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2021

### 2021-2022 Graduate Bulletin

Rochester Institute of Technology

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# RIT

Preparing you for an  
**outstanding  
educational  
experience**



**Graduate Bulletin  
2021-2022**

# Rochester Institute of Technology 2021–22 Academic Calendar

† The Add/Drop period is the first seven class days of the fall, spring, and full summer terms, excluding Sundays and holidays.

\* Tentative spring semester and summer term schedule. RIT reserves the right to update the spring and summer schedule.

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## Fall Semester (2211)

### August 23

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

### August 28

Saturday classes begin

### August 30

Last day of Add/Drop period †

### August 31

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

### September 6

Labor Day—No Classes

### October 11-12

Fall Break—No Classes

### November 5

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

### November 24

No Classes  
University closes at 2pm

### November 25-26

Thanksgiving Holiday  
University closed

### December 6

Last day, evening, and online classes

### December 7

Reading Day

### Dec. 8, 9, 10, 13, 14, 15

Final exams

### December 17

Final grades due

December 16–January 9

Break between fall and spring semesters

## Spring Semester (2215)

### January 10, 2022

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

### January 15

Saturday classes begin

### January 17

Martin Luther King Jr. Day (no classes)

### January 18

Last day of Add/Drop period †

### March 6 - 13

Spring Break (no classes)

### April 1

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

### April 25

Last day, evening, and online classes

### April 26

Reading Day

### April 27, 28, 29, May 2, 3, 4

Final exams

### May 6

Final grades due  
Convocation and Commencement Ceremonies

### May 7

Commencement Ceremonies

### May 9 - 11

Break between spring semester and summer term

## 12-week Summer Term (2218)

### May 12

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

### May 14

Saturday classes begin

### May 19

Last day to Add/Drop classes †

### May 20

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

### May 30

Memorial Day (no classes)  
University closed

### July 4

Independence Day observed  
University closed

### July 20

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

### August 3

Last day, evening, and online classes

### August 4

Reading Day

### August 5, 8, 9

Final exams

### August 11

Final grades due

### August 12 - 21

Break between summer term and fall semester

## Short Session I Summer Term (2218)

### May 12

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

### May 14

Saturday classes begin

### May 16

Last day to Add/Drop classes †

### May 17

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

### May 30

Memorial Day (no classes)  
University closed

### June 15

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

### June 22

Last day of classes

### June 23, 24

Final exams

### June 27

Final grades due

## Short Session II Summer Term (2218)

### June 27

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

### June 29

Last day to Add/Drop classes †

### June 30

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

### July 4

Independence Day observed (no classes)  
University closed

### July 27

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

### August 3

Last day, evening, and online classes

### August 4

Reading Day

### August 5, 8, 9

Final exams

### August 11

Final grades due

# 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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## Table of Content

|   |                   |
|---|-------------------|
| University Calendar . . . . .   | inside cover      |
| Graduate Education at RIT . . . . .                                     | 2                 |
| Graduate Programs of Study (HEGIS chart) . . . . .                      | 4                 |
| Doctoral Study at RIT . . . . .   | 6                 |
| College of <i>Art and Design</i> . . . . .                              | 8                 |
| Saunders College of <i>Business</i> . . . . .                           | 27                |
| Golisano College of <i>Computing and Information Sciences</i> . . . . . | 51                |
| Kate Gleason College of <i>Engineering</i> . . . . .                    | 71                |
| College of <i>Engineering Technology</i> . . . . .                      | 102               |
| College of <i>Health Sciences and Technology</i> . . . . .              | 115               |
| School of <i>Individualized Study</i> . . . . .                         | 123               |
| College of <i>Liberal Arts</i> . . . . .                                | 127               |
| <i>National Technical Institute for the Deaf</i> . . . . .              | 138               |
| College of <i>Science</i> . . . . .                                     | 143               |
| Golisano Institute for <i>Sustainability</i> . . . . .                  | 181               |
| RIT Online . . . . .  | 188               |
| Graduate Admission . . . . .  | 189               |
| Costs and Payment Procedures . . . . .                                  | 190               |
| Financial Aid . . . . .   | 192               |
| University Policies and Procedures . . . . .                            | 194               |
| Consumer Information . . . . .  | 199               |
| Administration and Trustees . . . . .                                   | 200               |
| Campus Map . . . . .  | inside back cover |

# Graduate Education at RIT

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

**College of Art and Design**

**Saunders College of Business**

**Golisano College of Computing and Information Sciences**

**Kate Gleason College of Engineering**

**College of Engineering Technology**

**College of Health Sciences and Technology**

**College of Liberal Arts**

**National Technical Institute for the Deaf**

**College of Science**

**Golisano Institute For Sustainability**

**School of Individualized Study**

For additional information, contact us at:

**Rochester Institute of Technology**

**Office of Graduate Enrollment Services**

**58 Lomb Memorial Drive**

**Rochester, NY 14623-5604**

**(585) 475-2229**

**gradinfo@rit.edu | rit.edu/grad**

## A Message from Twyla J. Cummings

### Associate Provost and Dean, RIT Graduate School

The core mission of the RIT Graduate School is to enable graduate students to succeed in their programs of study, research, and creative endeavors. The Graduate School operates collegially through partnerships with all units on campus involved in graduate education in support of graduate students. The colleges continue to administer their own degree programs, but the Graduate School brings a university-wide perspective to graduate education and promotes interdisciplinary endeavors. It strengthens the intellectual community of graduate students and faculty. The Graduate School partners with the colleges to maintain the highest quality of graduate education at RIT.

The graduate learning experience at RIT is focused and intensive. Our 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 global marketplace. Research topics often relate directly to situational concerns, rather than theoretical discourse. Many programs require a dissertation, thesis, or project, and encourage other avenues for professional experience, such as cooperative education and internships in government and industry. Graduate student may

also assist in undergraduate education, as teaching, research, or laboratory assistants.

Whether a dissertation, thesis, project, or professional portfolio is required of them, our students are encouraged to incorporate both independent study and experiential learning into their programs.

## A philosophy supported by campus resources

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

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.

## History of Graduate Education

Over the past six decades, graduate education at RIT has grown from a few niche programs to more than 100 professional and research-oriented degrees and advanced certificates constituting a diverse and unique, scholarly portfolio in the visual arts, humanities, business, and science, technology, engineering and mathematics (STEM) disciplines. RIT's strong tradition of undergraduate education has laid the groundwork for the university's graduate education programming, resulting in skilled, innovative and highly desired professionals. Today, RIT has approximately 3,000 graduate students and offers MS, MBA, MFA, MST, MSE, M.Arch., and Ph.D. degrees. All graduates from these disciplines continue to push the frontiers of research, entrepreneurship and innovation. All of RIT's colleges and degree granting units 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 offers eleven doctoral programs in the fields of astrophysical sciences and technology, color science, computing and information sciences, engineering, imaging science, mathematical modeling, microsystems engineering, electrical and computer engineering, sustainability, biomedical and chemical engineering, and mechanical and industrial engineering.

## A Philosophy Supported by Campus Resources

RIT's international reputation as an applied technological university with a unique connection to the arts and humanities gives graduate students the advantage of working with sophisticated technology and in laboratories found on and off campus. For example, students in microelectronic engineering have access to



clean-room facilities that meet industry standards. Students majoring in visual communication design access digital media using a variety of systems and software, including Macintosh, IBM, Silicon Graphics, and Media 100 digital video editing. Our telecommunications technology workstations have been donated by an industry eager to hire students experienced with equipment used in their own laboratories.

Technology has also brought together students in design, crafts, photography, and print and multimedia. In RIT's Electronic Still Photography Laboratory, these disciplines have merged through electronics. Regardless of the program, RIT encourages and promotes technological innovation in all areas.

### Specialized and Diverse Programs

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

Graduate students across campus engage in exciting research and stimulating dialogue with faculty and distinguished visitors such as George Bush, Bill Clinton, Joe Torre, Jesse Jackson, Annie Leibovitz, Jerry Uelsmann, Cornel West, and Greg Heisler.

The university continues to receive international recognition for the quality of its graduate programs. In a recent ranking of national graduate programs, U.S. News & World Report named the MFA in photography tied for 6th place in graduate studies. The industrial design MFA ranked 8th and the MFA in multimedia/visual communications ranked 12th.

### Convenient, 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 or online 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.

### 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, and 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](mailto:research@rit.edu), or on their website at [rit.edu/research](http://rit.edu/research).

