illinois University at Carbondale—Head, Thomas H. Gosnell School of Life Sciences; Associate Professor, Biology: herpetology, anatomy, evolution, biogeography, systematics

Feng Cui, MS, Truman State University; Ph.D., Iowa State University; MD, Hunan Medical University (China)—Assistant Professor, Bioinformatics: Next-generation sequencing data analysis, chromatin organization, epigenomics, cancer genomics and p53-DNA interactions

André Hudson, BS, Virginia Union University; Ph.D., Rutgers University—Associate Professor, Biology: amino acid metabolism, bacterial cell wall metabolism, plant-bacterial interactions

David A. Lawlor, BA, University of Texas; MS, Ph.D., University of Texas Health Science Center at San Antonio—Associate Professor, Biotechnology: immunology

Michael V. Osier, BS, University of Vermont; Ph.D., Yale University—Associate Professor; Graduate Program Director, Bioinformatics: high-throughput sequencing analysis, human genetics

Gary K. Skuse, BA, University of Rochester; Ph.D., Syracuse University—Professor, Bioinformatics: cancer genetics, RNA processing, natural language processing to mine the scientific and medical literature, computer networking, wired and wireless communications

Julie A. Thomas, B.App.Sc., Ph.D., LaTrobe University, Bendingo (Australia)—Assistant Professor, virology, phage genetics and genome structure, phage gene expression

Environmental Science

Larry Buckley, BA, University of Missouri; MS, Southern Illinois University at Edwardsville; Ph.D., Southern Illinois University at Carbondale—Head, Thomas H. Gosnell School of Life Sciences; Associate Professor, Biology: herpetology, anatomy, evolution, biogeography, systematics

Sandi Connelly, BS, Juniata College; MS, University at Buffalo; Ph.D., Miami University of Ohio, Thomas H. Gosnell School of Life Sciences; Assistant Professor, Biology: ecotoxicology, freshwater ecosystems, anthropogenic stresses, UV-radiation, evolution

Elizabeth Hane, BA, Rice University; MA, University of Kansas; Ph.D., Brown University—Associate Head, Thomas H. Gosnell School of Life Sciences; Associate Professor, Biology: plant community ecology, ecosystem biology, conservation biology

M. Ann Howard, BS, Cornell University; J.D., Rutgers University School of Law—Professor, College of Liberal Arts, Science, Technology and Society/Public Policy: relationship between environmental decision-making and the role of citizen involvement, sustainable community development

Christine Keiner, BA, McDaniel College; Ph.D., Johns Hopkins University—Associate Professor, College of Liberal Arts, Science, Technology and Society/Public Policy: history of ecology and biology, U.S. environmental politics, and relations between science and politics

Karl F. Korfmacher, BA, Carleton College; MS, Ph.D., Duke University—Professor, Environmental Science: GIS-based habitat suitability, transportation, hydrologic, and pollution modelling, land cover analysis, soil science

Jeffrey S. Lodge, BA, University of Delaware; Ph.D., University of Mississippi—Associate Professor, Biology: bioremediation of oil, pharmaceuticals, personal care products, and other pollutants in soils and water, microbial ecology (especially water systems), use of microalgae to treat various industrial waste streams, and wastewater microbiology

Carmody K. McCalley, BA, Middlebury College; Ph.D., Cornell University—Assistant Professor, Environmental Science: biogeochemistry, global change biology, terrestrial and wetland ecosystem ecology

Susan Smith Pagano, BS, State University College at Oswego; MS, State University College at Brockport; Ph.D., University of Rhode Island—Associate Professor, Biology: avian nutritional ecology and migration physiology

Todd Pagano, BA, State University College at Oswego; MS, Ph.D., Tufts University—Associate Professor, Chemistry/Laboratory Science Technology: aquatic chemistry, environmental chemistry, sensor/instrument design, environmental monitoring

Richard Shearman, BA, Western State College of Colorado; MS, Eastern New Mexico University; Ph.D., State University of New York, College of Environmental Science and Forestry—Associate Professor, College of Liberal Arts, Science, Technology, Society and Public Policy: environmental philosophy and practical problems associated with the conservation of biodiversity

Paul Shipman, BSE, MS, Emporia State University; Ph.D., Oklahoma State University—Associate Professor, Biology: ecological informatics, conservation of amphibians and reptiles, behavioral and evolutionary ecology

Anna Christina Tyler, BS, Cornell University, MS, Ph.D., University of Virginia—Graduate Program Director, Environmental Science; Associate Professor, Environmental Science and Biology: aquatic ecology, biogeochemistry, invasive species, ecosystem restoration

Jan van Aardt, BSc, University of Stellenbosch (South Africa); MS, Ph.D., Virginia Polytechnic Institute and State University—Associate Professor, Imaging Science: remote sensing of natural resources, application of hyperspectral, light detection and ranging for spectral-structural characterization of natural systems, integrated modeling approaches, scaling of natural resources remote sensing solutions through sensor interoperability

Jeffrey Wagner, AB, University of Missouri at Columbia; MS, Ph.D., University of Illinois-Urbana—Professor, College of Liberal Arts, Economics: sustainable waste management, green consumption, economics of active transportation, economics of endangered species recovery

Applied and Computational Mathematics, Applied Statistics

Mihail Barbosu, BS, Ph.D., Babes-Bolyai (Romania); MS, Ph.D., Paris VI University (France)—Head of School; Professor

Anurag Agarwal, MS, Indian Institute of Technology (India); Ph.D., State University of New York at Buffalo—Associate Professor, number theory, cryptography, algebra, graph theory

Ephraim Agyingi, BS, MS, University of Ilorin (Nigeria); Ph.D., University of Manchester (United Kingdom)—Associate Professor, numerical analysis

Peter Bajorski, MS, University of Wroclaw (Poland); Ph.D., Technical University of Wroclaw (Poland)—Professor, regression models, multivariate analysis, nonparametrics, imaging science applications

Nate Barlow, BS, Ph.D., Clarkson University—Assistant Professor, stability and propagation of waves in fluids, asymptotic methods

David S. Barth-Hart, BS, Syracuse University; MA, University of Rochester—Associate Professor, algebra, number theory

Maurino P. Bautista, BS, Ateneo de Manila University (Philippines); MS, Ph.D., Purdue University—Professor, numerical analysis, applied mathematics

Bernard Brooks, BS, University of Toronto (Canada); MBA, Rochester Institute of Technology; MS, Ph.D., University of Guelph (Canada)—Professor, mathematical modeling

Nathan Cahill, BS, MS, Rochester Institute of Technology; D.Phil., University of Oxford (United Kingdom)—Associate Professor, scientific computing, biomedical image analysis, computer vision

Manuela Campanelli, Laurea in Mathematics, University of Perugia (Italy); Ph.D., University of Bern (Switzerland)—Director, School of Mathematical Sciences; Professor, numerical relativity, gravitational physics, computational astrophysics

Linlin Chen, BS, Beijing University (China); MCS, Rice University; MA, Ph.D., University of Rochester—Associate Professor, statistics, biostatistics, statistical consulting, genetics, bioinformatics and computational biology

Elizabeth Cherry, BS, Georgetown University; Ph.D., Duke University—Associate Professor, computational cardiac dynamics

Patricia A. Clark, SB, SM, Massachusetts Institute of Technology; Ph.D., University of Rochester—Professor, mathematical biology

Matthew Coppenbarger, BS, University of Arizona; MA, Ph.D., University of Rochester—Associate Professor, mathematical physics, spectral theory

Michael Cromer, BS, York College of Pennsylvania; MS, Ph.D., University of Delaware—Assistant Professor, mathematical modeling of complex fluids, asymptotics and perturbation methods, simulation

Joshua Faber, BS, State University of New York at Stony Brook; Ph.D., Massachusetts Institute of Technology—Associate Professor, numerical relativity, computational astrophysics, dynamics

Raluca Felea, BS, University of Iasi (Romania); Ph.D., University of Rochester—Associate Professor, microlocal analysis

Ernest Fokoue, Maitrise B. Sc., University of Yaounde (Cameroon); M. Sc., Aston University (United Kingdom); Ph.D., University of Glasgow (United Kingdom)—Associate Professor, statistical machine learning and data mining

John F. Hamilton, BA, Cornell University; MA, Ph.D., Indiana University—Research Faculty

Anthony A. Harkin, BS, State University College at Brockport; MS, Massachusetts Institute of Technology; Ph.D., Boston University—Associate Professor, applied and computational mathematics, partial differential equations

Matthew J. Hoffman, BA, Williams College; MS, Ph.D., University of Maryland—Assistant Professor, data assimilation, applied mathematics, ocean and atmospheric forecasting

Jay Alan Jackson, BS, MS, Ph.D., Florida State University—Associate Professor, mathematical modeling, innovative and interdisciplinary math and science education

Jobby Jacob, BS, Bharata Mata College (India); MS, Indian Institute of Technology (India); MS, Ph.D., Clemson University—Associate Professor, graph theory

Baasansuren Jadamba, BS, National University of Mongolia (Mongolia); MS, University of Kaiserslautern (Germany); Ph.D., University of Erlangen-Nuremberg (Germany)—Assistant Professor, partial differential equations, inverse problems, numerical optimization

Akhtar Khan, MS, Technical University Kaiserslautern (Germany); Ph.D., Michigan Technological University—Associate Professor, applied math, optimization, inverse problems, variational inequalities, elasticity imaging

Seshavadhani Kumar, BS, MS, University of Madras (India); Ph.D., University of Delaware—Professor, operations research, simulation

Steven M. LaLonde, BA, State University College at Potsdam; MBA, University of Rochester; MA, Ph.D., Syracuse University—Director, Graduate Program in Applied Statistics, Associate Professor, multivariate analysis, survey design and analysis, statistical computing, educational and psychological measurement

Manuel Lopez, AB, Princeton University; Ph.D., Wesleyan University—Associate Professor, homological algebra

Carlos Lousto, MS, Universidad Nacional De La Plata (Argentina); Ph.D., Universidad De Buenos Aires (Argentina)—Professor, numerical relativity

Carl V. Lutzer, BS, Michigan State University; MA, Ph.D., University of Kentucky—Professor, mathematical physics

Sophia A. Maggelakis, BS, MS, Ph.D., Old Dominion University—Dean, College of Science; Professor, biomathematics

Kara L. Maki, BS, University of New Hampshire; MS, Ph.D., University of Delaware—Assistant Professor, mathematical modeling, scientific computing

Carol E. Marchetti, BS, Case Institute of Technology; MS, Weatherhead School of Management; MA, Ph.D., University of Rochester—Associate Professor, statistics

James E. Marengo, BA, MS, California State University; Ph.D., Colorado State University—Professor, statistics, probability

Douglas S. Meadows, BS, Stanford University; MS, New York University; Ph.D., Stanford University—Professor, algebraic topology, number theory, orthogonal polynomials

Laura M. Munoz, BS, California Institute of Technology; Ph.D., University of California at Berkeley—Assistant Professor

Darren A. Narayan, BS, State University of New York at Binghamton; MS, Ph.D., Lehigh University—Professor, graph theory, discrete math

Richard O'Shaughnessy, BA, Cornell University; Ph.D., California Institute of Technology—Assistant Professor

Niels F. Otani, BA, University of Chicago; Ph.D., University of California at Berkeley—Associate Professor

Robert J. Parody, BS, Clarkson University; MS, Rochester Institute of Technology; Ph.D., University of South Carolina—Associate Professor, experimental design, response surface methods, quality control and improvement

Wei Qian, BS, Peking University (China); MS, Stanford University; Ph.D., University of Minnesota, Twin Cities—Assistant Professor, high-dimensional modeling, nonparametric and semiparametric estimation, forecast combination and statistical applications

Michael Radin, BA, Rowan University; MS, Ph.D., University of Rhode Island—Associate Professor, differential equations

David Ross, BA, Columbia College; Ph.D., New York University—Professor, differential equations and numerical analysis

Hossein Shahmohamad, BS, MA, California State University at Long Beach; Ph.D., University of Pittsburgh—Professor, graph theory

Wanda Szpunar-Lojasiewicz, BS, Jagiellonian University (Poland); MS, Ph.D., University of Cracow (Poland)—Associate Professor, analysis

Joseph G. Voelkel, BS, Rensselaer Polytechnic Institute; MS, Northwestern University; Ph.D., University of Wisconsin-Madison—Professor, experimental design, process modeling and improvement, multivariate analysis

Paul Wenger, BA, Boston College; MS, Ph.D., University of Illinois at Urbana-Champaign—Assistant Professor, extremal and structural graph theory

John T. Whelan, BA, Cornell University; Ph.D., University of California at Santa Barbara—Associate Professor, computational relativity and gravitation, gravitational wave data analysis

Tamas Wiandt, BS, Jozsef Attila University; Ph.D., University of Minnesota—Associate Professor, dynamical systems