### Accreditation

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

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

and

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

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

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

### Twyla J. Cummings

*Associate Provost and Dean, RIT Graduate School*

| Graduate Programs of Study                            |   | Degree and HEGIS Code |         |      |      |      |         |      |         |        |
|---|---|-----------------------|---------|------|------|------|---------|------|---------|--------|
|   |   | Adv. Cert             | Ph.D.   | MBA  | ME   | MFA  | MS      | MST  | M. Arch | Page # |
| Art, Design, and Architecture                         |   |                       |         |      |      |      |         |      |         |        |
| Architecture  | Institute for Sustainability              |                       |         |      |      |      |         |      | 0202    |        |
| Ceramics  | Art and Design                            |                       |         |      |      | 1009 |         |      |         |        |
| Fine Arts Studio                                      | Art and Design                            |                       |         |      |      | 1002 |         |      |         |        |
| Furniture Design                                      | Art and Design                            |                       |         |      |      | 1009 |         |      |         |        |
| Glass   | Art and Design                            |                       |         |      |      | 1009 |         |      |         |        |
| Industrial Design                                     | Art and Design                            |                       |         |      |      | 1009 |         |      |         |        |
| Integrative Design                                    | Art and Design                            |                       |         |      |      |      | 1009    |      |         |        |
| Media Arts and Technology                             | Art and Design                            |                       |         |      |      |      | 0605    |      |         |        |
| Medical Illustration                                  | Health Sciences and Technology            |                       |         |      |      | 1299 |         |      |         |        |
| Metals and Jewelry Design                             | Art and Design                            |                       |         |      |      | 1009 |         |      |         |        |
| Non-toxic Printmaking                                 | Art and Design                            | 1009                  |         |      |      |      |         |      |         |        |
| Visual Arts–All Grades (Art Education)                | Art and Design                            |                       |         |      |      |      |         | 0831 |         |        |
| Visual Communication Design                           | Art and Design                            |                       |         |      |      | 1009 |         |      |         |        |
| Business, Management, and Leadership                  |   |                       |         |      |      |      |         |      |         |        |
| Accounting and Analytics                              | Business                                  |                       |         |      |      |      | 0502.00 |      |         |        |
| Accounting and Financial Analytics‡                   | Business                                  | 0703.00               |         |      |      |      |         |      |         |        |
| Business Administration                               | Business                                  |                       |         | 0506 |      |      |         |      |         |        |
| Business Administration–Accounting                    | Business                                  |                       |         | 0502 |      |      |         |      |         |        |
| Business Administration–Executive                     | Business                                  |                       |         | 0506 |      |      |         |      |         |        |
| Business Administration–Online Executive‡             | Business                                  |                       |         | 0506 |      |      |         |      |         |        |
| Business Analytics‡                                   | Business                                  |                       |         |      |      |      | 0599    |      |         |        |
| Computational Finance                                 | Business                                  |                       |         |      |      |      | 0504    |      |         |        |
| Construction Management‡                              | Engineering Technology                    |                       |         |      |      |      | 0599.00 |      |         |        |
| Data Science‡   | Computing and Information Sciences        |                       |         |      |      |      | 0701.00 |      |         |        |
| Engineering Management                                | Engineering                               |                       |         |      | 0913 |      |         |      |         |        |
| Entrepreneurship and Innovative Ventures              | Business                                  |                       |         |      |      |      | 0506    |      |         |        |
| Environmental, Health and Safety Management‡          | Engineering Technology                    |                       |         |      |      |      | 0420    |      |         |        |
| Finance   | Business                                  |                       |         |      |      |      | 0504    |      |         |        |
| Global Supply Chain Management                        | Business                                  |                       |         |      |      |      | 0513.00 |      |         |        |
| Health Care Finance‡                                  | Health Sciences and Technology            | 1202                  |         |      |      |      |         |      |         |        |
| Health Systems Management‡                            | Health Sciences and Technology            |                       |         |      |      |      | 1202    |      |         |        |
| Hospitality and Tourism Management                    | Business                                  |                       |         |      |      |      | 0510.1  |      |         |        |
| Human Resource Development‡                           | Business                                  |                       |         |      |      |      | 0515    |      |         |        |
| Lean Six Sigma‡                                       | Engineering                               | 1702                  |         |      |      |      |         |      |         |        |
| Manufacturing Leadership‡                             | Engineering                               |                       |         |      |      |      | 0599    |      |         |        |
| Media Arts and Technology                             | Art and Design                            |                       |         |      |      |      | 0605    |      |         |        |
| Organizational Learning‡                              | Business                                  | 0515                  |         |      |      |      |         |      |         |        |
| Product Development‡                                  | Engineering                               |                       |         |      |      |      | 0599    |      |         |        |
| Project Management‡                                   | School of Individualized Study            | 0506                  |         |      |      |      |         |      |         |        |
| Service Leadership and Innovation‡                    | Business                                  | 0510                  |         |      |      |      | 0599    |      |         |        |
| Technology Entrepreneurship                           | Business                                  | 0506.00               |         |      |      |      |         |      |         |        |
| Technology Innovation Management and Entrepreneurship | Business                                  |                       |         |      |      |      | 0506.00 |      |         |        |
| Workplace Learning and Instruction                    | Engineering Technology                    | 0515                  |         |      |      |      |         |      |         |        |
| Communications and Digital Media                      |   |                       |         |      |      |      |         |      |         |        |
| Communication   | Liberal Arts                              |                       |         |      |      |      | 0601.00 |      |         |        |
| Communication Networks                                | Engineering Technology                    |                       |         |      |      |      | 0925.00 |      |         |        |
| Health Care Interpretation‡                           | National Technical Institute for the Deaf |                       |         |      |      |      | 1199    |      |         |        |
| Media Arts and Technology                             | Art and Design                            |                       |         |      |      |      | 0605    |      |         |        |
| Print and Graphic Media Science                       | Engineering Technology                    |                       |         |      |      |      | 0699    |      |         |        |
| Visual Communication Design                           | Art and Design                            |                       |         |      |      | 1009 |         |      |         |        |
| Computing and Information Sciences                    |   |                       |         |      |      |      |         |      |         |        |
| Artificial Intelligence in Computer Science           | Computing and Information Sciences        | 0701.00               |         |      |      |      |         |      |         |        |
| Big Data Analytics                                    | Computing and Information Sciences        | 0702                  |         |      |      |      |         |      |         |        |
| Bioinformatics  | Science                                   |                       |         |      |      |      | 0499    |      |         |        |
| Computational Finance                                 | Business                                  |                       |         |      |      |      | 0504    |      |         |        |
| Computer Engineering                                  | Engineering                               |                       |         |      |      |      | 0999    |      |         |        |
| Computer Science                                      | Computing and Information Sciences        |                       |         |      |      |      | 0701    |      |         |        |
| Computing and Information Sciences                    | Computing and Information Sciences        |                       | 1701    |      |      |      |         |      |         |        |
| Computing Security‡                                   | Computing and Information Sciences        | 0799                  |         |      |      |      | 0799    |      |         |        |
| Cybersecurity‡  | Computing and Information Sciences        |                       |         |      |      |      |         |      |         |        |
| Data Science‡   | Computing and Information Sciences        |                       |         |      |      |      | 0701.00 |      |         |        |
| Electrical and Computer Engineering                   | Engineering                               |                       | 0909.00 |      |      |      |         |      |         |        |
| Game Design and Development                           | Computing and Information Sciences        |                       |         |      |      |      | 0799    |      |         |        |
| Health Informatics‡                                   | Computing and Information Sciences        |                       |         |      |      |      | 1217.00 |      |         |        |
| Human-Computer Interaction‡                           | Computing and Information Sciences        |                       |         |      |      |      | 0799    |      |         |        |
| Imaging Science‡                                      | Science                                   |                       |         |      |      |      | 1999.20 |      |         |        |
| Imaging Science                                       | Science                                   |                       | 1999.20 |      |      |      |         |      |         |        |
| Information Technology and Analytics‡                 | Computing and Information Sciences        |                       |         |      |      |      | 0699    |      |         |        |
| Media Arts and Technology                             | Art and Design                            |                       |         |      |      |      | 0605    |      |         |        |
| Software Engineering                                  | Computing and Information Sciences        |                       |         |      |      |      | 0999    |      |         |        |
| Visual Communication Design                           | Art and Design                            |                       |         |      |      | 1009 |         |      |         |        |
| Web Development                                       | Computing and Information Sciences        | 0699                  |         |      |      |      |         |      |         |        |
| Engineering and Engineering Technology                |   |                       |         |      |      |      |         |      |         |        |
| Architecture  | Institute for Sustainability              |                       |         |      |      |      |         |      | 0202    |        |
| Biomedical and Chemical Engineering                   | Engineering                               |                       | 0905.00 |      |      |      |         |      |         |        |
| Communication Networks                                | Engineering Technology                    |                       |         |      |      |      | 0925.00 |      |         |        |
| Computer Engineering                                  | Engineering                               |                       |         |      |      |      | 0999    |      |         |        |
| Electrical and Computer Engineering                   | Engineering                               |                       | 0909.00 |      |      |      |         |      |         |        |