Elmer L. Young, BA, Amherst College; MS, Ph.D., The Ohio State University—Associate Professor, topology and analysis

Yosef Zlochower, BS, Ph.D., University of Pittsburgh—Associate Professor, numerical relativity

Chemistry

Jeremy Cody, BS, Indiana University of Pennsylvania; Ph.D., University of Rochester—Assistant Professor, Organic Chemistry: synthetic organic chemistry

Christina Goudreau Collison, BA, Colby College; Ph.D., University of Rochester—Associate Professor, Organic Chemistry: synthetic organic chemistry

Christopher Collison, BS, Ph.D., Imperial College of London (United Kingdom)—Associate Professor, Physical Chemistry: photovoltaic chemistry

Michael G. Coleman, BS, Ph.D., University of Buffalo—Associate Professor, Medicinal chemistry: synthethic organometallic methodologies towards medicinally relevant targets

Paul A. Craig, BS, Oral Roberts University; Ph.D., University of Michigan—Professor, School Head, Analytical Biochemistry

Nathan Eddingsaas, BS, University of Wisconsin, Stevens Point; Ph.D., University of Illinois at Urbana-Champaign—Assistant Professor, Analytical Chemistry, Atmospheric Chemistry

Joseph P. Hornak, BS, Utica College of Syracuse University; MS, Purdue University; Ph.D., University of Notre Dame—Professor, Joint Appointment with Imaging Science, Physical Chemistry: magnetic resonance spectroscopies and imaging

Thomas D. Kim, BS, Loyola College; Ph.D., University of Wisconsin at Madison—Associate Professor, Biochemistry: pharmacology

Lea V. Michel, BA, Colgate University; Ph.D., University of Rochester—Associate Professor, Biochemistry: structural biology, biophysics

Massoud J. Miri, BS, MS, Ph.D., University of Hamburg (Germany)—Associate Professor, Polymer Chemistry: polymerization mechanisms, polymer properties, catalysis

Suzanne O'Handley, BS, Rutgers University; MS, Ph.D., University of Rochester—Associate Professor, Biochemistry: cloning characteristics of nudix hydrolases, novel phosphatase families, novel antibiotic targets, enzyme-substrate specificity

John-David Rocha, BS, MS, University of North Texas; Ph.D., Rice University—Assistant Professor, Physical Chemistry

K. S. V. Santhanam, BSc, MA, Ph.D., Sri Venkateswara University (India)—Professor, Analytical Chemistry: organic conducting polymers, electrochemistry, sensors and carbon nanotubes

Hans Schmitthenner, BS, Massachusetts Institute of Technology; Ph.D., Pennsylvania State University—Associate Research Professor, Analytical and Organic Chemistry: imaging agent synthesis and analysis.

Thomas W. Smith, BS, John Carroll University; Ph.D., University of Michigan—Professor, Organic/Polymer Chemistry: synthesis and device applications of block copolymer systems and nano composites

Gerald A. Takacs, BS, University of Alberta (Canada); Ph.D., University of Wisconsin—Professor, Physical Chemistry: chemical kinetics, atmospheric chemistry, plasma chemistry, and photochemistry

Scott Williams, BS, Purdue University; Ph.D., Montana State University—Professor, Assistant School Head, Inorganic Chemistry: pharmaceutical quality assurance through application of point-of-care assays

Materials Science and Engineering

John Andersen, BS, State University of New York at Buffalo; MA, Ph.D., University of Rochester—Professor, Physics: theoretical solid-state physics, transport phenomena, electron-photon interactions, nonlinear phenomena, electronic properties of molecular crystals, experimental low-temperature physics, large-scale computations, parallel processing

Linda Barton, BS, Massachusetts Institute of Technology; MS, Ph.D., University of Illinois—Associate Professor, Physics: magnetic materials and magnetic measurements, calorimetry, bulk transport measurements, properties of materials at or near phase transitions, critical phenomena

Mishkat Bhattacharya, B.Tech., Indian Institute of Technology (India); MA, Ph.D., University of Rochester—Assistant Professor, Physics: quantum optics, nanoscience, superconductivity

David A. Borkholder, BS, Rochester Institute of Technology; MS, Ph.D., Stanford University—Associate Professor, Electrical Engineering

Robert J. Bowman, BS, Pennsylvania State University; MS, San Jose State University; Ph.D., University of Utah—Professor, Electrical Engineering

Peter Cardegna, BS, Loyola College; Ph.D., Clemson University—Professor, Physics: superconductivity, low temperature physics, photographic materials

Shu Chang, BS, Berea College; Ph.D., University of Minnesota—Melbert B. Cary Jr. Professor: additive manufacturing

Christopher Collison, BS, Ph.D., Imperial College of London (United Kingdom)—Associate Professor, Physical Chemistry: polymer chemistry, organic photovoltaics.

Denis Cormier, BS, University of Pennsylvania; MS, State University of New York at Buffalo; Ph.D., North Carolina State University—Professor: Additive Manufacturing, Rapid Prototyping.

Michael Cromer, BS, York College of Pennsylvania; MS, Ph.D., University of Delaware—Assistant Professor, mathematical modeling of complex fluids, asymptotics and perturbation methods, simulation

Moumita Das, BS, MS, Jadavpur University (India); Ph.D., Indian Institute of Science—Assistant Professor: soft matter

Tracy Davis, BA, BS, Wofford College; Ph.D., Clemson University—Associate Professor, Physics: experimental solid-state physics, optics, low temperature physics, computer models of chaotic systems

Scott Franklin, BA, University of Chicago; Ph.D., University of Texas—Professor: granular materials.

Thomas R. Gaborski, BS, Cornell University; MS, Ph.D., University of Rochester—Assistant Professor, Nanomaterials, Separations, Cellular Mechanics

Gabrielle Gaustad, BS, Alfred University; MS, Ph.D., Massachusetts Institute of Technology—Associate Professor: sustainability, materials recovery.

Anju Gupta, BE, University of Mumbai (Bombay), India; MS, Worcester Polytechnic Institute; PhD , University of Rhode Island—Assistant Professor : Self-assemblies, emulsions, thin films, thermal analysis, cell-membrane interactions, bioremediation, biosensors

Surendra K. Gupta, B.Tech., India Institute of Technology (India); MS, University of Notre Dame; Ph.D., University of Rochester—Professor, Mechanical Engineering: x-ray diffraction, atomic force microscopy, micromechanics modeling, digital image analysis

Richard K. Hailstone, BS, Northern Illinois University; MS, Indiana University—Associate Professor, Imaging Science: silver halide materials and processing, imaging materials

Seth M. Hubbard, BS, Drexel University; MS, Case Western Reserve University; Ph.D., University of Michigan—Associate Professor, Physics, Epitaxial Crystal Growth, Growth and Characterization of Nanomaterials, High-efficiency Photovoltaic Devices, Semiconductor Device Design and Fabrication, Thin Films

Joseph P. Hornak, BS, Utica College of Syracuse University; MS, Purdue University; Ph.D., University of Notre Dame—Professor, Chemistry: physical chemistry, magnetic resonance spectroscopy and imaging

Patricia Iglesias Victoria, BS, Ph.D., Polytechnic University of Cartagena (Spain)—Assistant Professor: ionic liquids, tribology

Michael A. Jackson, BS, MS, Ph.D., State University of New York at Buffalo—Associate Professor, Microelectronic Engineering: microelectronic device design, fabrication, and test; material characterization techniques, surface analytical instrumentation; vacuum processing, including CVD, plasma, and ion beam techniques, micromachining, ferroelectric thin films, amorphous silicon and polysilicon film deposition and characterization

Michael Kotlarchyk, BS, MS, Ph.D., Massachusetts Institute of Technology—Professor, Physics: characterization of structure and phase transitions in surfactant systems (micelles, microemulsions, and liquid crystals) using scattering techniques; mass and surface fractals in condensed matter systems, theories of liquids; chaos in simple non-linear physical systems

Santosh Kurinec, BS, MS, Ph.D., University of Delhi (India)—Professor, Microelectronic Engineering; Electronic Materials and Devices, IC Processing, Quantum and Nanoscale Devices

Kathleen Lamkin-Kennard, BS, Worcester Polytechnic Institute; MS, Ph.D., Drexel University—Assistant Professor, Mechanical Engineering: biomedical engineering and biomaterials.

Zhaolin Lu, Changqing University (China); MS, Michigan Technological University; Ph.D., University of Delaware—Associate Professor : Photonics and Metamaterials, Electromagnetics, and Nanoelectronics.

Casey Miller, BA, Wittenberg University; Ph.D., University of Texas at Austin—Associate Professor, Chemistry and Materials Science: thin film magnetism, spintronics, magnetocaloric effect

Massoud Miri, BS, MS, Ph.D., University of Hamburg (Germany)—Associate Professor, Chemistry: polymerization mechanisms, polymer properties, catalysis

Ali Ogut, B.Ch.E., Hacettepe University (Turkey); MS, Ph.D., University of Maryland—Associate Professor, Mechanical Engineering: polymer processing, heat and mass transfer, rheology, transport phenomena

Michael Pierce, BS, Rensselaer Polytechnic Institute; MS, Ph.D., University of Washington—Assistant Professor, Physics: experimental physics, condensed matter physics, surface science, magnetism, x-ray science, and phase transitions

Christiaan Richter, BA, BSc, University of Pretoria (South Africa); MS, University of Nebraska at Lincoln; Ph.D., Northeastern University— Assistant Professor, Solar Energy, Nanomaterials, Terahertz Spectroscopy

John-David Rocha, BS, MS, University of North Texas; Ph.D., Rice University—Assistant Professor, Physical Chemistry: nanotubes and optical spectroscopy.

Reginald E. Rogers, BS, Massachusetts Institute of Technology; MS, Northeastern University; Ph.D., University of Michigan—Assistant Professor, Carbon Nanotubes, Adsorption, Batteries

Sean L. Rommel, BS, Ph.D., University of Delaware—Associate Professor, Microelectronic Engineering; Emerging Semiconductor Devices, Photonic Devices, Integration

K. S. V. Santhanam, BSc, MA, Ph.D., Sri Venkateswara University (India)—Professor, Analytical Chemistry: organic conducting polymers, electrochemistry, sensors and carbon nanotubes

Michael Schertzer, B.Eng. Mgt., M.A.Sc., McMaster University (Canada); Ph.D., University of Toronto (Canada)—Assistant Professor, Bioengineering and Microsystems

Michael Schrlau, BS, University of Pittsburgh; Ph.D., University of Pennsylvania—Assistant Professor, Bioengineering and Microsystems

Bruce Smith, BS, MS, Ph.D., Rochester Institute of Technology—Professor, Microelectronic Engineering: 193 nm lithography, multilayer resist processing, attenuated phase shift mask materials

Thomas W. Smith, BS, John Carroll University; Ph.D., University of Michigan—Professor, Chemistry: synthesis and device applications of block copolymer systems and nano composites

Gerald A. Takacs, BS, University of Alberta (Canada); Ph.D., University of Wisconsin—Professor, Chemistry: physical chemistry, chemical kinetics, photochemistry, atmospheric chemistry, plasma etching and modification of materials

George Thurston, AB, Oberlin College; Ph.D., Massachusetts Institute of Technology—Professor, soft matter; protein aggregation.

Thomas Trabold, BS, Ph.D., Clarkson University—Associate Professor: sustainability; fuel cells; biofuels; waste-to-energy conversion.

Benjamin Varela, BS, Institute of Technology of Juarez (Mexico); MS, Ph.D., New Mexico State University—Associate Professor, Innovative Materials, Automation and Fluid Power, Dynamics.