\* 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 # |
| Electrical Engineering  | Engineering                               |                       |         |     |      |      | 0909    |      |         |        |
| Engineering Management  | Engineering                               |                       |         |     | 0913 |      |         |      |         |        |
| Engineering   | Engineering                               |                       | 0901    |     |      |      |         |      |         |        |
| Environmental, Health and Safety Management†                    | Engineering Technology                    |                       |         |     |      |      | 0420    |      |         |        |
| Imaging Science‡  | Science                                   |                       |         |     |      |      | 1999.20 |      |         |        |
| Imaging Science   | Science                                   |                       | 1999.20 |     |      |      |         |      |         |        |
| Industrial and Systems Engineering                              | Engineering                               |                       |         |     |      |      | 0913    |      |         |        |
| Lean Six Sigma‡   | Engineering                               |                       |         |     |      |      |         |      |         |        |
| Manufacturing and Mechanical Systems Integration                | Engineering Technology                    |                       |         |     |      |      | 0913    |      |         |        |
| Manufacturing Leadership‡                                       | Engineering                               |                       |         |     |      |      | 0599    |      |         |        |
| Materials Science and Engineering                               | Science                                   | 0915                  |         |     |      |      | 0915    |      |         |        |
| Mechanical and Industrial Engineering                           | Engineering                               |                       | 0910.00 |     |      |      |         |      |         |        |
| Mechanical Engineering  | Engineering                               |                       |         |     | 0910 |      | 0910    |      |         |        |
| Microelectronic Engineering                                     | Engineering                               |                       |         |     |      |      | 0999    |      |         |        |
| Microsystems Engineering  | Engineering                               |                       | 0999    |     |      |      |         |      |         |        |
| Packaging Science   | Engineering Technology                    |                       |         |     |      |      | 4999    |      |         |        |
| Product Development‡  | Engineering                               |                       |         |     |      |      | 0599    |      |         |        |
| Software Engineering  | Computing and Information Sciences        |                       |         |     |      |      | 0999    |      |         |        |
| Sustainable Engineering   | Engineering                               |                       |         |     |      |      | 0999    |      |         |        |
| Sustainable Systems   | Institute for Sustainability              |                       |         |     |      |      | 4904    |      |         |        |
| Vibrations  | Engineering                               | 0910                  |         |     |      |      |         |      |         |        |
| Environmental Studies and Sustainability                        |   |                       |         |     |      |      |         |      |         |        |
| Architecture  | Institute for Sustainability              |                       |         |     |      |      |         |      | 0202    |        |
| Environmental Science   | Science                                   |                       |         |     |      |      | 0420    |      |         |        |
| Environmental, Health and Safety Management‡                    | Engineering Technology                    |                       |         |     |      |      | 0420    |      |         |        |
| Packaging Science   | Engineering Technology                    |                       |         |     |      |      | 4999    |      |         |        |
| Sustainability  | Institute for Sustainability              |                       | 4904    |     |      |      |         |      |         |        |
| Sustainable Engineering   | Engineering                               |                       |         |     |      |      | 0999    |      |         |        |
| Sustainable Systems   | Institute for Sustainability              |                       |         |     |      |      | 4904    |      |         |        |
| Game Design and Development                                     |   |                       |         |     |      |      |         |      |         |        |
| Game Design and Development                                     | Computing and Information Sciences        |                       |         |     |      |      | 0799    |      |         |        |
| Health Professions and Medical Sciences                         |   |                       |         |     |      |      |         |      |         |        |
| Bioinformatics  | Science                                   |                       |         |     |      |      | 0499    |      |         |        |
| Health and Well-being Management                                | Health Sciences and Technology            |                       |         |     |      |      | 1299.00 |      |         |        |
| Health Care Finance‡  | Health Sciences and Technology            |                       |         |     |      |      |         |      |         |        |
| Health Care Interpretation‡                                     | National Technical Institute for the Deaf |                       |         |     |      |      | 1199    |      |         |        |
| Health Informatics‡   | Computing and Information Sciences        |                       |         |     |      |      | 1217.00 |      |         |        |
| Health Systems Management‡                                      | Health Sciences and Technology            |                       |         |     |      |      | 1202    |      |         |        |
| Medical Illustration  | Health Sciences and Technology            |                       |         |     |      | 1299 |         |      |         |        |
| Humanities, Social Sciences, and Education                      |   |                       |         |     |      |      |         |      |         |        |
| Criminal Justice  | Liberal Arts                              |                       |         |     |      |      | 2209    |      |         |        |
| Engineering Psychology  | Liberal Arts                              |                       |         |     |      |      |         |      |         |        |
| Environmental Science   | Science                                   |                       |         |     |      |      | 0420    |      |         |        |
| Environmental, Health and Safety Management‡                    | Engineering Technology                    |                       |         |     |      |      | 0420    |      |         |        |
| Experimental Psychology   | Liberal Arts                              | 2099                  |         |     |      |      | 2099    |      |         |        |
| Health Care Interpretation‡                                     | National Technical Institute for the Deaf |                       |         |     |      |      | 1199    |      |         |        |
| Human Resource Development‡                                     | Business                                  |                       |         |     |      |      | 0515    |      |         |        |
| Professional Studies‡   | School of Individualized Study            |                       |         |     |      |      | 4999    |      |         |        |
| School Psychology   | Liberal Arts                              | 0826                  |         |     |      |      | 0826    |      |         |        |
| Science, Technology and Public Policy                           | Liberal Arts                              |                       |         |     |      |      | 2102    |      |         |        |
| Secondary Education of Students Who Are Deaf or Hard of Hearing | National Technical Institute for the Deaf |                       |         |     |      |      | 0803    |      |         |        |
| Visual Arts—All Grades (Art Education)                          | Art and Design                            |                       |         |     |      |      |         | 0831 |         |        |
| Photography, Film, and Animation                                |   |                       |         |     |      |      |         |      |         |        |
| Film and Animation  | Art and Design                            |                       |         |     |      | 1010 |         |      |         |        |
| Media Arts and Technology                                       | Art and Design                            |                       |         |     |      |      | 0605    |      |         |        |
| Photography and Related Media                                   | Art and Design                            |                       |         |     |      | 1011 |         |      |         |        |
| Science and Math  |   |                       |         |     |      |      |         |      |         |        |
| Applied and Computational Mathematics                           | Science                                   |                       |         |     |      |      | 1799    |      |         |        |
| Applied Statistics‡   | Science                                   | 1702                  |         |     |      |      | 1702    |      |         |        |
| Astrophysical Sciences and Technology                           | Science                                   |                       | 1912    |     |      |      | 1912    |      |         |        |
| Bioinformatics  | Science                                   |                       |         |     |      |      | 0499    |      |         |        |
| Chemistry   | Science                                   |                       |         |     |      |      | 1905    |      |         |        |
| Color Science   | Science                                   |                       | 1999.20 |     |      |      | 1999.20 |      |         |        |
| Computational Finance   | Business                                  |                       |         |     |      |      | 0504    |      |         |        |
| Data Science‡   | Computing and Information Sciences        |                       |         |     |      |      | 0701.00 |      |         |        |
| Environmental Science   | Science                                   |                       |         |     |      |      | 0420    |      |         |        |
| Environmental, Health and Safety Management‡                    | Engineering Technology                    |                       |         |     |      |      | 0420    |      |         |        |
| Finance   | Business                                  |                       |         |     |      |      | 0504    |      |         |        |
| Imaging Science‡  | Science                                   |                       |         |     |      |      | 1999.20 |      |         |        |
| Imaging Science   | Science                                   |                       | 1999.20 |     |      |      |         |      |         |        |
| Materials Science and Engineering                               | Science                                   |                       |         |     |      |      | 0915    |      |         |        |
| Mathematical Modeling   | Science                                   |                       | 1799    |     |      |      |         |      |         |        |
| Packaging Science   | Engineering Technology                    |                       |         |     |      |      | 4999    |      |         |        |
| Physics   | Science                                   |                       |         |     |      |      | 1902.00 |      |         |        |
| Sustainability  | Institute for Sustainability              |                       | 4904    |     |      |      |         |      |         |        |
| Sustainable Systems   | Institute for Sustainability              |                       |         |     |      |      | 4904    |      |         |        |
| Undeclared and Individualized Study                             |   |                       |         |     |      |      |         |      |         |        |
| Professional Studies‡   | School of Individualized Studv            |                       |         |     |      |      | 4999    |      |         |        |

\* 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, mathematics, and sustainability. Our long history of providing education focused on emerging technologies has led to the development of doctorate level programs that draw upon our expertise and experience in these dynamic disciplines of study.

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

## Doctoral programs of study

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

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

*Biomedical and chemical engineering:* The biomedical and chemical engineering Ph.D. program provides you with the knowledge, training, and expertise to tackle important problems in industry, academia, government, and health care. You will graduate as a highly skilled researcher well positioned to be a leader in the next generation of engineers who will tackle the challenging and complex problem facing our society.

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

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

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

*Electrical and computer engineering:* The 21st century has witnessed such advances as the Smart Grid, ubiquitous fast internet access through wireless networks, artificial intelligence and machine learning technologies that rival humans in performance, the Internet-of-Things, cloud computing, fiber-optic networks capable of transmitting trillions of bits per second, new computing paradigms such as quantum or neuromorphic computing, and many more. None of these advances would have happened without the dedication of researchers in electrical and computer engineering. Students in the Ph.D. in electrical and computer engineering are explorers of the information age who transform the world by leading trailblazing research that expands and create knowledge.

*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 sta-

tistical foundations of imaging science that are necessary to create, optimize, and apply imaging systems.

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

*Mechanical and industrial engineering:* The mechanical and industrial engineering doctorate program produces graduates with a depth of knowledge in mechanical or industrial engineering, while allowing students to engage in cutting-edge, cross-disciplinary research. The flexible curriculum encourages students to gain domain-specific knowledge from courses offered throughout the college's portfolio of engineering programs. The curriculum, coupled with depth of knowledge in mechanical or industrial engineering disciplines, creates graduates who are ready to tackle the world's most pressing societal and industrial challenges. The program develops world-class researchers who can capitalize on the most promising discoveries and innovations to develop interdisciplinary solutions for real-world challenges.

*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. Learn more about RIT's key research centers and institutes online at [rit.edu/research/centers-and-institutes](http://rit.edu/research/centers-and-institutes).

# College of Art and Design

**Todd Jokl, Dean**

[rit.edu/artdesign](http://rit.edu/artdesign)

## Programs of Study

|   |    |
|---|----|
| Ceramics, MFA                               | 9  |
| Film and Animation, MFA                     | 19 |
| Fine Arts Studio, MFA                       | 13 |
| Furniture Design, MFA                       | 10 |
| Glass, MFA                                  | 11 |
| Industrial Design, MFA                      | 16 |
| Integrative Design, MS                      | 17 |
| Media Arts and Technology, MS               | 21 |
| Metals and Jewelry Design, MFA              | 12 |
| Non-toxic Printmaking, Adv. Cert.           | 14 |
| Photography and Related Media, MFA          | 22 |
| Visual Arts–All Grades (Art Education), MST | 15 |
| Visual Communication Design, MFA            | 17 |

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

Please visit the college's website—[www.rit.edu/artdesign](http://www.rit.edu/artdesign)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

## Admission requirements

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

Faculty review each student's portfolio to evaluate creative visual skills as well as the potential for success in the student's selected program.

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

For the most up-to-date information on portfolio requirements, including requirements by program and submission information, please visit <https://www.rit.edu/artdesign/portfolio-requirements>.

## 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.

## School for American Crafts

### Ceramics, MFA

[www.rit.edu/study/ceramics-mfa](http://www.rit.edu/study/ceramics-mfa)

**Jane Shellenbarger, Associate Professor**

**585-475-7785, [jmssac@rit.edu](mailto:jmssac@rit.edu)**

#### Program overview

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

#### What is Ceramics?

Ceramics is an artistic craft in which objects from earthenware, stoneware, and porcelain (including pottery, vases, bowls, sculptures, tiles, and more) are created and shaped using a mixture of clay, silica, feldspar and other materials. Once an object has been created, it is fired in a kiln, or a high temperature oven. Afterwards, many ceramic objects are then decorated with paints, glazes, and other finishing materials.

#### MFA in Ceramics

RIT's MFA in ceramics focuses on 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.

#### Studio Residency Program

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

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

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

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

## Curriculum

### Ceramics, MFA degree, typical course sequence

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

#### Professional Electives

| COURSE    |  |
|-----------|--|
| ARTH-600+ | Any ARTH-600 level course or above                             |
| IDEA-705  | Thinking About Making: The Practice of Art in a Global Society |
| STAR-635  | Curating and Managing Art Spaces                               |
| STAR-645  | Art Exhibition Critique  |
| STAR-758  | Studio Art Critique  |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in a field of arts, sciences, or education.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Furniture Design, MFA

[www.rit.edu/study/furniture-design-mfa](http://www.rit.edu/study/furniture-design-mfa)

**Andy Buck, Professor**

**585-475-2636, [aabsac@rit.edu](mailto:aabsac@rit.edu)**

### Program overview

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

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

### Studio Residency Program

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

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

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

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

## Curriculum

### Furniture Design, MFA degree, typical course sequence

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

### Professional Electives

| COURSE    |  |
|-----------|--|
| ARTH-600+ | Any ARTH-600 level course or above                             |
| IDEA-705  | Thinking About Making: The Practice of Art in a Global Society |
| STAR-635  | Curating and Managing Art Spaces                               |
| STAR-645  | Art Exhibition Critique  |
| STAR-758  | Studio Art Critique  |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in a field of arts, sciences, or education.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Glass, MFA

[www.rit.edu/study/glass-mfa](http://www.rit.edu/study/glass-mfa)

**David Schnuckel, Assistant Professor**  
585-475-2650, [dassac@rit.edu](mailto:dassac@rit.edu)

**Suzanne Peck, Lecturer**  
[smpfaa@rit.edu](mailto:smpfaa@rit.edu)

### Program overview

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

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

### Studio Residency Program

The MFA program is seeking candidates interested in pursuing glass-related research while contributing to the creative community of the glass program and the College of Art and Design. Learn more about the Glass Studio Residency Program, including details on how to apply.