Jayanthi Venkataraman, BS, MS, Bangalore University (India); Ph.D., Indian Institute of Science (India)—Professor, Electrical Engineering: electromagnetic fields

Steven J. Weinstein, BS, University of Rochester; MS, Ph.D., University of Pennsylvania—Department Head; Professor, Interfacial Transport Processes, Hydrodynamic Wave Phenomena, Applied Mathematics

Scott Williams, BS, Purdue University; Ph.D., Montana University—Professor, CIAS: printed electronics, bioactive paper technology, ink chemistry and formulation

Astrophysical Sciences and Technology

Stefi A. Baum, BA, Harvard University; Ph.D., University of Maryland—Research Professor, Imaging Science: astrophysics, astronomical imaging, and astronomical mission development, including radio, optical, UV, and x-ray observations; active galaxies, black holes, galaxies and cluster of galaxies

Manuela Campanelli, Laurea in Mathematics, University of Perugia (Italy); Ph.D., University of Bern (Switzerland)—Director, Center for Computational Relativity and Gravitation; Professor, Mathematics: numerical relativity, computational astrophysics, black holes, gravitational waves

Sukanya Chakrabarti, B.Sc., North Carolina State University; MS, Georgia Institute of Technology; Ph.D., University of California at Berkeley—Assistant Professor, Physics and Astronomy: computational astrophysics, galactic evolution and dynamics

Joshua Faber, BS, State University of New York at Stony Brook; Ph.D., Massachusetts Institute of Technology—Associate Professor, Mathematics: numerical relativity, general relativistic magnetohydrodynamics, relativistic astrophysics

Donald F. Figer, BA, Northwestern University; MS, University of Chicago; Ph.D., University of California—Professor, Center for Detectors: massive stars, massive star clusters, galactic center, imaging detectors

Jeyhan S. Kartaltepe, BA, Colgate University; MS, Ph.D., University of Hawaii—Assistant Professor, Physics and Astronomy: galaxy formation and evolution, galaxy mergers and interactions, galaxy morphology, infrared and submillimeter galaxies, active galactic nuclei

Joel H. Kastner, BS, University of Maryland; MS, Ph.D., University of California—Director, Laboratory for Multiwavelength Astrophysics; Professor, Imaging Science: astronomical imaging, including x-ray, infrared and radio spectroscopy; young stars and planet formation; evolved stars and planetary nebulae

Carlos Lousto, MS, Universidad Nacional De La Plata (Argentina); Ph.D., Universidad De Buenos Aires (Argentina)—Professor, Mathematics: numerical relativity, relativistic astrophysics, black hole physics, perturbation theory

David Merritt, BS, Santa Clara University; Ph.D., Princeton University—Professor, Physics and Astronomy: theoretical astrophysics, galaxy dynamics, supermassive black holes, gravitational N-body problem, computational dynamics

Zoran Ninkov, BSc, University of Western Australia (Australia); MS, Monash University (Australia); Ph.D., University of British Columbia (Canada)—Professor, Imaging Science: detector array development and characterization, development of novel astronomical instrumentation, studies of young stellar clusters, planetary detection

Jason Nordhaus, BA, BS, MS, Ph.D., University of Rochester—Assistant Professor, Science and Mathematics, National Technical Institute for the Deaf: computational astrophysics, core-collapse supernovae, binary interactions, strongly magnetized compact objects, physics of common envelopes

Christopher O'Dea, BS, Massachusetts Institute of Technology; Ph.D., University of Massachusetts—Research Professor, Physics and Astronomy: astronomy, active galactic nuclei (Seyfert galaxies, radio galaxies, quasars), clusters of galaxies, cooling flows

Richard O'Shaughnessy, BA, Cornell University; Ph.D., California Institute of Technology—Assistant Professor, Mathematics: gravitational wave astronomy, numerical and general relativity

Michael W. Richmond, BA, Princeton University; MA, Ph.D., University of California at Berkeley—Professor, Physics and Astronomy: observational astronomy, supernovae, variable stars, reduction of optical data, automatic telescopes

Andrew Robinson, BSc, Ph.D., University of Manchester (United Kingdom)—Director, Astrophysical Sciences and Technology; Professor, Physics and Astronomy: astronomy, active galactic nuclei, supermassive black holes, radio galaxies, high redshift quasars

John Whelan, BA, Cornell University; Ph.D., University of California at Santa Barbara—Graduate Program Coordinator, Astrophysical Sciences and Technology; Associate Professor, Mathematics: quantum physics, gravitational wave data analysis, astrophysical relativity

Michael D. Zemcov, BSc, University of British Columbia (Canada); Ph.D., Cardiff University (United Kingdom)—Assistant Professor, Physics and Astronomy: Experimental and observational cosmology, including cosmological structure formation, extragalactic background radiation, cosmic microwave background, near infra-red to submillimeter instrumentation

Yosef Zlochower, BS, Ph.D., University of Pittsburgh—Associate Professor, Mathematics: numerical relativity, relativistic astrophysics, black hole physics

Color Science

Roy S. Berns, BS, MS, University of California; Ph.D., Rensselaer Polytechnic Institute—Richard S. Hunter Professor of Color Science, Appearance, and Technology

Mark D. Fairchild, BS, MS, Rochester Institute of Technology; MA, Ph.D., University of Rochester—Associate Dean of Research and Graduate Education; Professor and Director, Program of Color Science/Munsell Color Science Laboratory

Susan Farnand, BS, Cornell University; MS, Ph.D., Rochester Institute of Technology—Visiting Assistant Professor, Program of Color Science

Elena Fedorovskaya, MS, Ph.D., Lomonosov Moscow State University (Russia)—Paul and Louise Miller Distinguished Professor, School of Media Sciences

James Ferwerda, BA, MS, Ph.D., Cornell University—Associate Professor, Imaging Science

Joseph Geigel, BS, Manhattan College; MS, Stevens Institute of Technology; D.Sc., George Washington University—Associate Professor, Computer Science

David Long, BS, University of Texas at Austin; MS, University of Rochester, Ph.D., Rochester Institute of Technology—Associate Professor, School of Film and Animation

Andrew Herbert, BS, McGill University (Canada); MA, Ph.D., University of Western Ontario (Canada)—Professor and Chair, Department of Psychology

Michael Murdoch, BS, Cornell University; MS, Rochester Institute of Technology, Ph.D., Eindhoven University of Technology—Assistant Professor, Program of Color Science

Imaging Science

Stefi A. Baum, BA, Harvard University; Ph.D., University of Maryland—Research Professor, Imaging Science: astrophysics, astronomical imaging, and astronomical mission development, including radio, optical, UV, and x-ray observations; active galaxies, black holes, galaxies and cluster of galaxies

Charles Bachmann, A.B., Princeton University; Sc.M., Ph.D., Brown University—Associate Professor, Imaging Science and Frederick and Anna B. Wiedman Chair: coastal characterization from remote sensing; advanced retrieval algorithms for hyperspectral and multi-sensor imagery; spectroscopy, BRDF, and advanced instrumentation for calibration and validation; pattern recognition; graph and manifold descriptions of high-dimensional data

Gabriel J. Diaz, BFA, Skidmore College; MS, Ph.D., Rensselaer Polytechnic Institute—Assistant Professor, Imaging Science: visually guided action; human motor control; eye movements; visual prediction; virtual/augmented reality systems

Roger Dube, BS, Cornell University; Ph.D. Princeton University—Research Professor, Imaging Science: space weather, cosmology, stellar astrophysics, holographic data storage, computer security, artificial intelligence

Roger L. Easton, BS, Haverford College; MS, University of Maryland; MS, Ph.D., University of Arizona—Professor, Imaging Science: application of imaging technologies to manuscripts of cultural importance; optical holography; digital and optical signal/image processing

James Ferwerda, BA, MS, Ph.D., Cornell University—Associate Professor, Imaging Science: high dynamic range imaging, perceptually-based rendering, material appearance, display systems, low vision and assistive technologies

Michael Gartley, BS, Binghamton University; MS, Ph.D., Rochester Institute of Technology—Assistant Research Professor, Imaging Science: modeling and simulation of remote sensing signature phenomenology

Richard Hailstone, BS, Northern Illinois University; MS, Indiana University—Associate Professor, Imaging Science: characterization of materials using electron microscopy, synthesis of nanoparticles, imaging system modeling

Maria Helguera, BS, National Autonomous University of Mexico (Mexico); MS, University of Rochester; Ph.D., Rochester Institute of Technology—Associate Research Professor, Imaging Science: medical imaging, ultrasound tissue characterization, digital image processing

Joseph P. Hornak, BS, Utica College of Syracuse University; MS, Purdue University; Ph.D., University of Notre Dame—Professor, Joint Appointment with School of Chemistry and Materials Science: physical chemistry, magnetic resonance spectroscopy and imaging

Emmett Ientilucci, BS, MS, Ph.D., Rochester Institute of Technology—Assistant Research Professor, Imaging Science: remote sensing, hyperspectral image processing, multivariate statistics, target detection, radiometry

Christopher Kanan, BS, Oklahoma State University; MS, University of Southern California, Ph.D., University of California—Assistant Professor, Imaging Science: computer vision, object categorization, active vision, visual saliency, eye movement analysis

Joel H. Kastner, BS, University of Maryland; MS, Ph.D., University of California—Professor, Imaging Science: astronomical imaging, including x-ray, infrared and radio spectroscopy; young stars and planet formation; evolved stars and planetary nebulae

John P. Kerekes, BS, MS, Ph.D., Purdue University—Professor, Imaging Science: multispectral remote sensing systems, multidimensional imaging system, pattern recognition

Robert L. Kremens, BS, The Cooper Union; MS, University of Rochester; MS, Ph.D., New York University—Research Professor, Imaging Science: wildland fire behavior and effects, remote sensing instrumentation, autonomous remote instruments for environmental monitoring, electronics measurement systems

David W. Messinger, BS, Clarkson University; Ph.D., Rensselaer Polytechnic Institute—Director, Professor, and Xerox Chair, Imaging Science: remote sensing image exploitation, advanced mathematical approaches to spectral image processing, LWIR hyperspectral processing

Zoran Ninkov, BSc, University of Western Australia (Australia); MS, Monash University (Australia); Ph.D., University of British Columbia (Canada)—Professor, Imaging Science: detector array development and characterization, development of novel astronomical instrumentation, studies of young stellar clusters, planetary detection

Jeff Pelz, BFA, MS, Rochester Institute of Technology; Ph.D., University of Rochester—Frederick Wiedman Professor, Imaging Science: visual perception and cognition, understanding high-level visual processing by examining eye movements in the execution of complex tasks in natural environments

Jie Qiao, BS, University of Science and Technology Liaoning (China); MS, Tsinghua University (China); MBA, University of Rochester; Ph.D., University of Texas at Austin—Associate Professor, Imaging Science: optical metrology, optical instrumentations, adaptive optics and active optics, ultrafast laser systems and applications (remote sensing, material processing), optical system design and performance evaluation

Navalgund Rao, MS, Banaras Hindu University (India); Ph.D., University of Minnesota—Research Professor, Imaging Science: industrial and medical applications of ultrasound imaging, digital signal processing; modeling and analysis of medical imaging systems

Carl Salvaggio, BS, MS, Rochester Institute of Technology; Ph.D., Syracuse University and the State University of New York College of Environmental Science and Forestry—Professor: novel techniques for the measurement of spectral optical properties, quantitative reflective and emissive remote sensing, digital image processing, three-dimensional geometry extraction from imagery, and scene simulation and modeling

John Schott, BS, Canisius College; MS, Ph.D., Syracuse University and the State University of New York College of Environmental Science and Forestry—Research Professor, Imaging Science: quantitative radiometric remote sensing, synthetic image generation, spectroscopy, calibration and atmospheric correction of satellites imaging systems, remote assessment of the Great Lakes water resources

Grover Swartzlander, BS, Drexel University; MSEE, Purdue University; Ph.D., Johns Hopkins University—Associate Professor, Imaging Science: optical vortices, optical coronagraphs and high contrast imaging, pattern formation in linear and nonlinear optics, optical tweezers, optical coherence, solar sailing, metamaterials

Jan van Aardt, BSc, University of Stellenbosch (South Africa); MS, Ph.D., Virginia Polytechnic Institute—Professor, Imaging Science: remote sensing of natural resources, application of hyperspectral, light detection and ranging for spectral-structural characterization of natural systems, integrated modeling approaches, scaling of natural resources remote sensing solutions through sensor interoperability

Anthony Vodacek, BS, University of Wisconsin; MS, Ph.D., Cornell University—Professor, Imaging Science: imaging spectrometry applications environmental characterization and monitoring; remote sensing data assimilation in environmental models; thermal and non-thermal techniques for wildland fire detection; coastal remote sensing and aquatic optics

Graduate Program Faculty

Iris Asllani, B.Sc., University of Tirana (Albania); M.Sc., Ph.D., University of Washington at Seattle—Assistant Professor, Biomedical Engineering: development and implementation of multimodal functional MRI methods for applications in basic neuroscience and clinical research

Peter Bajorski, BS, MS, University of Wroclaw (Poland); Ph.D., Technical University of Wroclaw (Poland)—Professor, School of Mathematical Sciences: target detection and unmixing in hyperspectral images, multiwave analysis, regression analysis

Mishkat Bhattacharya, B.Tech., Indian Institute of Technology (India); MA, Ph.D., University of Rochester—Assistant Professor, Physics: quantum optics, nanoscience, superconductivity

Nathan Cahill, BS, MS, Rochester Institute of Technology; D.Phil., University of Oxford (United Kingdom)—Associate Professor, School of Mathematical Sciences: image alignment and stitching, 3-D medical image registration, variational techniques and partial differential equations for image processing

Sohail A. Dianat, BS, Aria-Mehr University (Iran); MS, Ph.D., George Washington University—Professor, Electrical Engineering: digital communication, signal processing and image processing

Marcos Esterman, BS, MS, Massachusetts Institute of Technology; Ph.D., Stanford University—Associate Professor, Industrial and Systems Engineering: systems engineering, product development, design robustness, sustainable print systems, addictive manufacturing