## Curriculum

### Glass, MFA degree, typical course sequence

| COURSE                             |                                       | SEMESTER CREDIT HOURS |
|------------------------------------|---------------------------------------|-----------------------|
| <b>First Year</b>                  |                                       |                       |
| CGLS-601                           | Glass Graduate Studio: Concepts       | 6                     |
| CGLS-602                           | Glass Graduate Studio: Practice       | 6                     |
| STAR-701                           | Technology in the Studio              | 3                     |
| STAR-702                           | Studio Art Research                   | 3                     |
| STAR-714                           | Ideation and Series                   | 3                     |
|                                    | Open Electives                        | 6                     |
|                                    | Professional Elective                 | 3                     |
| <b>Second Year</b>                 |                                       |                       |
| CGLS-601                           | Glass Graduate Studio: Concepts       | 6                     |
| CGLS-602                           | Glass Graduate Studio: Practice       | 6                     |
| STAR-706                           | Business Practices for Studio Artists | 3                     |
| STAR-718                           | Research Methods and Publication      | 3                     |
| STAR-790                           | Research and Thesis                   | 3                     |
| STAR-890                           | Thesis                                | 6                     |
|                                    | Open Elective                         | 3                     |
| <b>Total Semester Credit Hours</b> |                                       | <b>60</b>             |

### Professional Electives

| COURSE    |  |
|-----------|--|
| ARTH-600+ | Any ARTH 600 level course or above                             |
| IDEA-705  | Thinking About Making: The Practice of Art in a Global Society |
| STAR-635  | Curating and Managing Art Spaces                               |
| STAR-645  | Art Exhibition Critique  |
| STAR-758  | Studio Art Critique  |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in a field of arts, sciences, or education.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.



Metals and Jewelry Design, MFA

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

Program overview

The MFA in metals and jewelry design is a professional degree for practicing artists, craftspeople, or designers who desire to leave a lasting impression on their fields through a devotion to their work and the high standards of discipline and artistic ideals. By immersing yourself in soldering, fabrication, stone setting, silversmithing, forging, and casting, this metalsmithing and jewelry design degree will develop your knowledge and deepen your experience working with different theories and materials while you are challenged to think unconventionally in order to redefine industry standards.

The MFA in metals and jewelry design is generally a two-year, full-time program that involves the presentation of a thesis, which includes written documentation and a formal exhibition of a body of work. The program provides students with broad exposure to metal working techniques, expands knowledge of applied design, strengthens perceptual and philosophical concepts, and develops an individual mode of expression. This sequence leads to a master's thesis, inaugurated by the student and overseen by the faculty. The program is structured on the basis of individual needs, interests, and background preparation, as may be determined through faculty counseling.

Studio Residency Program

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

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

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

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

Curriculum

Metals and Jewelry Design, MFA degree, typical course sequence

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

Professional Electives

| COURSE    |  |
|-----------|--|
| ARTH-600+ | Any ARTH-600 level course or above                             |
| IDEA-705  | Thinking About Making: The Practice of Art in a Global Society |
| STAR-635  | Curating and Managing Art Spaces                               |
| STAR-645  | Art Exhibition Critique  |
| STAR-758  | Studio Art Critique  |

Admission requirements

- To be considered for the MFA program in metals and jewelry design, candidates must fulfill the following requirements:
- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
  - Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
  - Hold a baccalaureate degree (or US equivalent) from an accredited university or college in a field of arts, sciences, or education.
  - Recommended minimum cumulative GPA of 3.0 (or equivalent).
  - Submit a current resume or curriculum vitae.
  - Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
  - Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
  - Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.

- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## School of Art

### Fine Arts Studio, MFA

[www.rit.edu/study/fine-arts-studio-mfa](http://www.rit.edu/study/fine-arts-studio-mfa)

**Denton Crawford, Senior Lecturer**

**585-475-6253, [denton@rit.edu](mailto:denton@rit.edu)**

### Program overview

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

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

### Curriculum

#### Fine Arts Studio, MFA degree, typical course sequence

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

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

#### Professional Electives

| COURSE    |  |
|-----------|--|
| ARTH-600+ | Any ARTH 600 level course or above                             |
| IDEA-705  | Thinking About Making: The Practice of Art in a Global Society |
| STAR-635  | Curating and Managing Art Spaces                               |
| STAR-645  | Art Exhibition Critique  |
| STAR-758  | Studio Art Critique  |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college of fine arts.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Non-toxic Printmaking, Adv. Cert.

www.rit.edu/study/non-toxic-printmaking-adv-cert  
Elizabeth Kronfield, Professor  
585-475-5762, edkfaa@rit.edu

for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Program overview

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

What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

Curriculum

Non-toxic Printmaking, advanced certificate, typical course sequence

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

Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a BFA or MFA, or be recognized as a master printer or professional print maker.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Three letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements

## Visual Arts–All Grades (Art Education), MST

[www.rit.edu/study/visual-arts-all-grades-art-education-mst](http://www.rit.edu/study/visual-arts-all-grades-art-education-mst)

**Lauren Ramich, Lecturer**

**585-475-7140, [larfaa@rit.edu](mailto:larfaa@rit.edu)**

### Program overview

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

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

### Curriculum

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

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

### Accreditation

The visual arts–all grades program maintains Initial Program accreditation from the Council for the Accreditation of Educator Preparation (CAEP). The program's most recent CAEP accreditation approval was spring 2021. Reporting outcomes and student achievement data are available for review.

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.

- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college with a major concentration in art, art education, arts technology education, photography, or new media.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## School of Design

### Industrial Design, MFA

[www.rit.edu/study/industrial-design-mfa](http://www.rit.edu/study/industrial-design-mfa)

**Alex Lobos, Professor**

**585-475-7417, [alffaa@rit.edu](mailto:alffaa@rit.edu)**

#### Program overview

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

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

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

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

#### Curriculum

##### Industrial Design, MFA degree, typical course sequence

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

\* Art History Elective refers to any graduate level non-studio course searchable in SIS with the Art History attribute of ARTH.

#### Admission requirements

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

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



## Integrative Design, MS

[www.rit.edu/study/integrative-design-ms](http://www.rit.edu/study/integrative-design-ms)

### Program overview

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

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

### Curriculum

#### Integrative Design, MS degree, typical course sequence

| COURSE                                   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| INGD-721 Elements and Methods            | 3                     |
| INGD-722 Emotion and Implementation      | 3                     |
| INGD-726 Visualization I: Development    | 3                     |
| INGD-727 Visualization II: Communication | 3                     |
| INGD-731 Design Studio I: Concepts       | 3                     |
| INGD-732 Design Studio II: Capstone      | 3                     |
| Open Electives                           | 12                    |
| <b>Total Semester Credit Hours</b>       | <b>30</b>             |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Visual Communication Design, MFA

[www.rit.edu/study/visual-communication-design-mfa](http://www.rit.edu/study/visual-communication-design-mfa)

**Adam Smith, Associate Professor**  
585-475-4552, [aesfaa@rit.edu](mailto:aesfaa@rit.edu)

### Program overview

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

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

### Plan of Study

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

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

### Creative Industry Day

RIT's Office of Career Services and Cooperative Education hosts Creative Industry Day, which connects students majoring in art, design, film and animation, photography, and select computing majors with companies, organizations, creative agencies, design firms, and more. The 2021 Creative Industry Day will be a week-long virtual event where you'll be able to network with company representatives and interview directly for open co-op and permanent employment positions.

### Curriculum

#### Visual Communication Design, MFA degree, typical course sequence

| COURSE                                     | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                          |                       |
| VCDE-701 Design History Seminar            | 3                     |
| VCDE-706 3D Modeling and Motion            | 3                     |
| VCDE-707 Web and UI Design                 | 3                     |
| VCDE-708 Typography                        | 3                     |
| VCDE-709 Digital Design in Motion          | 3                     |
| VCDE-712 Design Studies Seminar            | 3                     |
| <i>Choose one of the following:</i>        | <i>3</i>              |
| VCDE-718 Project Design and Implementation |                       |
| VCEE-722 Design Praxis I                   |                       |
| Professional Electives                     | 6                     |
| Open Elective                              | 3                     |



| COURSE                             |                                       | SEMESTER CREDIT HOURS |
|------------------------------------|---------------------------------------|-----------------------|
| <b>Second Year</b>                 |                                       |                       |
| VCDE-746                           | Professional Practices                | 3                     |
| VCDE-790                           | Thesis Research and Planning          | 3                     |
| VCDE-890                           | Thesis: Implementation and Evaluation | 6                     |
|                                    | Professional Electives                | 9                     |
|                                    | Open Electives                        | 9                     |
| <b>Total Semester Credit Hours</b> |                                       | <b>60</b>             |

### Professional Electives

| COURSE   |   |
|----------|---|
| IGME-609 | Programming for Designer                      |
| VCDE-617 | Experimental Workshop                         |
| VCDE-621 | Character Design and Rigging                  |
| VCDE-622 | 3D Environment Design                         |
| VCDE-626 | Physical Interface Design                     |
| VCDE-627 | Real Time Design                              |
| VCDE-628 | 3D Particles and Dynamics                     |
| VCDE-633 | Hard Surface Modeling                         |
| VCDE-636 | 3D Motion Design                              |
| VCDE-717 | Design Systems                                |
| VCDE-723 | Interaction Design                            |
| VCDE-726 | Design Praxis II                              |
| VCDE-728 | Motion Graphics                               |
| VCDE-731 | 3D Visual Design                              |
| VCDE-732 | Branding and Identity Design                  |
| VCDE-733 | Digital Media Integration                     |
| VCDE-737 | UX Design Strategies                          |
| VCDE-741 | Experiential Graphic Design                   |
| VCDE-742 | Information Design                            |
| VCDE-799 | Visual Communication Design Independent Study |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Portfolio

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

## School of Film and Animation

### Film and Animation, MFA

[www.rit.edu/study/film-and-animation-mfa](http://www.rit.edu/study/film-and-animation-mfa)

**Kevin Bauer, Lecturer**

**585-475-5303, [kmbpph@rit.edu](mailto:kmbpph@rit.edu)**

#### Program overview

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

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

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

#### Plan of Study

The MFA in film and animation offers four options:

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

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

#### Electives

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

#### Thesis

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

#### Screenings

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

## Curriculum

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

| COURSE                              | SEMESTER CREDIT HOURS                       |
|-------------------------------------|---|
| <b>First Year</b>                   |   |
| SOFA-603                            | 2D Animation I: Fundamentals 3              |
| SOFA-605                            | Basic Sound Recording 3                     |
| SOFA-610                            | Graduate Seminar 2                          |
| SOFA-611                            | History and Aesthetics of Animation 3       |
| <i>Choose one of the following:</i> |   |
| SOFA-615                            | 3D Animation Fundamentals 3                 |
| SOFA-617                            | Stop Motion Puppet Fundamentals 3           |
| SOFA-622                            | 30 Second Film 3                            |
| SOFA-625                            | Animated Acting Principles 3                |
| SOFA-627                            | Pre-Production for Animators 3              |
| SOFA-628                            | Animation Writing and Visual Storytelling 3 |
| <i>Choose one of the following:</i> |   |
| SOFA-623                            | Stop Motion Master Class 3                  |
| SOFA-748                            | Concept and Character Design 3              |
| SOFA-730                            | Animation Film Language 2                   |
| <b>Second Year</b>                  |   |
| <i>Choose one of the following:</i> |   |
| SOFA-604                            | 2D Animation II: Mechanics 3                |
| SOFA-652                            | Alternative Frame by Frame 3                |
| SOFA-618                            | Business and Careers in Animation 3         |
| SOFA-676                            | After Effects for Animators 3               |
| SOFA-717                            | Animation Workshop 4                        |
| SOFA-780                            | Thesis Preparation Seminar 1                |
|                                     | Open Electives 6                            |
|                                     | Professional Electives 6                    |
| <b>Third Year</b>                   |   |
| SOFA-790                            | Research and Thesis I 4                     |
| SOFA-890                            | Research and Thesis II 4                    |
| <b>Total Semester Credit Hours</b>  |   |
|                                     | <b>65</b>                                   |

#### Professional Electives

| COURSE   |                                |
|----------|--------------------------------|
| SOFA-620 | 3D Modeling Mastery            |
| SOFA-638 | Complete 3D Character Creation |
| SOFA-644 | Cinematic Compositing          |
| SOFA-652 | Alternative Frame by Frame     |
| SOFA-665 | Creative Research Workshop     |
| SOFA-684 | Animation Gesture              |

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

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

Professional Electives

| COURSE   |                                |
|----------|--------------------------------|
| SOFA-620 | 3D Modeling Mastery            |
| SOFA-638 | Complete 3D Character Creation |
| SOFA-644 | Cinematic Compositing          |
| SOFA-652 | Alternative Frame by Frame     |
| SOFA-665 | Creative Research Workshop     |
| SOFA-681 | Particle Effects and Dynamics  |
| SOFA-684 | Animation Gesture              |

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

| COURSE                             | SEMESTER CREDIT HOURS               |
|------------------------------------|-------------------------------------|
| <b>First Year</b>                  |                                     |
| SOFA-602                           | Production Processes 6              |
| SOFA-605                           | Basic Sound Recording 3             |
| SOFA-606                           | Graduate Directing 3                |
| SOFA-610                           | Graduate Seminar 2                  |
| SOFA-613                           | Graduate Screenwriting 3            |
| SOFA-621                           | Spring Film 3                       |
| SOFA-626                           | Writing the Short 3                 |
| SOFA-678                           | Cinematography and Lighting I 3     |
|                                    | History and Aesthetics Elective 3   |
| <b>Second Year</b>                 |                                     |
| SOFA-614                           | Business and Careers in Film 3      |
| SOFA-721                           | Fall Film 3                         |
| SOFA-733                           | Hybrid Forms: Theory and Practice 3 |
| SOFA-780                           | Thesis Preparation Seminar 1        |
|                                    | History and Aesthetics Elective 3   |
|                                    | Professional Electives 9            |
|                                    | Open Electives 6                    |
| <b>Third Year</b>                  |                                     |
| SOFA-790                           | Research and Thesis I 4             |
| SOFA-890                           | Research and Thesis II 4            |
| <b>Total Semester Credit Hours</b> |                                     |
| <b>65</b>                          |                                     |

History and Aesthetics Electives

| COURSE    |  |
|-----------|--|
| ARTH-600+ | Any ARTH-600 level course or above         |
| PHGR-701  | Histories and Aesthetics of Photography I  |
| PHGR-702  | Histories and Aesthetics of Photography II |
| SOFA-642  | History and Aesthetics: Animation Stories  |
| SOFA-660  | Documentary Film History                   |
| SOFA-661  | New Documentary Issues                     |
| SOFA-662  | Film History                               |
| SOFA-691  | Film Sound Theory Music                    |
| SOFA-692  | Film Sound Theory: Effects                 |
| SOFA-693  | Film Sound Theory:Voice                    |

Professional Electives

| COURSE   |                                 |
|----------|---------------------------------|
| SOFA-607 | Advanced Directing              |
| SOFA-635 | Acting for Film                 |
| SOFA-641 | Advanced Sound Recording        |
| SOFA-644 | Cinematic Compositing           |
| SOFA-652 | Alternative Frame by Frame      |
| SOFA-655 | Film Practice                   |
| SOFA-657 | Digital Color Correction        |
| SOFA-665 | Creative Research Workshop      |
| SOFA-670 | 30 Second Commercial Production |
| SOFA-671 | Advanced Production Immersion   |
| SOFA-672 | Mixing and Sound Design         |
| SOFA-678 | Cinematography and Lighting I   |
| SOFA-682 | Underwater Cinematography       |
| SOFA-683 | Advanced Editing                |
| SOFA-689 | Cinematography and Lighting II  |

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

| COURSE                             | SEMESTER CREDIT HOURS               |
|------------------------------------|-------------------------------------|
| <b>First Year</b>                  |                                     |
| SOFA-602                           | Production Processes 6              |
| SOFA-605                           | Basic Sound Recording 3             |
| SOFA-606                           | Graduate Directing 3                |
| SOFA-610                           | Graduate Seminar 2                  |
| SOFA-613                           | Graduate Screenwriting 3            |
| SOFA-621                           | Spring Film 3                       |
| SOFA-626                           | Writing the Short 3                 |
|                                    | History and Aesthetics Elective 3   |
|                                    | Professional Elective 3             |
| <b>Second Year</b>                 |                                     |
| SOFA-614                           | Business and Careers in Film 3      |
| SOFA-663                           | Writing the Feature 3               |
| SOFA-664                           | Writing the Series 3                |
| SOFA-721                           | Fall Film 3                         |
| SOFA-733                           | Hybrid Forms: Theory and Practice 3 |
| SOFA-780                           | Thesis Preparation Seminar 1        |
|                                    | History and Aesthetics Electives 6  |
|                                    | Open Electives 6                    |
| <b>Third Year</b>                  |                                     |
| SOFA-790                           | Research and Thesis I 4             |
| SOFA-890                           | Research and Thesis II 4            |
| <b>Total Semester Credit Hours</b> |                                     |
| <b>65</b>                          |                                     |

History and Aesthetics Electives

| COURSE    |  |
|-----------|--|
| ARTH-600+ | Any ARTH-600 level course or above         |
| PHGR-701  | Histories and Aesthetics of Photography I  |
| PHGR-702  | Histories and Aesthetics of Photography II |
| SOFA-642  | History and Aesthetics: Animation Stories  |
| SOFA-660  | Documentary Film History                   |
| SOFA-661  | New Documentary Issues                     |
| SOFA-662  | Film History                               |
| SOFA-691  | Film Sound Theory Music                    |
| SOFA-692  | Film Sound Theory: Effects                 |
| SOFA-693  | Film Sound Theory:Voice                    |

Professional Electives

| COURSE   |                                 |
|----------|---------------------------------|
| SOFA-607 | Advanced Directing              |
| SOFA-635 | Acting for Film                 |
| SOFA-641 | Advanced Sound Recording        |
| SOFA-644 | Cinematic Compositing           |
| SOFA-652 | Alternative Frame by Frame      |
| SOFA-655 | Film Practice                   |
| SOFA-657 | Digital Color Correction        |
| SOFA-665 | Creative Research Workshop      |
| SOFA-670 | 30 Second Commercial Production |
| SOFA-671 | Advanced Production Immersion   |
| SOFA-672 | Mixing and Sound Design         |
| SOFA-678 | Cinematography and Lighting I   |
| SOFA-682 | Underwater Cinematography       |
| SOFA-683 | Advanced Editing                |
| SOFA-689 | Cinematography and Lighting II  |

Admission requirements

- To be considered for admission to the MFA in film and animation, candidates must fulfill the following requirements:
- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
  - Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
  - Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
  - Recommended minimum cumulative GPA of 3.0 (or equivalent).
  - Submit a current resume or curriculum vitae.

- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

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

### 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.

## School of Photographic Arts and Sciences

### Media Arts and Technology, MS

[www.rit.edu/study/media-arts-and-technology-ms](http://www.rit.edu/study/media-arts-and-technology-ms)

**Michael Peres, Professor**

**585-475-2775, mrppph@rit.edu**

### Program overview

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

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

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

### Capstone Project

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

## Curriculum

### Media Arts and Technology, MS degree, typical course sequence

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                                   |                       |
| PHMS-611 Media Foundations: The Digital File        | 3                     |
| PHMS-623 Leadership in Creative Spaces              | 3                     |
| PHMS-711 Industry Issues, Trends, and Opportunities | 3                     |
| PHMS-721 Implementing Imaging Business Change       | 3                     |
| PHMS-731 Digital Content Management                 | 3                     |
| PHMS-743 Contemporary Media and Communications      | 3                     |
| PHMS-746 Capstone I                                 | 3                     |
| PHMS-747 Capstone II                                | 3                     |
| PPRT-703 Cross Media Workflow                       | 3                     |
| Open Elective                                       | 3                     |
| <b>Total Semester Credit Hours</b>                  | <b>30</b>             |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Photography and Related Media, MFA

[www.rit.edu/study/photography-and-related-media-mfa](http://www.rit.edu/study/photography-and-related-media-mfa)

**Joshua Thorson, Assistant Professor**

**585-475-5870, [jjtpph@rit.edu](mailto:jjtpph@rit.edu)**

### Program overview

RIT's MFA in photography and related media emphasizes an expansive interpretation of photography as a conceptual art form, with the intention of engaging and nurturing the individuality of each student in their continued development as innovative, critical artists in the world. Successful completion of the program enables students to become successful visual artists and seek careers in fields including education, archives, museum or gallery work, and as professional photographers.