Donald F. Figer, BA, Northwestern University; MS, University of Chicago; Ph.D., University of California—Professor, Center for Detectors: massive stars, massive star clusters, galactic center, imaging detectors

Ernest Fokoue, BS, University of Yaoundé (Cameroon); MS, Aston University; Ph.D., University of Glasgow—Associate Professor, School of Mathematical Sciences: statistical machine learning and data mining

Roger S. Gaborski, BS, MS, State University of New York at Buffalo; Ph.D., University of Maryland—Professor, Computer Science: visual and acoustic scene understanding, computer vision, video processing, artificial intelligence, blind source separation, machine learning

Thomas Gaborski, BS, Cornell University; MS, Ph.D., University of Rochester—Assistant Professor, Biomedical Engineering: NanoBio Devices at the interface of nanomaterials, biology and imaging

Joseph Geigel, BS, Manhattan College; MS, Stevens Institute of Technology; D.Sc., George Washington University—Professor, Computer Science: computer graphics, multimedia storytelling, functional sound synthesis for computer generated animations, virtual reality and theater

Andrew Herbert, BS, McGill University (Canada); MA, Ph.D., University of Western Ontario (Canada)—Professor, Department of Psychology

Matthew Hoffman, BA, Williams College; MS, Ph.D., University of Maryland—Assistant Professor, Mathematical Sciences: data assimilation, applied mathematics, ocean and ecosystem modeling, Martian atmosphere and climate, ensemble Kalman filter, scientific computation

Seth Hubbard, BS, Drexel University; MS, Case Western Reserve University; Ph.D. University of Michigan—Associate Professor, Physics: next generation photovoltaic devices, nanomaterials, novel and wide bandgap semiconductors, semiconducting polymers and devices

Michael Kotlarchyk, BS, MS, Ph.D., Massachusetts Institute of Technology—Professor, Physics: radiation scattering techniques, laser light scattering, small-angle neutron and x-ray scattering, photon correlation spectroscopy, structure and interactions in complex fluids, optics and photonics

Cristian Linte, BSc, University of Windsor (Canada); MESc, Ph.D. University of Western Ontario (Canada)—Assistant Professor, Biomedical Engineering: image-guided visualization and navigation for minimally invasive therapy

Sildomar Monteiro, MSc, Aeronautics Technological Institute (Brazil); Ph.D., Tokyo Institute of Technology (Japan)—Assistant Professor, Electrical Engineering, machine learning, statistical signal and image processing, and their applications in robotics, remote sensing, and biomedical engineering

Michael Pierce, BS, Rensselaer Polytechnic Institute; MS, Ph.D., University of Washington—Assistant Professor, Physics: experimental physics, condensed matter physics, surface science, magnetism, x-ray science, and phase transitions

Raymond Ptucha, BS, State University of New York at Buffalo; MS, Ph.D., Rochester Institute of Technology—Assistant Professor, Computer Engineering; machine learning, computer vision, robotics, and embedded control

Eli Saber, BS, State University of New York at Buffalo; MS, Ph.D., University of Rochester—Professor, Electrical and Microelectronic Engineering: signal, image and video processing; computer vision

Andreas Savakis, BS, MS, Old Dominion University; Ph.D., North Carolina State University—Professor, Computer Engineering: digital image processing, computer vision

Bruce Smith, BS, MS, Ph.D., Rochester Institute of Technology—Professor, Microelectronic Engineering: immersion lithography, high NA and polarization, aberration metrology, UV/VUV thin films, high index fluids, optical extension and imaging theory

Thomas W. Smith, BS, John Carroll University; Ph.D., University of Michigan—Professor, Chemistry and Microsystems Engineering: synthesis and device applications of block polymer systems and nano composites

Brian Tomaszewski, BA, University of Albany; MA, University of Buffalo; Ph.D., Pennsylvania State University—Assistant Professor, Information Sciences and Technologies: geographic information science and technology, visual analytics, context modeling and representation, disaster management

Richard Zanibbi, BA, MSc, Ph.D., Queen's University (Canada)—Associate Professor, Computer Science: pattern recognition, machine learning, document recognition, CAPTCHAs, human-computer interaction, and programming languages

Affiliate Faculty

Vince Calhoun, BS, University of Kansas; MA, MS, Johns Hopkins University; Ph.D., University of Maryland—Director, Image Analysis and MR Research, The MIND Institute; Associate Professor, Department of Neurosciences, University of New Mexico; Associate Professor, Department of Computer Science, University of New Mexico

Vikram Dogra, MD, JIPMER Medical School (India)—Professor of Diagnostic Radiology, Urology and Biomedical Engineering, Department of Imaging Sciences, University of Rochester School of Medicine

Golisano Institute for Sustainability

Nabil Nasr, Associate Provost and Institute Director
rit.edu/gis

Programs of Study

Golisano Institute for Sustainability is a comprehensive academic, training, and technology-transfer center focusing on multidisciplinary studies in sustainable production systems and the built environment. The institute's research areas include sustainable products, sustainable mobility, alternative energy systems, Eco-IT, and pollution prevention.

Admission requirements

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

Financial aid and scholarships

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

Research

The Golisano Institute for Sustainability is home to six different research centers and institutes, each with a highly specific mission in sustainability.

- *National Center for Remanufacturing and Resource Recovery* is internationally recognized as a leading center for applied research in remanufacturing.
- *Center for Integrated Manufacturing Studies* combines applied research with technology transfer to help manufacturers remain competitive in the global marketplace.
- *Center for Sustainable Mobility* assesses and evaluates the environmental and economic impact of different alternative fuel and propulsion technologies on the entire U.S. public transportation system.
- *Center of Excellence in Sustainable Manufacturing* is dedicated to enhancing the environmental and economic performance of products and processes.
- *New York State Pollution Prevention Institute* enhances the understanding of pollution prevention techniques while disseminating technologies to enhance these efforts.
- *NanoPower Research Labs* is dedicated to the creation and utilization of nano devices and materials for power generation and storage.

Facilities

The institute's headquarters are located in the new 84,000 sq. ft. Sustainability Institute Hall, which is certified LEED® (Leadership in Energy and Environmental Design) Platinum by the U.S. Green Building Council—the highest standard that can be achieved in the rating system. The building is adjacent to the Center for Integrated Manufacturing Studies that houses additional laboratories. Labs and facilities include:

- *Clean Technologies Demonstration Lab:* Features a wide variety of environmentally friendly cleaning technologies utilized in remanufacturing processes.
- *Eco-Design Lab:* Focuses on developing and testing product design solutions that reduce the environmental impact of information technology products throughout their lifecycle.
- *Electronics Lab:* GIS' focal point for the development and testing of embedded systems for prognostic applications.
- *Environmental Chemistry Lab:* Fundamental chemistry techniques are used to reduce life-cycle environmental impacts of products and processes with an emphasis on end-of-life material recovery processes.
- *Fuel Cell Testbed:* Innovations in fuel cell technologies are developed and tested with research focused on improving reliability and reducing costs.
- *Imaging Products Laboratory:* Provides state-of-the-art evaluation and research to enhance the sustainability of imaging products.
- *Materials Integration Lab:* Investigates how the bulk physical properties of materials lead to wear and the failure of components and subsystems.
- *Materials Science Lab:* Focuses on the analysis of material composition and how material properties drive failure of components.
- *Microgrid Testbed:* Information about the building's variable energy production and usage is analyzed to determine how to optimally use this energy in Sustainability Institute Hall.
- *Rapid Reverse Engineering Lab:* Equipped with instruments to accurately reconstruct missing product design information to enable new production, improve design, and enhance opportunities for remanufacturing.
- *Staples Sustainable Innovation Lab:* Supports the innovation and development of products having low environmental impact.
- *Sustainable Manufacturing Testbed:* This lab is devoted to developing advanced manufacturing, remanufactuirng, and recycling processes.
- *Vehicle Dynamics Lab:* Testing of engines, as well as complete vehicles, is conducted in order identify ways of improving energy efficiency and reducing emissions due to alternative fuels.

Architecture, M.Arch.

rit.edu/gis/architecture/

Dennis A. Andrejko, FAIA Head, Department of Architecture
(585) 475-4990, archdept@rit.edu

Program overview

At a time of significant transition in the profession, RIT's architecture program allows for full incorporation of the skills and knowledge critical to the 21st century architect. The program produces broad-thinking architects well grounded in the principles and practices of sustainability who can apply their knowledge and talents to the architectural problems posed by the modern city.

Plan of study

Students are required to complete 105 credit hours. Designed as a full-time program, courses are offered on campus, primarily during the day. Much of the course work is studio-based and includes technical courses, sustainability courses, and electives. In addition to three required sustainability courses, students will take one sustainability elective. All students prepare a thesis during their final year of study. Students take four graduate electives, drawn from courses offered by the colleges of Applied Science and Technology, Business, Engineering, Imaging Arts and Sciences, and Liberal Arts. In addition to course work, students must fulfill one co-op experience and one global experience.

The program is designed for students with a broad range of interests and backgrounds who are interested in studying architecture at the graduate level, whose undergraduate degrees were obtained in fields either inside or outside of architecture. The curriculum has been shaped by the global emphasis of sustainability, factors that impact urbanism, and the application of the principles of design and craft; along with a focus around building technology, materials, construction, and systems.

Sustainability

With a global need for a more sustainable world, including buildings and their impact on energy consumption and carbon footprints, the focus of many courses reflect the conditions of sustainable design and practice.

Technology

Design exploration is enhanced through the understanding of the implication of technology on both design process and product. The program enables students to focus and collaborate in many specialized areas of technology, including engineering, computer science, imaging science, materials and construction, and products and remanufacturing.

Urbanism

Because a degraded urban environment has grave implications for social, economic, cultural, and environmental health, the program pays particular attention to urban settings and urban principles. The complexity of the urban environment requires an interdisciplinary approach to architecture education – one that references economics, public policy, sociology, and regional culture. The program focuses on the practices and principles of preservation and adaptive reuse. The city of Rochester, New York, serves as an active learning environment for students.

Integrated learning/integrated practice

Like all strong design programs, the program's core education will take place in the studio. However, our studio curriculum integrates construction technologies, material science, and mechanics into design. From the outset, students will approach design problems within teams, learning to value and leverage collective intelligence. The integrated learning model prepares students for the increasingly integrated practice of architecture, where integrated project delivery is fast becoming the dominant model, and architects are orchestrating teams of professionals from a variety of fields, including engineering, management, science, and computer science.

Curriculum

Architecture, M.Arch. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ARCH-611	Architectural Representation I	3
ARCH-621	Architectural History I	3
ARCH-631	Architectural Design I	6
ARCH-761	Understanding Sustainability	3
ARCH-612	Architectural Representation II	3
ARCH-622	Architectural History II	3
ARCH-632	Architectural Design II	6
ARCH-641	Fundamentals of Building Systems	3
Second Year		
ARCH-731	Architectural Studio I: Site	6
ARCH-741	Integrated Building Systems I	3
ARCH-751	Architectural Theory	3
ARCH-734	Architectural Studio II: Urban	6
ARCH-742	Integrated Building Systems II	3
ARCH-752	Urban and Regional Planning	3
ARCH-762	Industrial Ecology Fundamentals	3
	Graduate Elective	3
Third Year		
ARCH-733	Architectural Studio III: Adaptive	6
ARCH-743	Integrated Building Systems III	3
ARCH-753	Research Seminar/Thesis Prep	3
ARCH-763	Sustainable Building Metrics	3
ARCH-735	Architectural Studio IV: Integrative	6
ARCH-744	Integrated Building Systems IV	3
ARCH-771	Professional Practice	3
	Graduate Elective	3
Fourth Year (fall only)		
ARCH-790	Thesis	6
	Sustainability Elective	3
	Graduate Electives	6
ARCH-699	Cooperative Education	0
	Global Experience	0
Total Semester Credit Hours		**105**

Admission requirements

To be considered for admission to the M.Arch. program in architecture, candidates must fulfill the following requirements:

- Hold a baccalaureate degree (B.Arch., BS, BA, or BFA) from an accredited institution,
- Have an undergraduate cumulative GPA of B (3.0) or higher,
- Successfully complete at least one semester each of college-level math (e.g. algebra, pre-calc, calculus) and science (e.g. physics, earth science, chemistry, etc.).
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit a one page personal statement and a 90 second video (maximum length) explaining your interest in studying architecture at the graduate level.
- Submit scores from the Graduate Record Examination (GRE).
- Submit three letters of recommendation (one from a current or former teacher or academic adviser; one from a current or former supervisor; and one from someone familiar with your creative abilities).
- Submit a PDF digital portfolio (see portfolio guidelines) of creative work, which may include sketches, constructions, graphics, and/or photographs. (While student portfolios do not require examples of architectural drawing/design, evidence of creative talent will be important in determining admission).
- Complete a graduate application.

- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 600 (paper-based) and 100 (Internet-based) are required.

Applicants who exceed the general admission requirements may be considered for conditional acceptance before GRE scores are available.

Portfolio Guidelines

All applications must be accompanied by a PDF digital portfolio. Print or bound portfolios or digital portfolios in formats other than PDF will not be accepted or reviewed. Please note, all PDF portfolios should be less than 6.0mb. Files larger than this will not be accepted or reviewed. In the event the review committee requires additional information or higher resolution images, the applicant will be notified.

Guidelines for portfolio preparation:

- Image quality: A medium quality image setting on a digital camera is sufficient. No images should be pixelated.
- File size: The total size must be 8.5"x11" format and cannot exceed 6.0mb. Alternatively students may use the PDF portfolio feature (found under FILE, in more recent versions of Adobe Acrobat) to create a portfolio.
- Orientation: Landscape orientation is preferred.
- Cropping: Crop out unnecessary objects from the images so that there are no distractions from work presented.
- Image enhancement: If the image files of your work are not accurate after photographing, image-editing software is allowed to correct the appearance of the files submitted. Please use caution. It is important to maintain the integrity of the original artwork.
- File name: Only one PDF portfolio file is allowed. It should be labeled using the following format: UARC_XX_LASTNAME.PDF, (XX is equal to the code for the academic year to which you are applying, ex: 2013 would be 13, 2014 would be 14, etc.) Enter last name in all capital letters in place of LASTNAME. Do not enter given names or middle names in this field.
- Submission: All PDF portfolio files must be submitted via email to gradinfo@rit.edu. Students should include their name in the subject line of the email. Files delivered on CD/ROM or USB drives will not be reviewed or accepted.

Sustainability, Ph.D.

rit.edu/gis/academics/ph.d-sustainability/
Thomas Trabold, Ph.D., Associate Professor
(585) 475-7363, tatasp@rit.edu

Program overview

The doctorate program in sustainability is the first program in the world to focus on sustainable production systems. It seeks to advance research and education in alternative-energy development, sustainable production, sustainable mobility, and eco-IT.

The program's curriculum emphasizes sustainable production systems, which create goods and services using processes that are non-polluting; conservation of energy and natural resources; economic viability; and safety for workers, communities, and consumers. Course work and research take a systems level and interdisciplinary approach to solving seemingly intractable sustainability problems.

Students have the opportunity to work with multidisciplinary faculty and researchers in numerous RIT research centers, including the Center for Remanufacturing and Resource Recovery, the Center for Sustainable Manufacturing, the Center for Sustainable Mobility, the Center for Sustainable Energy Systems, and the New York State Pollution Prevention Institute–all of which are housed in the Golisano Institute for Sustainability.

Plan of study

Students must complete 60 semester credit hours of course work and research.

Curriculum

Sustainability, Ph.D. degree, typical course sequence

COURSE		SEMESTER CREDIT HOURS
First Year		
ISUS-600	Graduate Seminar	2
ISUS-702	Fundamentals of Sustainability Science	3
ISUS-704	Industrial Ecology	3
	Elective	3
ISUS-706	Economics of Sustainable Systems	3
ISUS-806	Risk Analysis	3
ISUS-808	Multicriteria Sustainable Systems Analysis	3
Second Year		
ISUS-705	Technology Policy and Sustainability or Approved Substitute	3
	Elective	3
Choose one of the following:		8
ISUS-890	Dissertation Research	
ISUS-807	Research	
	Electives	
ISUS-600	Graduate Seminar	2
Third Year		
Choose one of the following:		8
ISUS-890	Dissertation Research	
ISUS-807	Research	
	Electives	
ISUS-600	Graduate Seminar	4
Fourth Year		
ISUS-600	Graduate Seminar	2
ISUS-890	Dissertation Research	10
Total Semester Credit Hours		**60**

Admission requirements

To be considered for admission to the Ph.D. program in sustainability, candidates must fulfill the following requirements:

- Hold a baccalaureate degree from an accredited institution (course work must include at least one year of college science and one year of college mathematics including calculus and statistics),

- Have minimum GPA of 3.0,
- Submit scores from the Graduate Record Examination (GRE),
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work,
- Submit a personal statement of educational objectives,
- Submit a current resume or curriculum vitae,
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral candidates must be confidential and must be submitted directly from the referee to RIT.
- Participate in a personal interview with the faculty committee (by teleconference if necessary), and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Minimum scores of 600 (paper-based) or 100 (Internet-based) are required. International English Language Testing System (IELTS) scores are accepted in place of the TOEFL. Minimum scores vary, however, the absolute minimum score required for unconditional acceptance is 6.5.

Sustainable Systems, MS

rit.edu/gis/academics/ms-sustainability/
Gabrielle Gaustad, Ph.D., Associate Professor
(585) 475-7363, gabrielle.gaustad@rit.edu

Program overview

The MS degree in sustainable systems focuses on sustainable production systems, which create goods and services using processes that are non-polluting; conservation of energy and natural resources; economic viability; and safety and health for workers, communities, and consumers. Course work and research take a systems level and interdisciplinary approach to solving sustainability problems, as opposed to single disciplinary and locally optimized approaches destined to yield marginally positive impacts.

Graduates are prepared to pursue careers in their chosen field with an understanding of basic sustainability principles and the expertise to analyze and solve complex sustainability issues.

Plan of study

Students must complete 24 semester credit hours of course work plus a 6 semester credit hour thesis or capstone project. Full-time students may complete the degree in one year (two semesters plus one summer term).

Tracks

Students have the option of choosing one of four tracks: sustainable manufacturing, sustainable mobility, sustainable energy systems, and sustainable built environments. Students can also create additional tracks using elective courses (selected in consultation with the student's adviser) from a wide variety of courses offered by the Golisano Institute for Sustainability or any one of RIT's other colleges.

Curriculum

Sustainable systems, MS degree, typical course sequence (semesters)

COURSE		SEMESTER CREDIT HOURS
First Year		
ISUS-702	Fundamentals of Sustainability Science	3
ISUS-704	Industrial Ecology	3
ISUS-706	Economics of Sustainable Systems	3
ISUS-806	Risk Analysis	3
ISUS-708	Sustainability Practice	3
	Electives	6
ISUS-705	Technology Policy and Sustainability*	3
Choose one of the following:		6
ISUS-780	Capstone	
ISUS-790	Thesis	
Total Semester Credit Hours		**30**

Admission requirements

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

- Hold a baccalaureate degree from an accredited institution,
- Have fulfilled the following curriculum requirements: one year of college science and one year of college mathematics (including calculus and statistics),
- Have a minimum grade point average of 3.0,
- Participate in an interview with the academic department,
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work,
- Submit scores from the Graduate Record Exam (GRE),
- Submit two letters of reference,

- Submit a personal statement of educational objectives,
- Submit a current resume, and
- Complete a graduate application.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Minimum scores of 600 (paper-based) or 100 (Internet-based) are required. International English Language Testing System (IELTS) scores will be accepted in place of the TOEFL exam. The minimum acceptable score for unconditional acceptance is 6.5.

Additional information

Non-matriculated students

An applicant with a bachelor's degree from an approved undergraduate institution and the appropriate background is permitted to take graduate courses as a non-matriculated student. If the student is subsequently admitted to the graduate program, a limited number of credit hours from courses taken at RIT as a non-matriculated student can be transferred to the degree program. Any applicant who wishes to register for a graduate course as a non-matriculated student must obtain permission from the chair of the graduate program and the course instructor.

Nabil Nasr, BS, Helwan University (Egypt); M.Eng., Pennsylvania State University; MS, Ph.D., Rutgers University—Associate Provost and Director, Golisano Institute for Sustainability

Dennis A. Andrejko, B.Arch., Arizona State University; M.Arch, Massachusetts Institute of Technology—Head, Department of Architecture, Associate Professor

Thomas A. Trabold, BS, Ph.D., Clarkson University—Head, Department of Sustainability, Associate Professor

Nana-Yaw A. Andoh, B.Arch., M.ADU., University of Notre Dame—Assistant Professor

Callie W. Babbitt, BS, Georgia Institute of Technology; ME, Ph.D., University of Florida—Associate Professor

Roger B. Chen, BS, MS, University of Texas at Austin, Ph.D., University of Maryland College Park—Assistant Professor

Jules Chiavaroli, B.Arch., University of Notre Dame; MBA, Rochester Institute of Technology—Professor

Gabrielle Gaustad, BS, Alfred University; MS, Ph.D., Massachusetts Institute of Technology—Associate Professor

Michael Haselkorn, BS, Alfred University; MS, Ph.D., University of Illinois at Urbana—Research Associate Professor

Nenad Nenadic, BA, University of Novi Sad (Yugoslavia); MS, Ph.D., University of Rochester—Research Associate Professor

Eugene Park, BA, BE, Dartmouth College, Ph.D., University of Rhode Island—Research Associate Professor

Giovanna Potestà, Laurea in Architecttura, Ph.D., University of Florence (Italy)—Assistant Professor

Charles Ruffing, BS, St. Joseph's University, Ph.D., University of Illinois—Research Associate Professor

Paul H. Stiebitz, BS, ME, Rochester Institute of Technology; MS, State University of New York at Buffalo—Professor

Michael Thurston, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Research Associate Professor and Technical Director, Systems Modernization and Sustainment Center

Eric Williams, BA, Macalester College; Ph.D., State University of New York at Stony Brook—Associate Professor

Online Learning

www.rit.edu/online

RIT is a recognized leader in the delivery of online asynchronous education. Since 1980, the university has offered distance learning courses and was among the first universities nationwide to utilize the Internet as a mode of delivery. In 1991, the university began offering full degrees through online learning.

RIT offers numerous degree and certificate programs in an online format—most of which may be earned without ever coming to campus. The university offers hundreds of graduate and undergraduate courses online annually. Each year nearly 5,000 students enroll in an online learning course. Students are encouraged to select and apply to their chosen academic program, but in some cases may enroll in courses prior to matriculation into a program.

Online learning offers students the flexibility to learn on their own time, when and where it best meets their needs. All online courses are taught using Internet and Web-based technologies. Students must have Internet access, a computer, DVD player and monitor, and a telephone to participate in courses. Not all courses use the same technologies. Some take advantage of toll-free phone or Web conferences, while others use text-based chat or CD-ROMs. Some have Web-based simulations and some require additional software to complete course requirements. All courses use asynchronous Internet/Web-based tools for the fundamental class structure.

Online students have full access to customer and technical support through phone and e-mail. Online learners also have full access to the library and its services. Other online services include registration, orientation, access to student records, and course material ordering. Officially registered students receive e-mails about three weeks before the online course begins welcoming them to the online learning experience and directing them to orientation information. Here, students can visit the Online Student Community to access information on courses, order course materials, and review any proctored exam requirements.

All courses offered online meet the same rigorous objectives set for traditional classroom experiences. Faculty members who teach online courses often teach the same class in a traditional format.

However, just as each professor establishes the learning outcomes for a traditional course, their individual choices are also reflected in the online classroom. Most classes establish either a weekly schedule for learning activities or a project-based learning approach, in which deliverables (assignments, projects, discussion participation, etc.) are due after certain learning outcomes are accomplished. Most classes also include various readings either from textbooks or electronic reserves. Students interact online with other students to exchange ideas and collaborate much as they would face-to-face.

Online learning serves students throughout the United States and in nearly 40 countries. Students living near Rochester may choose to take both online and traditional courses as a way of increasing flexibility and remaining on target to complete a degree.

Online graduate programs

Master's degrees:

- Applied Statistics
- Business Administration (Online Executive MBA)
- Environmental, Health and Safety Management
- Facility Management
- Health Systems Administration
- Human Resource Development
- Human-Computer Interaction
- Imaging Science
- Manufacturing Leadership
- Microelectronics Manufacturing Engineering
- Networking and System Administration
- Product Development
- Professional Studies
- Service Leadership and Innovation
- Telecommunications Engineering Technology

Advanced certificates:

- Applied Statistics
- Communication and Digital Media
- Health Care Finance
- Information Assurance
- Lean Six Sigma
- Network Planning and Design
- Organizational Learning
- Project Management
- Service Systems
- Training, Design and Assessment
- User Experience Design and Development

Graduate Admission

Admission decisions for graduate applicants are made by the department or college offering the program, and upon receipt of a completed application folder from the Office of Graduate Enrollment Services. Correspondence between the student and the university is conducted through the Office of Graduate Enrollment Services, according to the following policies and procedures:

1. Inquiries regarding academic programs, as well as all applications for graduate study, are directed to the Office of Graduate Enrollment Services, Rochester Institute of Technology, Bausch & Lomb Center, Building 77, Room A130, 58 Lomb Memorial Drive, Rochester, NY 14623-5604.
2. The Office of Graduate Enrollment Services will acknowledge the inquiry or application, instructing the student as to the information required for admission by the school or department to which he or she is applying.
3. Once a student has submitted a formal application, the Office of Graduate Enrollment Services will prepare an applicant file. All correspondence and admission information is collected by the Office of Graduate Enrollment Services and placed in the applicant's file. The file will include an RIT application, previous college records (transcripts), applicable test scores, letters of recommendation, and other documents that may support admission of the candidate.
4. When all relevant admission data has been received, the applicant's file is sent to the appropriate school or department for review and an admission decision.
5. When the school or department has made a decision on the application, the decision and the applicant's file is returned to the Office of Graduate Enrollment Services.
6. The Office of Graduate Enrollment Services notifies candidates of admission decisions.
7. Academic units may informally advise non-degree students, but no formal program of study can be approved prior to admission.
8. The formal program is laid out by the dean's designee (department head, coordinator or program director, etc.) and is the one that must be followed by all students applying for admission or readmission in that program.
9. The basic entry requirements for graduate degree candidates include the completion of a baccalaureate degree and whatever other evidence of the applicant's potential to complete graduate studies may be required by the particular program. Rare exceptions to the baccalaureate requirement can be made in the case of candidates who have demonstrated unusual competence in their field of specialization. For these exceptions the recommendation of the department chairperson or director and the approval of the appropriate dean and the Graduate Council are required.