### Electives

Elective courses are available in dynamic areas such as video, printmaking, painting, sculpture, communication design, crafts, bookmaking, graphic design, new media, computer graphics, art history, and archival preservation and conservation. A complete list of graduate electives is available through the student's advisor. There are also graduate electives offered throughout the university. Students also have opportunities to enhance their studies through independent studies and internships.

### Thesis

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

### Faculty

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

### Facilities

William Harris 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 graduate students to learn firsthand about gallery operations, installation, and marketing and communications as a gallery manager or staff member.

In addition to gallery spaces, students have open access to dedicated studio spaces and world-class imaging equipment, including:

- Professional gallery spaces
- Kreonite analog color processor
- Lambda digital chromogenic processor
- Alternative process facilities and chemicals
- Black and white and color darkrooms
- Lighting studios



- 35mm, medium, and large format film cameras
- 35mm and medium format digital cameras
- Video equipment, such as Ronin stabilizers, dollies, and more
- Sound equipment and dedicated recording studio
- Access to printmaking, glass, wood shop, and other art-making facilities

## Curriculum

### Photography and Related Media, MFA degree, typical course sequence

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

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

\*\* Professional Elective refers to graduate studio courses offered in the Photography and Related Media program (PHGR).

## Accreditation

The MFA program in photography and related media is accredited by the National Association of Schools of Art and Design (NASAD).

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Three letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Participate in an individual interview.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements

for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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.

### Transfer Credit

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

### Scholarships and Graduate Assistantships

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



## Faculty

### Dean's Office

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**Todd Jokl**, BA, Yale University; MFA, University of Connecticut; Ed.D., Southern Connecticut State University—Dean, Professor

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

**Christine Shank**, BFA, Miami University; MFA, Texas Woman's University—Associate Dean of Undergraduate Studies; Associate Professor

### School for American Crafts

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

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

**Rolf Hoeg**, AOS, BS, Rochester Institute of Technology; MFA, Vermont College of Fine Art—Lecturer

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

**Suzanne Peck**, BA, The Colorado College; MFA, Rhode Island School of Design—Lecturer

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

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

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

**Leonard A. Urso**, BFA, MFA, State University College at New Paltz—Ann Mowris Mulligan Distinguished Professor in Contemporary Crafts

### School of Art

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

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

**Denton Crawford**, BFA, University of South Florida; MFA, University of Georgia—Graduate Director, Fine Arts Studio; Senior Lecturer

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

**Allen Douglas**, BFA, Syracuse University; Illustration Master Class, Amherst College—Lecturer

**Craig Foster**, BFA, University of Michigan; MS, Medical College of Georgia at Augusta University—Undergraduate Program Co-Director, Medical Illustration; Assistant Professor

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

**Chad Grohman**, BFA, Rochester Institute of Technology; MFA, University of Hartford—Undergraduate Program Director, Illustration; Assistant Professor

**Jeff Harter**, BFA, State University of New York at Buffalo; MA, Syracuse University—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—Undergraduate Program Director, Medical Illustration; Associate Professor

**Elizabeth Kronfield**, BFA, Bowling Green State University; MFA,

University of Georgia—School Director, School of Art and School for American Crafts; Professor

**Christina Leung**, BA, Miami University of Ohio; MFA, Cornell University—Visiting Assistant Professor

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

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

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

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

**Nicholas Sweet**, BFA, California Institute of the Arts; MA, University of Alaska Fairbanks—Visiting Lecturer

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

**Daniel Worden**, BA, Texas Christian University; MA, Ph.D., Brandeis University—Associate Professor

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

### School of Design

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**Jason Arena**, BS, University of Buffalo; MFA, Pratt Institute—Undergraduate Program Co-Director, New Media Design; Associate Professor

**Bryce Beamer**, BS, MS, Philadelphia University—Assistant Professor

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

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

**Melissa Dawson**, BS, Cornell University; MFA, Rochester Institute of Technology—Assistant 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—Undergraduate Program Director, Graphic Design; Associate Professor

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

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

**Samantha Haedrich**, BFA, Carnegie Mellon University; MFA, Yale 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—Senior Associate Dean; Professor

**Gary D. Jacobs**, BFA, University of Northern Colorado; MFA, Pennsylvania State University—Assistant Professor

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

**Mark Kinsgley**, BFA, Rochester Institute of Technology—Melbert B. Cary Jr. Professor

**Alex Lobos**, BA, Universidad Rafael Landivar (Guatemala); MFA, University of Notre Dame—Graduate Director, Industrial Design; Professor

**Mindy Magyar**, BS, Cornell University; MFA, Cranbrook Academy of Art; MBA, University of Pennsylvania—Associate Professor

**Ihab Mardini**, BA, International University of Science and Technology (Syria); MFA, Rochester Institute of Technology—Assistant Professor

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

**Gary Molinari**, BFA, Rochester Institute of Technology; MS, Nazareth College of Rochester—Senior Lecturer

**Josh Owen**, BA, BFA, Cornell University; MFA, Rhode Island School of Design—Director, Vignelli Center for Design Studies; Massimo and Lella Vignelli Distinguished Professor In Design

**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—Professor Emeritus

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

**Joel Rosen**, BFA, Virginia Commonwealth University; MFA, Rochester Institute of Technology—Lecturer

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

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

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

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

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

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

## School of Film and Animation

**Amy Adrion**, BA, Georgetown University; MFA, University of California, Los Angeles—Assistant Professor

**Vashti Anderson**, BA, University of Wisconsin-Madison; MFA, New York University—Assistant Professor

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

**Meghdad Asadilari**, BSc, MSc, Shiraz University (Iran); MFA, Rochester Institute of Technology—Assistant Professor

**Christine A. Banna**, BFA, Boston University; MFA, Tufts University—Lecturer

**Kevin Bauer**, BFA, State University College at Oneonta; MFA, Rochester Institute of Technology—Graduate Director, Film and Animation; Lecturer

**Jack Beck**, BA, Denison University; MFA, University of Iowa—Undergraduate Program Director, Production; Professor

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

**Michael Boas**, BA, State University College at Geneseo—Visiting Lecturer

**Donald Casper**, BS, Rochester Institute of Technology—Lecturer

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

**Ricardo Figueroa**, BS, MS, University of Puerto Rico at Mayagüez; Ph.D., Rochester Institute of Technology—Undergraduate Program Director, Motion Picture Science; Associate Professor

**Tom Gasek**, BFA, Rochester Institute of Technology; MFA, Art Institute of Boston at Lesley University—Professor

**Brian Larson**, BFA, Colorado State University; MFA, Miami International University—Undergraduate Program Director, Animation; Associate Professor

**David Long**, BS, University of Texas; MS, University of Rochester—Director, RIT MAGIC Center and MAGIC Spell Studios; Associate Professor

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

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

**Jesse O'Brien**, BS, The Art Institute of Pittsburgh; MFA, The Academy of Art University—Assistant Professor

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

**Jonathan Seligson**, BFA, Rhode Island School of Design; MFA, California Institute of the Arts—Lecturer

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

**Vanessa Sweet**, BFA, The University of the Arts; MFA, California Institute of the Arts—Assistant Professor

**Shanti Thakur**, BA, Ottawa University; BA, Concordia University; MFA, Temple University—School Director, School of Film and Animation; Professor

**Munjal Yagnik**, BFA, MFA, Syracuse University—Lecturer

## School of Photographic Arts and Sciences

**Walter Colley**, BFA, Rochester Institute of Technology—Visiting Lecturer

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

**Meredith Davenport**, BFA, Rochester Institute of Technology; MFA, Hunter College—Undergraduate Program Director,

Photojournalism; Associate Professor

**Rachel Ferraro**, BFA, Rochester Institute of Technology; MFA, Visual Studies Workshop—Associate Professor

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

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

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

**Willie Osterman**, BFA, Ohio University; MFA, University of Oregon—Professor

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

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

**Michael R. Peres**, BA, Bradley University; BS, MS, Rochester Institute of Technology—Graduate Director, Media Arts and Technology; Gannett Distinguished Professor

**Robert Rose**, BS, Rochester Institute of Technology; M.Ed., American InterContinental University—Assistant Professor

**Patricia Russotti**, BS, Empire College; M.Ed., Indiana University—Associate Professor

**Christine Shank**, BFA, Miami University; MFA, Texas Woman's University—Associate Dean of Undergraduate; Associate Professor

**Christye Sisson**, BS, MS, Rochester Institute of Technology—School Director, School of Photographic Arts and Sciences; Professor

**Josh Thorson**, BA, University of Minnesota-Twin Cities; MFA, Bard College; Ph.D., Rensselaer Polytechnic Institute—Graduate Director, Photography and Related Media; Associate Professor

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

## College of Art and Design

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

**Catherine Zuromskis**, BA,  
Harvard College; MA, University  
of New York at Stony Brook; MA,  
Ph.D., University of Rochester—  
Undergraduate Program Director,  
Fine Art Photography; Associate  
Professor

# Saunders College of Business

Jacqueline R. Mozrall, Dean

[rit.edu/business](http://rit.edu/business)

## Programs of Study

|   |    |
|---|----|
| Accounting and Analytics, MS                              | 28 |
| ⊕ Accounting and Financial Analytics, Adv. Cert.          | 29 |
| Accounting, MS  |    |
| Business Administration–Accounting, MBA                   | 32 |
| Business Administration–Executive, MBA                    | 33 |
| Business Administration, MBA                              | 30 |
| ⊕ Business Administration–Online Executive, MBA           | 34 |
| ⊕ Business Analytics, MS                                  | 35 |
| Computational Finance, MS                                 | 36 |
| Entrepreneurship and Innovative Ventures, MS              | 37 |
| Finance, MS   | 38 |
| Global Supply Chain Management, MS                        | 39 |
| Hospitality and Tourism Management, MS                    | 40 |
| ⊕ Human Resource Development, MS                          | 42 |
| ⊕ Organizational Learning, Adv. Cert.                     | 43 |
| ⊕ Service Leadership and Innovation, Adv. Cert.           | 44 |
| ⊕ Service Leadership and Innovation, MS                   | 45 |
| Technology Entrepreneurship, Adv. Cert.                   | 46 |
| Technology Innovation Management and Entrepreneurship, MS | 47 |

⊕ 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.

Please visit the college's website—[www.rit.edu/business](http://www.rit.edu/business)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

## Entrepreneurship at RIT

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

At the heart of the university's entrepreneurship initiatives is the Simone Center for Innovation and Entrepreneurship. The center promotes, nurtures, and expands innovation and entrepreneurship through a three-pronged approach that combines interdisciplinary entrepreneurial curriculum, experiential learning, and entrepreneurship programs. Visit the center's website—[www.rit.edu/research/simonecenter](http://www.rit.edu/research/simonecenter)—for more information:

## 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.

## Accreditation

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

## Accounting and Analytics, MS

[www.rit.edu/study/accounting-and-analytics-ms](http://www.rit.edu/study/accounting-and-analytics-ms)

**Matthew Cornwell,**

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### Program overview

Accounting analytics can help an organization answer financial questions by looking at all the data gathered by a company (e.g., transactional data, financial data, investment analysis, etc.) and analyzing this information to gain significant insights, predict future outcomes, or even ascertain risk.

In RIT's master's in accounting analytics you'll develop analytics skills to conduct descriptive, diagnostic, predictive, and prescriptive analysis of accounting information. The program pulls together key areas of technology, finance, strategy, analytics, data modeling, and more to help you advance your accounting career.

This innovative program teaches you how technologies and business analytics are used in the accounting profession, with a specific focus on:

- Hands-on experience working with data-science oriented computing languages such as R and Python
- Working knowledge of databases in Structured Query Language (SQL) and Systems Applications and Products in Data Processing (SAP)
- Data visualization skills, such as Tableau
- Understanding of essential technologies such as blockchain

As an accountant or business professional seeking career advancement, you'll benefit from the accounting analytics courses in areas that are making a significant impact on today's business operations, including big data, AI, and advanced analytics based on the foundation of accounting and auditing. You'll be taught business analytics and technology skills by faculty who teach in RIT's nationally ranked program in management information systems.

Accounting analytics is an exciting, dynamic field that is growing. And graduates of RIT's master's in accounting analytics are in demand.

### Curriculum

#### Accounting and Analytics, MS degree, typical course sequence

| COURSE                             |  | SEMESTER CREDIT HOURS |
|------------------------------------|--|-----------------------|
| <b>First Year</b>                  |  |                       |
| ACCT-738                           | Information Systems Auditing and Assurance Services      | 3                     |
| ACCT-745                           | Accounting Information and Analytics                     | 3                     |
| ACCT-796                           | Accounting Capstone Experience                           | 3                     |
| BANA-680                           | Data Management for Business Analytics                   | 3                     |
| BANA-780                           | Advanced Business Analytics                              | 3                     |
| FINC-780                           | Financial Analytics                                      | 3                     |
| MGIS-650                           | Introduction to Data Analytics and Business Intelligence | 3                     |
|                                    | BANA or MGIS Elective                                    | 3                     |
|                                    | Graduate Electives                                       | 6                     |
| <b>Total Semester Credit Hours</b> |  | <b>30</b>             |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate coursework, including any transfer credit earned.

- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Students are required to complete online preparatory coursework in R and Python prior to joining the MS in accounting and analytics program. The coursework does not need to be completed prior to applying, and will take roughly 3-4 weeks to complete.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

#### Deferment

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



## Accounting and Financial Analytics, Adv. Cert.

[www.rit.edu/study/accounting-and-financial-analytics-adv-cert](http://www.rit.edu/study/accounting-and-financial-analytics-adv-cert)

**Matthew Cornwell,**

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### Program overview

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

### Advanced Financial Analytics Courses

The accounting analytics certificate provides you with the skills you need to operate effectively in today's modern data-centric business environment. A selection of advanced financial analytics courses will help you learn how to access, interpret, analyze, and report business and financial data. Courses completed in the certificate program can be applied later to RIT's master's degree in business analytics, or they may be used as a valuable add-on for students pursuing graduate degrees from RIT in fields such as finance, accounting and analytics, applied statistics, and computer science.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. Graduate certificates can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or they can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Accounting and Financial Analytics, advanced certificate, typical course sequence

| COURSE                              |  | SEMESTER CREDIT HOURS |
|-------------------------------------|--|-----------------------|
| <b>First Year</b>                   |  |                       |
| ACCT-745                            | Accounting Information and Analytics                     | 3                     |
| FINC-780                            | Financial Analytics                                      | 3                     |
| MGIS-650                            | Introduction to Data Analytics and Business Intelligence | 3                     |
| <i>Choose one of the following:</i> |  | 3                     |
| BANA-680                            | Data Management for Business Analytics                   |                       |
| MGIS-725                            | Data Management and Analytics                            |                       |
| <b>Total Semester Credit Hours</b>  |  | <b>12</b>             |

### Admission requirements

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

- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.
- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.



## Business Administration, MBA

[www.rit.edu/study/business-administration-mba](http://www.rit.edu/study/business-administration-mba)

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### Program overview

Applications of technology and data analytics are the future of modern business. And, as organizations adapt, there is an increasing demand for business leaders to acquire skills in information systems and data analytics. RIT's MBA degree is designed to provide you with a strong focus on not only technology, but information systems, data analytics, and an exceptional foundation in the STEM fields.

**Information Systems**—You'll learn to design and implement leading-edge enterprise technologies in order to collect, store, analyze, and manage vast amounts of data gathered through various customer touch points.

**Data Analytics**—As businesses and organizations collect more and more data, there is a need to analyze and interpret this information and use it to make intelligent business decisions. RIT's MBA program includes courses in data analytics, data management, and business intelligence to help you acquire the skills you need to harness information that generates managerial insights.

**STEM**—Paired with our traditional focus on technology, RIT's entire MBA degree has now become a STEM-designated program. This means you'll graduate with a solid background in the STEM fields that are impacting business today. You'll compete STEM-designated elective courses, chosen by you, in areas that include computing, supply chain analysis, managing innovation, and more.

RIT's MBA degree provides you with the flexibility to design the curriculum that best suit your professional aspirations while also providing with the STEM education that is increasingly in demand.

### Cooperative Education

Cooperative education, or co-op for short, is full-time, paid work experience in your field of study. And it sets RIT graduates apart from their competitors. It's exposure—early and often—to a variety of professional work environments, career paths, and industries. RIT co-op is designed for your success.

Cooperative education in the MBA program is optional. 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.

## Curriculum

### Business Administration, MBA degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS                                      |
|------------------------------------|--|
| <b>First Year</b>                  |  |
| ACCT-603                           | Accounting for Decision Makers 3                           |
| DECS-743                           | Operations and Supply Chain Management 3                   |
| ESCB-705                           | Economics and Decision Modeling 3                          |
| FINC-721                           | Financial Analysis for Managers 3                          |
| MGIS-650                           | Introduction to Data Analytics and Business Intelligence 3 |
| MGMT-740                           | Leading Teams in Organizations 3                           |
| MGMT-775                           | Ethical Decision Making and Corporate Social Performance 3 |
| MKTG-761                           | Marketing Concepts and Commercialization 3                 |
| <b>Second Year</b>                 |  |
|                                    | STEM Electives 9   |
|                                    | Open Graduate Electives 6                                  |
| MGIS-735                           | Design and Information Systems 3                           |
| MGMT-735                           | Management of Innovation 3                                 |
| MGMT-759                           | Competitive Strategy 3                                     |
| <b>Total Semester Credit Hours</b> | <b>48</b>  |

### STEM Electives

| COURSE   |   |
|----------|---|
| ACCT-645 | Accounting Information and Analytics                    |
| ACCT-738 | Information Systems Auditing and Assurance Services     |
| ACCT-796 | Accounting Capstone Experience                          |
| BANA-680 | Data Management for Business Analytics                  |
| BANA-780 | Advanced Business Analytics                             |
| BANA-785 | Business Analytics Experience                           |
| CSCI-654 | Foundations of Parallel Computing                       |
| CSCI-721 | Foundations of Data Cleaning and Preparation            |
| DECS-744 | Project Management                                      |
| DECS-745 | Quality Control and Improvement                         |
| DECS-750 | Supply Chain Analysis                                   |
| FINC-742 | Financial Modeling and Analysis                         |
| FINC-772 | Equity Analysis   |
| FINC-773 | Debt Analysis   |
| FINC-780 | Financial Analytics                                     |
| FINC-795 | Computational Finance Experience                        |
| GRCS-701 | Research Methods  |
| HRDE-745 | Information Systems in HRD                              |
| HSPT-740 | Economic Performance Analysis for Hospitality & Tourism |
| INTB-710 | Global Business Analytics                               |
| INTB-730 | Cross-Cultural Management                               |
| ISEE-682 | Lean Six Sigma Fundamentals                             |
| ISEE-682 | Lean Six Sigma Fundamentals                             |
| ISEE-703 | Supply Chain Management                                 |
| MATH-601 | Methods of Applied Mathematics                          |
| MATH-605 | Stochastic Processes                                    |
| MATH-711 | Advanced Methods in Scientific Computing                |
| MATH-712 | Numerical Methods for Partial Differential Equations    |
| MATH-735 | Mathematics of Finance I                                |
| MATH-736 | Mathematics of Finance II                               |
| MATH-741 | Partial Differential Equations I                        |
| MATH-742 | Partial Differential Equations II                       |
| MGIS-720 | Information Systems Design                              |
| MGIS-725 | Data Management and Analytics                           |
| MGIS-760 | Integrated Business Systems                             |
| MGIS-761 | Business Process Analysis and Workflow Design           |
| MGMT-741 | Managing Organizational Change                          |
| MGMT-755 | Negotiations  |
| MGMT-756 | Power and Influence                                     |
| MKTG-763 | Buyer Behavior  |
| MKTG-768 | Marketing Analytics                                     |
| MKTG-772 | Internet Marketing: Strategy & Tactics                  |
| MKTG-773 | Database Marketing                                      |
| PROF-711 | Advanced Project Management                             |
| SERQ-723 | Service Analytics                                       |
| SERQ-732 | Assessment of Service Quality                           |
| SERQ-735 | Data Mining in the Service Sector                       |
| SERQ-745 | Social Psychology of Service                            |
| SERQ-747 | Design Thinking and Creativity                          |
| STAT-611 | Statistical Software - R                                |
| STAT-621 | Statistical Quality Control                             |
| STAT-747 | Principles of Statistical Data Mining                   |
| STAT-756 | Multivariate Analysis                                   |
| STAT-773 | Time Series Analysis and Forecasting                    |
| STAT-784 | Categorical Data Analysis                               |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in algebra and statistics
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

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

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

## Non-degree course enrollment

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

## Waiver policy/transfer credit

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

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

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

## Deferment

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

## Business Administration–Accounting, MBA

[www.rit.edu/study/business-administration-accounting-mba](http://www.rit.edu/study/business-administration-accounting-mba)