The U.S. Government expects international students to prove competency in the English language prior to their acceptance to an American college or university. In keeping with this expectation, students whose native language is not English and whose secondary or higher education was completed in a non-native English speaking country must take a test of English language proficiency. Students must achieve the following minimum scores prior to consideration for admission into graduate studies: 550 (paper-based) or 79 (Internet-based) on the Test of English as a Foreign Language (TOEFL), 6.5 on the International English Language Testing System (IELTS), or 58 on the Pearson Test of English – Academic. Individual academic units may require higher standards or additional requirements.

Applicants whose test results fall below the minimum scores for admission but who otherwise meet academic requirements will be referred to the English Language Center. They will not be admitted to academic programs until they meet proficiency criteria established by the English Language Center.

In certain cases graduate students may be admitted prior to, but conditional upon completion of the baccalaureate degree. Applicants should not be considered for admission prior to the start of their final year of undergraduate study. The student must present a final transcript signifying successful completion of their baccalaureate degree by the end of the first term they are enrolled in the graduate program.

Graduate applicants who do not fully satisfy all admission criteria as to grades, test scores or other credentials, but do show sufficient promise to qualify for a trial period of graduate study may be admitted on probation to the university. Such students must achieve a 3.00 (B) program grade point average by the end of their first 9 credit hours of graduate study. Those students who do not meet this criterion will be suspended. Responsibility for specific requirements and maintenance of the student's appropriate status rests with the academic unit in consultation with the Office of Graduate Enrollment Services and the Office of the Registrar.

New York State immunization requirement

All students registered for four or more credits and born after January 1, 1957, must comply with New York state and RIT immunization requirements. New York State Law requires proof of immunity to measles, mumps, and rubella through either two MMR immunizations or positive blood titers for each disease. New York state also requires all students, regardless of age, to sign a meningococcal awareness form. RIT requires students age 26 and under to have the meningitis shot. Required immunizations should be obtained before arrival to avoid delay in registration or interruption of classes for which students have enrolled. Contact the Student Health Center (www.rit.edu/studentaffairs/studenthealth) with questions. Additional information and forms are available online.

Readmission

Students who leave a graduate program, or have a lapse in enrollment greater than or equal to three terms, including summer but not including intersession, and wish to return to that program must reapply through the Office of Graduate Enrollment Services. All student applications are subject to admissions standards at the time of reapplication. The program of study shall be subject to review and may be rewritten. Previous waiver and/or transfer credit may be lost, and program deficiencies may need to be made up.

Each college has the responsibility, upon a student's readmission, of determining which previous courses if any, are applicable toward the degree. Be aware that standards and degree requirements may have changed and previous waiver, transfer, or competency credit may be lost and program deficiencies may need to be made up. All readmission decisions are made by the academic unit. Readmission is not guaranteed.

Graduate students must complete the graduate program within seven years of the date of the oldest course counted toward their program. This does not apply to prerequisites, bridge program courses or similar requirements.

Costs and Payment Procedures

Costs and Payment Procedures

The university reserves the right to change its tuition and fees without prior notice. Nonmatriculated students are charged graduate rates for graduate courses.

Graduate costs are listed in the table on this page. In addition, any graduate student carrying more than 18 credit hours of study will be charged the full-time tuition rate plus $1,673/credit hour for each hour of study exceeding 18.

Room and board for full-time students: A variety of housing options (residence halls and apartmentd) and meal plans are available to graduate students. Costs vary according to options selected. For information about housing and meal plan options, please visit Housing Operations at: https://www.rit.edu/fa/housing/.

The cost of books and supplies varies depending on the area of study and the number of courses taken by a student. The estimated cost for books and supplies ranges from $500 to $2,500 a year for full-time students and $300 to $700 a year for part-time students.

Charges for tuition, fees, and room and board are computed on a semester basis. University billing statements may be paid by cash, check, or electronic check (e-check). The university does not accept credit card payments for tuition, fees, and room and board that appear on the student billing statement. However, we have an arrangement for a third-party vendor to accept MasterCard, Visa, and Discover Card when payment is made online. The vendor does charge a percentage fee for each credit card transaction. Billing-related payments (check) may be mailed to: Rochester Institute of Technology, Student Financial Services, P. O. Box 92878-200, Rochester, NY 14692-8978. Payment also may be made in person at the Office of Student Financial Services on the first floor of the University Services Center. Credit card and e-check payment information can be found at www.rit.edu/sfs/billing-dates-and-payment-options.

Due dates are clearly designated on the billing statement and our website. Failure to pay the amount due or arrange an optional payment by the due date will result in a late payment fee. Charges less anticipated financial aid and other credits reflected on billing statement will be divided into four installments. Payments due are:

- Fall semester: August 15, 2016
- Spring semester: January 15, 2017

Payment plan option information can be found at: www.rit.edu/sfs/billing-dates-and-payment-plan-options.

Graduate Costs

TUITION	PER SEMESTER*	PER YEAR
Full-time (12–18 credit hours)	$20,902	$41,804
Part-time (11 credit hours or less)	$1,742/credit hour	$1,742/credit hour
Student activities fee	$137	$274

* Tuition rate is for fall and spring semesters. Contact Student Financial Services for information on tuition rates for summer term and intersession.

If you have questions concerning payment options, please contact the Student Financial Services Office, (585) 475-6186 or asksfs@rit.edu.

Electronic Billing

The university has an electronic billing (E-Bill) program for students. Each semester, all students receive an e-mail notification to their official university e-mail account stating that their E-Bill is available. Students have the option of granting additional access to allow for a parent, guardian, sponsor, or other authorized user to receive E-Bill notifications (www.rit.edu/eservices).

Student Accident and Sickness Insurance

All registered students are required to maintain medical insurance while attending RIT. Insurance coverage can be through RIT, a family member's policy, or a personal policy.

A student accident and sickness insurance plan is available through RIT. There is a separate charge for this insurance. The plan provides coverage, within limits specified in the policy, for sickness and injury, outpatient services, emergency care, and prescriptions.

Enrollment in this plan is voluntary for all students except registered international undergraduate students (full- and part-time) on A, B, E, F, G, I, J, K, O, Q, R, and V visas. These students will be enrolled automatically in the basic accident and sickness policy on a semiannual basis.

There is no need to waive coverage if it is not desired. Students who want to enroll in this plan may enroll online or by mail. An open enrollment period is available at the beginning of each academic semester. Payment can be made by check, money order, or credit card, or the premium can be added to the student's account.

The open enrollment period ends 30 days after the start of the academic semester in which the student first registers.

For plan and enrollment information, visit the Web at www.universityhealthplans.com or call (800) 437-6448. Students are not required to obtain the student accident and sickness insurance plan to receive services at the Student Health Center.

Refund Policies

For information regarding refund policies for withdrawal during the semester, please contact the Student Financial Services Office or visit their website atw www.rit.edu/fa/sfs/refund.

Partial refund schedule for room and board

To complete a withdrawal from RIT, a resident student must check out with Housing Operations. All students on a meal plan should check out with the Food Service administrative office, located in the Student Alumni Union, room A520 (lower level). Refunds, when granted, are from the date of official check out. Room and board refund policies are established by the Center for Residential Life and RIT Food Service.

Room

1. During the first week of classes—90 percent of unused room charge
2. During the second week of classes—75 percent of unused room charge
3. During the third week of classes—60 percent of unused room charge
4. During the fourth week of classes—50 percent of unused room charge
5. Fifth and subsequent weeks—no refund

Board

1. Within the first four weeks—75 percent of the unused meal/debit charges
2. After the fourth week—50 percent of the unused meal/debit charges
3. During the last two weeks of classes—no refund

Any student who intentionally defrauds or attempts to defraud the university of tuition, fees, or other charges, or who gives false information in order to obtain financial aid, is subject to legal liability, prosecution, and university disciplinary action.

Financial Aid

www.rit.edu/financialaid

General Information

RIT offers a full range of financial aid programs to assist graduate students with their educational expenses. The information provided in this section is an overview of the sources of assistance available. Please consult the Office of Financial Aid and Scholarships' website for more detailed information.

Scholarships and assistantships are available in most graduate departments. In addition, some departments offer externally funded tuition remission and stipends from corporate or government sponsors. Please contact the appropriate graduate program director or the Office of Graduate Enrollment Services for additional information.

Financial aid awards are offered only once a student is accepted. Awards are generally given to full-time students, but exceptions are made for qualified part-time students.

International students (F-1 or J-1 visa holders) may generally work on campus for up to 20 hours per week. Special authorization from International Student Services and/or the INS is needed for all other employment, including co-ops and internships. Please consult International Student Services at (585) 475-6943 or www.rit.edu/iss for employment or visa questions.

All federal student aid programs require submission of the Free Application for Federal Student Aid (FAFSA). The FAFSA may be completed online at www.fafsa.gov.

Academic Progress Requirements

Federal regulations require financial aid recipients to maintain minimum standards of satisfactory academic progress (SAP) for continued receipt of federally sponsored aid. All students receiving federal assistance must remain admitted in a degree program. Regulations require a maximum time frame for degree completion, a quantitative measurement (complete two thirds or 66.67% of credit hours attempted) and a qualitative measurement (2.0 minimum cumulative grade point average). Credit hours attempted include withdrawals, repeated courses, incompletes, grade exclusions, non-matriculated courses, and credit by exam. The annual review of academic progress at the end of spring term each year considers all terms of enrollment, including terms in which no federal aid was received. Students whose academic progress is not in compliance with federal regulations will be notified of the deficiency. Students who do not meet minimum SAP standards may continue to receive federal aid during a probationary period, not to exceed one academic year and not to exceed 150 percent timeframe for degree completion, as the result of an academic appeal initiated with the Office of Financial Aid and Scholarships, and in coordination with the academic department. Please refer to the Graduate Bulletin section titled Registration and Degree Requirements for additional information about making satisfactory academic progress.

In addition, loan eligibility for students with full-time-equivalent status is limited to a maximum of three terms.

Financial Aid Refund Policy

Return of federal funds

In accordance with federal regulations, the Office of Financial Aid and Scholarships recalculates federal aid eligibility for students who withdraw, drop out, are suspended, or take a leave of absence prior to completing more than 60 percent of a term. "Withdrawal date" is defined as the actual date the student initiated the withdrawal process, the student's last date of recorded attendance or the midpoint of the term for a student who leaves without notifying the university. Recalculation is based on the percent of earned aid using the following formula: number of days completed up to the withdrawal date/total days in the term. Aid returned to federal programs is then equal to 100 percent minus the percentage earned multiplied by the amount of federal aid disbursed.

Funds are returned to the federal government in the following sequence: Federal Direct Unsubsidized Loans, Federal PLUS Loans, Federal Perkins Loans, other federal aid.

Late disbursement

If the student is otherwise eligible, the first disbursement of Federal Direct Unsubsidized Loan proceeds is allowed up to 180 days after the student has ceased to be enrolled. Subsequent disbursements are not allowed.

State scholarships

Regulations vary. Any adjustments are done in accordance with the specific requirements of the sponsoring state.

Privately funded grants and scholarships

In the absence of specific instructions from the sponsor, 100 percent of the semester award will be credited to the student's account.

RIT grants and scholarships

Institutional funding such as RIT grants and scholarships are prorated based on the tuition refund schedule for withdrawal during a semester. For more information, please contact the Office of Financial Aid and Scholarships or visit their website at www.rit.edu/financialaid.

Financial Aid Programs

GRANTS/SCHOLARSHIPS	ELIGIBILITY	AMOUNT	HOW TO APPLY
Graduate Assistantships	Graduate student matriculated into an RIT graduate degree program.	Amounts vary	Complete Graduate Admissions Application and check appropriate box to be considered for graduate assistantships.
Graduate Merit Scholarships	Graduate student matriculated into an RIT graduate degree program.	Amounts vary	Complete Graduate Admissions Application and check appropriate box to be considered for graduate scholarship.
Vietnam Veterans Tuition Award Program	Eligible Veterans who are New York state residents.	$6,195 per year for full-time study; available for undergraduate or graduate study.	File the Free Application for Federal Student Aid (FAFSA) and TAP Application. Also file the Vietnam Veterans Tuition Award Supplement at www.hesc.com.
Veterans Benefits	Eligible veterans and children of deceased veterans, or service-connected disabled veterans.	Amounts vary.	Contact: Office of Veterans Affairs at (888) 442-4551, or visit their website at www.va.gov.
Bureau of Indian Affairs Graduate Fellowship Grants	Enrolled full-time and recognized by Secretary of the Interior as a member of an Indian tribe and demonstrating financial need and academic achievement.	Amounts vary	Contact American Indian Graduate Center (AIGC) at (800) 628-1920, or on the Web at www.aigc.com.

LOANS	ELIGIBILITY	AMOUNT	HOW TO APPLY
Federal Direct Loans	Matriculated students who are enrolled at least half-time and who are U.S. citizens or permanent residents.	Maximum amount: $20,500. The maximum amount cannot exceed the cost of education minus all other financial aid awarded.	File the Free Application for Federal Student Aid (FAFSA). (must be a U.S. citizen or Permanent Resident)
Federal Perkins Loan	Students who meet requirements established by federal government, and demonstrate significant financial need.	Up to $8,000 per year; $40,000 limit for undergraduate and graduate study.	File the Free Application for Federal Student Aid (FAFSA). (must be a U.S. citizen or Permanent Resident)
Private Alternative Loans	Enrolled student who is credit-approved by lender.	Up to the cost of education minus all other financial aid awarded.	Consult the Office of Financial Aid and Scholarships website at www.rit.edu/financialaid or contact the private lender directly.
Federal Direct PLUS Loans for Graduate Students	Matriculated students who are enrolled at least half-time and who are U.S. citizens or permanent residents.	The maximum amount cannot exceed the cost of education minus all financial aid awarded.	File the Free Application for Federal Student Aid (FAFSA) and complete a Federal Direct PLUS Loan application.

EMPLOYMENT	ELIGIBILITY	AMOUNT	HOW TO APPLY
Federal Work Study Program	Students who are U.S. citizens or permanent residents with financial need: most jobs provided are on campus, and some community service positions are available.	Varies, depending on hours and wage rate (RIT wage rates start at $8.75 per hour).	File the Free Application for Federal Student Aid (FAFSA). Contact the RIT Student Employment Office at www.rit.edu/emcs/seo.
RIT Employment Program	No financial need requirement; may be on campus or off campus.	Varies, depending on hours and wage rate (RIT wage rates start at $8.75 per hour).	Contact the RIT Student Employment Office at www.rit.edu/emcs/seo.

This chart covers the most commonly awarded financial aid programs available to full-time graduate students at RIT. Information is correct as of July 2016. Most graduate programs require satisfactory progress toward degree completion to maintain eligibility. Filing the FAFSA by April 1 will ensure priority consideration for all programs. Applications filed after this date will receive consideration as long as funds remain available. Scholarships provided by RIT will be prorated for NTID-sponsored students to reflect lower NTID tuition rates.

University Policies and Procedures

Academic Policies and Procedures

A graduate degree at RIT may be obtained in more than 70 programs ranging from business administration to imaging science. (Please refer to page 4 for a complete listing of graduate programs of study.)

Upon completion of the stipulated requirements, students are certified by their academic departments for their degrees. A statement verifying that a degree has been awarded will be posted to the transcript and diplomas are mailed to all graduates.

Enrollment

1. Student should complete the enrollment and payment process in accordance with university enrollment/billing procedures, as indicated in the current enrollment guide.
2. It is the responsibility of the student to update their address online through the Student Information System (SIS), or to advise the registrar of any change of address.
3. University ID cards are required for students to use many campus facilities and services (e.g., the library, Student Life Center, meal plans, check cashing). Identification cards are available at the Registrar's Office.
4. Students are expected to pursue their degree without a substantial break. Failure to enroll (register) for three successive academic terms, including summer but excluding Intersession, can result in the loss of active student status.
5. RIT considers graduate-level students to be "full time" in every academic term in which they are enrolled for at least 9 semester credit hours. With approval of the department chair and associate provost for academic programs, additional equivalent credit can be granted for such activities as thesis work, teaching assistantships, and internships.

Student classification

Active graduate students are those who have applied to and been formally accepted into a graduate program through the Office of Graduate Enrollment Services. Such students may enroll for graduate-level courses (600 and above) that fit their home department-approved programs. When enrolling for graduate courses outside the home department, students may need to secure the approval of the department offering the course.

Non-degree-seeking students will be allowed to take graduate courses on a space-available basis with the department's approval, and with the knowledge that course work completed while a non-degree-seeking student will not necessarily apply to any given academic program.

Active and non-degree-seeking graduate students may enroll for undergraduate-level courses with the understanding that these courses may not apply to any RIT graduate program.

Degree Requirements

Credit requirements

The minimum credit requirement for a master's degree is 30 semester credit hours. At least 80 percent of these credit hours must be earned at the graduate level and in residence at the university.

Transfer credit

A maximum of 20 percent of the total required semester hours for the graduate degree may be awarded through any combination of transfer credit, waived credit, and credit by competency. Only a course with a grade of B (3.0) or better may be transferred.

Transfer credits are not calculated in the student's grade point average but will count toward overall credit requirements for the degree. Transfer credits do not count toward the satisfaction of residency requirements.

A graduate student who wishes to take courses at another institution and transfer them toward degree work at RIT must obtain prior permission from the appropriate departmental officer or dean.

Candidacy for an advanced degree

A graduate student must be a candidate for an advanced degree for at least one term prior to receipt of the degree. The position of the Graduate Council is that a student is a candidate for the master's degree when they are formally admitted to RIT as a graduate student.

Thesis requirements

Included as part of the total credit-hour requirement may be a research, dissertation, thesis, or project requirement, as specified by each department. The amount of credit the student is to receive must be determined by the time of enrollment for that term. For the purpose of verifying credit, an end-of-term grade of R should be submitted for each enrollment of research and thesis/dissertation guidance by the student's faculty adviser. Before the degree can be awarded, the acceptance of the thesis/dissertation must be recorded on the student's permanent record. Students also should note the following continuation of thesis/dissertation policy.

Students who complete a thesis or dissertation as a requirement for their master's or doctoral degree are required to submit a hard copy of the document to the Wallace Library to be placed in the Archives. Students also are required to submit an electronic copy of the thesis or dissertation to ProQuest/UMI for publication.

Continuation of thesis/project/dissertation

Once work has begun on a thesis, project or dissertation, it is seen as a continuous process until all requirements are completed. If a thesis, project, or dissertation is required, or such an option is elected, and if the student has completed all other requirements for the degree, the student must enroll for the Continuation of Thesis/Project/Dissertation course each term (including summer but excluding intersession). This course costs the equivalent of one-semester credit hour, although it earns no credit.

1. Enrollment for the Continuation of Thesis/Project/Dissertation course preserves student access to RIT services; e.g., Wallace Library, academic computing, and faculty and administrative support. With payment of appropriate user fees, access to the Student Life Center and Student Health Center also is preserved.
2. If circumstances beyond students' control preclude them from making satisfactory progress on their thesis/project/dissertation, they should consider taking a leave of absence and discuss such a leave in advance with their adviser/department head. The dean's signature of approval is required on the Leave of Absence or Institute Withdrawal form, a copy of which also must be sent

to the associate provost for academic programs. If students do not enroll for the Continuation of Thesis/Project/Dissertation course, or take an approved leave of absence, their departments may elect to remove them from the program.
3. The length of time to complete a thesis/project/dissertation is at the discretion of the department. Be sure to read, however, the first point under "Summary of requirements for master's degree" on this page.

Note: The dissertation is required only of Ph.D. students.

Summary experience

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

Overlapping credit for second degree

At the discretion of the Graduate Committee in the specific degree area, a maximum of 20 percent of previous RIT master's degree earned hours can normally be applied toward satisfying requirements for a second master's degree. The use of a given course in two different programs can be allowed only if the course that was used for credit toward the first degree is a required course for the second degree. The course must be used in both programs within five years; i.e., no more than five years between the time used for the first degree and when applied again toward the second degree.

In no case shall fewer than the minimum 30 semester credit hours be required for the second degree. If duplication of courses causes a student to go below the 30-hour limit in the second degree program, he or she would be exempted from these courses but required to replace the credit hours with departmentally approved courses. An RIT student will not be admitted through the Graduate Enrollment Services Office to the second degree program until the first program has been completed.

Financial standing

Tuition and fees paid to the university cover approximately 60 to 70 percent of the actual expense of a student's education. The rest of the cost is borne by the university through income on its endowment, gifts from alumni and friends, and grants from business and industry. Students, former students, and graduates are in good financial standing when their account is paid in full in the Student Financial Services Office. Any student whose account is not paid in full will not receive transcripts or degrees. The university reserves the right to change its tuition and fees without prior notice.

Summary of requirements for master's degree

1. Successfully complete all required courses of the university and the college. These requirements should be met within seven years of the date of the oldest course counted toward the student's program. Extension of this rule may be granted through petition to the Graduate Council.
2. Complete a minimum of 30 semester credit hours for the master's degree. At least 80 percent of graduate-level course work and research (courses numbered 600 and above) must be earned in residence at RIT.
3. Achieve a program cumulative grade point average of 3.0 (B) or better.
4. Complete a thesis/project/dissertation or other appropriate research or comparable professional achievement, at the discretion of the degree-granting program.
5. Pay in full, or satisfactorily adjust, all financial obligations to the university.

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

Definition of grades

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

GRADE	DESCRIPTION
A	Excellent
A-	
B+	
B	Above Average
B-	
C+	
C	Satisfactory
C-	
D	Minimum Passing Grade
F	Failure
AU	Audit (Indicates a student has officially registered for the course for no credit.)

D and F grades do not count toward the fulfillment of program requirements for a graduate degree. **The grades of all courses attempted by graduate students will count in the calculation of the cumulative grade point average.** The program cumulative grade point average shall average 3.0 (B) as a graduation requirement. The dean of the college or their designee must approve all applications for graduate courses a student wishes to repeat.

The GPA is computed by the following formula: GPA = total quality points earned divided by total credit hours attempted. There are other evaluations of course work that do not affect GPA calculations. Only I and R (as described below) can be assigned by individual instructor at the end of a term.

Registered (R)—This permanent grade used in graduate course work indicating that a student has registered for a given course but has yet to meet the total requirements for the course or has

continuing requirements to be met. The grade is given in graduate thesis work. Completion of this work will be noted by having the approved/accepted thesis or dissertation title, as received by the registrar from the department, added to the student's permanent record. Full tuition is charged for these courses. "R" graded courses are allowed in the calculation of the residency requirement for graduate programs; however, they do not affect GPA calculations.

Incomplete (I)—This notation is given when an instructor observes conditions beyond the control of a student such that the student is unable to complete course requirements in the given term or session. The instructor determines and advises the student of the due date by which the student must complete course requirements. This is a temporary grade that reverts to an F if the registrar has not received a change of grade directive by the end of the second succeeding term (including summer but excluding intersession). Full tuition is charged however credit hours are not earned and the GPA is not affected until a permanent grade is assigned.

Withdrawn (W)—This notation will be assigned in courses from which a student withdraws through the end of the twelfth week of classes, or if a student withdraws from all courses in a given term.

Audit (AU)—This notation indicates a student has audited a course. An audit request form must be completed and approved by the department offering the course. The student need not take exams, and half tuition will be charged. A student can change from credit to audit or audit to credit status for a course only during the first seven calendar days, excluding Sundays and holidays, of the full fall and spring terms and summer session. Audited courses do not count toward the residency requirement, do not get included in GPA calculations, and do not count toward degree requirements.

Credit by competency (X)—This notation is assigned for the successful completion of various external or university examinations, provided such examinations cover or parallel the objectives and content of the indicated course. For graduate students, the combined total amount of credit applied through external (non-RIT) transfer credit, waived courses, and credit by competency may not exceed 20 percent of the total credits in the graduate program.

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 30 semester credit hours.

In addition, waiver credit for graduate courses can be applied only toward 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 in the specified program.

Changing grades

Once a grade has been reported by an instructor, it is not within the right of any person to change this unless an actual error has been made in computing or recording it. If an error has been made, the instructor must complete the appropriate form. The completed form must be approved by the head of the department in which the instructor teaches. When approved, the form is then sent to the registrar. There is, however, an appeal procedure for disputed grades through the Academic Conduct Committee of the college in which the course is offered.

Academic probation and suspension

Any active graduate student whose cumulative or program cumulative GPA falls below a 3.0 after 9 credit hours (attempted or earned) will be placed on probation and counseled by the departmental adviser concerning continuation in the graduate program.

Those students placed on probation must raise their cumulative and program cumulative GPA to the 3.0 level within 9 credit hours or be suspended from the graduate program.

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

Student Conduct Policies and Procedures

Standards for student conduct

The RIT community intends that campus life will provide opportunities for students to exercise individual responsibility and places high priority on self-regulation by its members. All members of the community are responsible for encouraging positive behavior by others, as well as preventing or correcting conduct by others that is detrimental to RIT's educational mission and values.

As an educational community, RIT strives for a campus environment that is free from coercive or exploitative behavior by its members. Moreover, it sets high standards that challenge students to develop values that enhance their lives professionally and will enable them to contribute constructivelyt to society.

RIT enjoys a diversity of backgrounds, lifestyles, and personal value systems among those who compose the academic community. Students, however, are expected to observe and respect the policies and standards of the university and the right of individuals to hold values that differ from their own and those expressed by RIT. Students are encouraged to review the Student Rights and Responsibilities Handbook for information regarding campus policies and expectations of student conduct.

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

RIT offers a number of services for graduate students. Those described in the following pages are among the most frequently used.

RIT honor code

Integrity and strong moral character are valued and expected within and outside of the RIT community. Members of the campus community, including students, trustees, faculty, staff, and administrators, have adopted an honor code to:

- demonstrate civility, respect, decency, and sensitivity toward our fellow RIT community members, recognizing that all

individuals at this university are part of the larger RIT family and as such are entitled to support and respect.

- conduct ourselves with the highest standards of moral and ethical behavior. Such behavior includes taking responsibility for our own personal choices, decisions, and academic and professional work.
- affirm through the daily demonstration of these ideals that RIT is a university devoted to the pursuit of knowledge and a free exchange of ideas in an open and respectful climate.

Computer security and safeguards

RIT's Code of Conduct for Computer and Network Use guides campus-wide use of all computers and networks. This document, found online at www.rit.edu/computerconduct, outlines RIT's official policy related to ethical use of computing and network resources. ITS put into place multiple safeguards to protect RIT's network environment and the integrity of individual user accounts. Additionally, ITS provides all students, faculty, and staff with antivirus software free of charge.

Health Policies

Health/Medical records

Medical records are confidential. Information will not be released without the written consent of the student. Exceptions to this rule are made only when required by the public health laws of New York state or a court-ordered subpoena or in a life-threatening situation.

New York state and RIT immunization requirements

New York state public law requires that all students enrolled for more than six credit hours in a term and born after January 1, 1957, must provide proof of having received the appropriate immunizations against measles, mumps, and rubella, and to sign a meningitis awareness form. The law applies to all full time and part time students including RIT employees. Immunization requirements include:

- Two MMR vaccinations at least one month apart and after the first birthday;
- A Meningitis Awareness Form, signed by all students regardless of age; and
- Immunization against meningitis, which is required by RIT for all students age 21 and under.

Failure to comply with the New York State immunization law may result in exclusion from classes and the campus, and a $200 fine.

NOTE: An email notification is sent to students' RIT email account with directions to complete the necessary health information through the Student Health Center portal. Please note that the immunization form is to be completed by the student online and then downloaded and taken to the student's health provider or school official for verification. The form must then be forwarded to the Student Health Center for approval (fax: 585-475-7530).

Consumer Information

Student retention

RIT's graduation rate for freshmen seeking bachelor's degrees is 66 percent. Additionally, 88 percent of first-time, full-time freshmen register for their second year (source: IPEDS 2010 Enrollment and Graduation Rate Surveys).

Public Safety

The Public Safety Department is open 24-hours-a-day and is located in Grace Watson Hall. The department encourages the RIT community to take responsibility for their safety by staying informed of these services and reporting suspicious activity. Although each individual is ultimately responsible for their own personal safety, learning and practicing basic safety precautions can enhance one's well being. The department provides the following services:

Blue light call boxes—Identified by a blue light and located across campus these call boxes provide a direct line to Public Safety 24-hours-a-day. The location of the call is automatically recorded at the Public Safety Communications Center, making it possible for hard-of-hearing individuals to also use the call boxes. The call boxes may be used to request an escort, assist a motorist, report suspicious individuals or activity, or request access to a locked building or room.

Mobile escort service—Available to anyone, seven-days-a-week, on a timed schedule between 11 p.m. and 3 a.m.

Lost and found—All items lost and found on campus are stored by the Public Safety Department. To report an item lost, please visit rit.edu/publicsafety/safety/lostitems.html to submit information related to lost property (requires RIT computer account).

Emergency notification—If a family member needs to make an emergency notification to a student, he or she should contact Public Safety at (585) 475-2853 or TEXT at (585) 205-8333. Public safety will locate the student and relay the message.

Awareness programs—Public safety hosts a variety of prevention awareness programs and services on various topics including crime prevention, personal safety, and alcohol awareness. A monthly newsletter, RIT Ready, is distributed to students, faculty, and staff to bolster emergency preparedness on campus.

Annual Safety and Security Report—Public safety's security report is available online and offers a description of security practices and information on reported occurrences of crime. Access the report at rit.edu/ZnhGf.

Confidential tip line—This service is to obtain information that is unattainable through conventional methods and to alert public safety to endangering behavior that might go otherwise unreported. Individuals who utilize the tip line are encouraged to leave their names and contact information; however, they will not be contacted. An online form is available at rit.edu/publicsafety/forms/tipline (requires RIT computer account).

Crime statistics—The Advisory Committee on Public Safety will provide, upon request, all campus crime statistics as reported to the Department of Education. RIT crime statistics can be found at the Department of Education website (ope.ed.gov/security) or by contacting the Public Safety Department. A hard copy of reported crime statistics required to be ascertained under Title 20 of the U.S. Code Section 1092(f) will be mailed to the interested party within 10 days of the request.

Sexual assault information and CARES—Confidential counseling services are available to anyone in need by calling (585) 546-2777 (voice/TTY). RIT's Campus Advocacy Response and Support (CARES) is located on campus and provides confidential and crisis intervention and support services for relationship concerns. Contact (585) 295-3533 at any time for assistance.

Emergency Preparedness—RIT regularly communicates, prepares, and practices emergency management with public safety personnel and campus managers from various departments. If necessary, we will provide updated information through broadcast email, mass notification system (RIT ALERT), voicemail, ALERTUS beacons, and the university's website at rit.edu.

Outcomes Rate

In compliance with the federal Student-Right-to-Know and Campus Security Act, and regulations of the U.S. Department of Education, RIT provides the following information to current and prospective students:

- Of the cohort of full-time degree-seeking undergraduate students who first enrolled at RIT in fall 2009, 70.0 percent had earned their bachelor's degrees as of August 2015. While these beginning and end dates meet the act's requirements for determining a graduation rate (150 percent of the normal length of full-time study [4 years]), it is important to recognize that nearly two-thirds of entering freshmen enroll in programs with mandatory cooperative education requirements. These requirements range from three to 14 months depending upon the academic program, thus extending the reported program length to five years.

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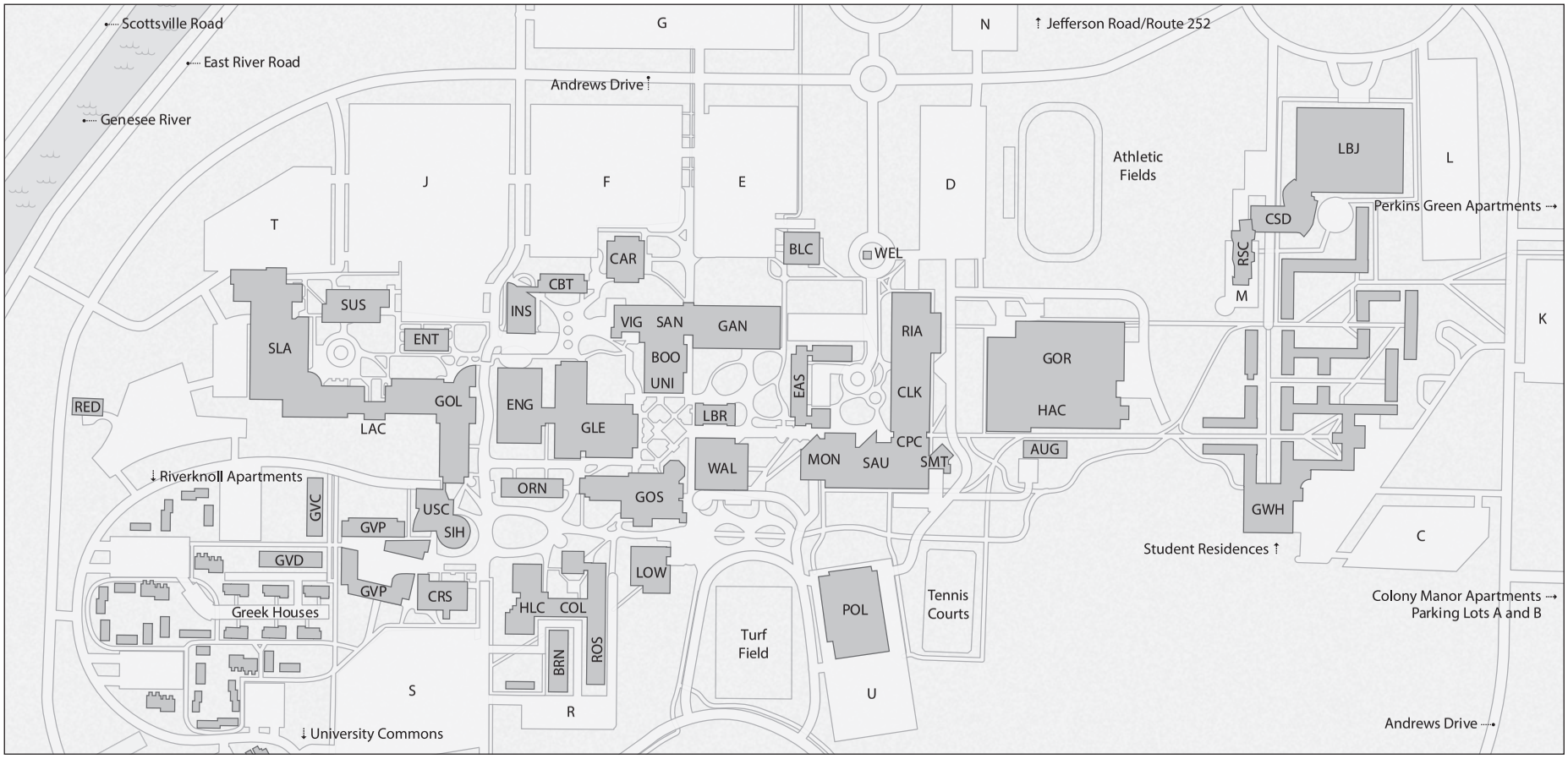

RIT CAMPUS MAP

AUG	August Center
BLC	Bausch & Lomb Center
BOO	James E. Booth Hall
BRN	Brown Hall
CAR	Chester F. Carlson Center for Imaging Science
CBT	Center for Bioscience Education & Technology
CLK	George H. Clark Gymnasium
COL	Color Science Hall
CPC	Campus Center
CRS	Crossroads
CSD	CSD Student Development Center
EAS	George Eastman Hall
ENG	Engineering Hall
ENT	Engineering Technology Hall
GAN	Frank E. Gannett Hall
GLE	James E. Gleason Hall
GOL	Golisano Hall
GOR	Gordon Field House and Activities Center
GOS	Thomas Gosnell Hall
GVC	Global Village Way C
GVD	Global Village Way D
GVP	Global Village Plaza
GWH	Grace Watson Hall
HAC	Hale-Andrews Student Life Center
HLC	Hugh L. Carey Hall
INS	Institute Hall
LAC	Laboratory for Applied Computing
LBJ	Lyndon Baines Johnson Hall
LBR	Liberal Arts Hall
LOW	Max Lowenthal Hall
MON	Monroe Hall
ORN	Orange Hall
POL	Gene Polisseni Arena
RED	Red Barn
RIA	Frank Ritter Ice Arena
ROS	Lewis P. Ross Hall
RSC	Rosica Hall
SAN	Sands Family Studios
SAU	Student Alumni Union
SIH	Student Innovation Hall
SLA	Louise Slaughter Hall
SMT	Schmitt Interfaith Center
SUS	Golisano Institute for Sustainability
UNI	University Gallery
USC	University Services Center
VIG	Vignelli Center for Design Studies
WAL	Wallace Library
WEL	Welcome Center

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