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### Program overview

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

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

### Curriculum

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

| COURSE                             | SEMESTER CREDIT HOURS  |
|------------------------------------|--|
| <b>First Year</b>                  |  |
| ACCT-707                           | Advanced Accounting 3  |
| ACCT-708                           | Advanced Topics in Auditing and Assurance 3                                  |
| ACCT-738                           | Information Systems Auditing and Assurance Services 3                        |
| ACCT-796                           | Accounting Capstone Experience 3   |
| BLEG-731                           | Commercial Law and Professional Skills 3                                     |
| MGMT-735                           | Management of Innovation 3   |
| MGMT-740                           | Leading Teams in Organizations 3   |
| MGMT-759                           | Competitive Strategy 3   |
| MKTG-761                           | Marketing Concepts and Commercialization 3                                   |
|                                    | Accounting, Economics, Finance, or Management Information Systems Elective 3 |
| <b>Total Semester Credit Hours</b> | <b>30</b>  |

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

| COURSE            | SEMESTER CREDIT HOURS  |
|-------------------|--|
| <b>First Year</b> |  |
| ACCT-603          | Accounting for Decision Makers 3   |
| ACCT-704          | Corporate Financial Reporting I 3  |
| ACCT-709          | Basic Taxation 3   |
| BLEG-730          | Business Legal Concepts 3  |
| BLEG-731          | Commercial Law and Professional Skills 3                                     |
| DECS-743          | Operations and Supply Chain Management 3                                     |
| ESCB-705          | Economics and Decision Modeling 3  |
| FINC-721          | Financial Analysis for Managers 3  |
| MGIS-650          | Introduction to Data Analytics and Business Intelligence 3                   |
| MGMT-735          | Management of Innovation 3   |
| MGMT-740          | Leading Teams in Organizations 3   |
| MGMT-775          | Ethical Decision Making and Corporate Social Performance 3                   |
| MKTG-761          | Marketing Concepts and Commercialization 3                                   |
|                   | Accounting, Economics, Finance, or Management Information Systems Elective 3 |

| COURSE                             | SEMESTER CREDIT HOURS  |
|------------------------------------|--|
| <b>Second Year</b>                 |  |
| ACCT-745                           | Accounting Information and Analytics 3                                       |
| ACCT-705                           | Corporate Financial Reporting II 3   |
| ACCT-706                           | Cost Management 3  |
| ACCT-707                           | Advanced Accounting 3  |
| ACCT-708                           | Advanced Topics in Auditing and Assurance 3                                  |
| ACCT-710                           | Tax Analysis and Strategy 3  |
| ACCT-738                           | Information Systems Auditing and Assurance Services 3                        |
| ACCT-796                           | Accounting Capstone Experience 3   |
| MGMT-759                           | Competitive Strategy 3   |
|                                    | Accounting, Economics, Finance, or Management Information Systems Elective 3 |
| <b>Total Semester Credit Hours</b> | <b>72</b>  |

### Electives

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

| COURSE   | SEMESTER CREDIT HOURS  |
|----------|--|
| ACCT-641 | Cases in Forensic Accounting and Fraud Examination 3             |
| ACCT-650 | Financial Reporting for Government and Not-for-Profit Entities 3 |
| ACCT-711 | Internal Auditing 3  |
| ACCT-740 | Comparative Financial Statement Analysis 3                       |
| ACCT-758 | Seminar in Accounting 3  |
| ESCB-758 | Seminar in Economics 3   |
| FINC-605 | Financing New Ventures 3   |
| FINC-722 | Financial Management II 3  |
| FINC-725 | Securities and Investment Analysis 3                             |
| FINC-740 | Options and Futures 3  |
| FINC-742 | Financial Modeling and Analysis 3                                |
| FINC-758 | Seminar in Finance 3   |
| FINC-760 | Finance in a Global Environment 3                                |
| FINC-761 | Stock Market Algorithmic Trading 3                               |
| FINC-772 | Equity Analysis 3  |
| FINC-773 | Debt Analysis 3  |
| FINC-774 | Advanced Derivatives 3   |
| FINC-780 | Financial Analytics 3  |
| MGIS-720 | Information Systems Design 3                                     |
| MGIS-725 | Data Management and Analytics 3                                  |
| MGIS-735 | Design and Information Systems 3                                 |
| MGIS-745 | Information Systems Development 3                                |
| MGIS-755 | Information Technology Strategy and Management 3                 |
| MGIS-758 | Seminar in Management Information Systems 3                      |
| MGIS-760 | Integrated Business Systems 3                                    |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in algebra and statistics
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements

for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

### Deferment

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

## Business Administration–Executive, MBA

[www.rit.edu/study/business-administration-executive-mba](http://www.rit.edu/study/business-administration-executive-mba)

**Emilee McHugh,**

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### Program overview

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

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

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

### Curriculum

#### Business Administration - Executive MBA degree, typical course sequence

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

Admission requirements

- To be considered for admission to the executive MBA program, candidates must fulfill the following requirements:
- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
  - Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
  - Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
  - Recommended minimum cumulative GPA of 3.0 (or equivalent).
  - Submit a current resume or curriculum vitae.
  - Letters of recommendation are optional.
  - Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
  - Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
  - Have at least six years of professional work experience.
  - Participate in an interview with a representative of the executive MBA team.
  - International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Sponsorship

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

Business Administration–Online Executive, MBA

[www.rit.edu/study/business-administration-online-executive-mba](http://www.rit.edu/study/business-administration-online-executive-mba)  
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Program overview

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

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

**Plan of study**

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

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

Curriculum

Business Administration - Online Executive MBA degree, typical course sequence

| COURSE     |                                     | SEMESTER CREDIT HOURS |
|------------|-------------------------------------|-----------------------|
| Residency  |                                     |                       |
| MGMT-806   | Team Building and Ethics            | 1                     |
| First Year |                                     |                       |
| ACCT-801   | Accounting and Organizational Goals | 2                     |
| ACCT-802   | Managerial Accounting               | 2                     |
| DECS-810   | Statistical Analysis for Managers   | 2                     |
| DECS-864   | Systems Support for Operations      | 2                     |
| DECS-875   | Business Simulation                 | 2                     |



| COURSE                      |  | SEMESTER CREDIT HOURS |
|-----------------------------|--|-----------------------|
| ESCB-840                    | Microeconomics & Pricing                     | 2                     |
| FINC-845                    | Valuation and Capital Budgeting              | 2                     |
| FINC-846                    | Financial Planning and Analysis              | 2                     |
| MGMT-800                    | Leadership Development I                     | 1                     |
| MGMT-810                    | Leadership                                   | 2                     |
| MGMT-818                    | Strategic Thinking I                         | 2                     |
| MGMT-819                    | Strategic Thinking II                        | 2                     |
| MGMT-850                    | Negotiations and Decision-making             | 2                     |
| MGMT-861                    | Managing Technology, Innovation and Research | 2                     |
| MGMT-889                    | Capstone Consulting Project I                | 3                     |
| MKTG-851                    | Marketing Strategy                           | 2                     |
| MKTG-865                    | Managing New Product Commercialization       | 2                     |
| Second Year                 |  |                       |
| FINC-850                    | International Finance                        | 2                     |
| INTB-820                    | International Business                       | 2                     |
| INTB-825                    | International Study Seminar                  | 2                     |
| MGMT-801                    | Leadership Development II                    | 1                     |
| MGMT-860                    | Executive Leadership Series                  | 2                     |
| MGMT-890                    | Capstone Consulting Project II               | 3                     |
| Total Semester Credit Hours |  | 47                    |

## Admission requirements

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

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

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

## Business Analytics, MS

[www.rit.edu/study/business-analytics-ms](http://www.rit.edu/study/business-analytics-ms)

**Matthew Cornwell,**

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## Program overview

Today's businesses collect an incredible amount of data from nearly every customer touch point, from point-of-sale transactions, customer service interactions, social media feedback, search engine entries, market research activities, sales data, demographic information, and more. Right now, only a tiny portion of this data is analyzed and used to guide and inform business decisions. By earning a business analytics master's degree, you'll become skilled in using big data to create powerful solutions to help companies increase sales, reach new customers, develop new products, enhance customer experiences, and more. The program is available on-campus, or you may earn an online master's in business analytics.

## Business Analytics Courses

In RIT's business analytics master's degree you'll acquire a broad and in-depth training in multiple disciplines related to business analytics, including management information systems (MIS), marketing, accounting, finance, analytics, and data management.

This is a career-focused degree developed in conjunction with top employers—such as Intuit, Excellus, and PriceWaterhouse—with a curriculum designed to help you understand and connect contemporary analytics technologies with today's business practices. You'll complete business analytics courses that will enable you to develop the advanced skills needed to conduct the descriptive, diagnostic, predictive, and prescriptive analysis of information as you learn to manage data and analytics in a range of business settings.

## Learn in High Tech Analytics Labs

You'll pair your master's in business analytics with access to two high tech labs. The Sklarsky Center for Business Analytics, a modern, interactive lab that features Bloomberg Terminals and the most advanced analytics software. The REDCOM Active Learning Collaboratory supports interactive learning and features CISCO Telepresence for connecting interactively with RIT's global campuses in China, Croatia, Dubai, and Kosovo, and our corporate partners around the world.

## Careers in Business Analytics

You'll graduate prepared to launch your career in business analytics in positions that range from marketing research, analytics, and consulting; digital analytics; web intelligence and analytics; accounting and financial analytics and risk management; supply chain analytics; customer analytics; and consulting.

## Curriculum

### Business Analytics, MS degree, typical course sequence

| COURSE                      |  | SEMESTER CREDIT HOURS |
|-----------------------------|--|-----------------------|
| First Year                  |  |                       |
| ACCT-745                    | Accounting Information and Analytics                     | 3                     |
| BANA-680                    | Data Management for Business Analytics                   | 3                     |
| BANA-780                    | Advanced Business Analytics                              | 3                     |
| BANA-785                    | Business Analytics Experience                            | 3                     |
| FINC-780                    | Financial Analytics                                      | 3                     |
| MGIS-650                    | Introduction to Data Analytics and Business Intelligence | 3                     |
| MKTG-768                    | Marketing Analytics                                      | 3                     |
|                             | Analytics Elective                                       | 3                     |
|                             | Open Elective  | 6                     |
| Total Semester Credit Hours |  | 30                    |



**Analytics Electives**

| COURSE   |                                       |
|----------|---------------------------------------|
| MGIS-720 | Information Systems Design            |
| MGIS-725 | Data Management and Analytics         |
| MGIS-735 | Design and Information Systems        |
| MGIS-760 | Integrated Business Systems           |
| STAT-641 | Applied Linear Models - Regression    |
| STAT-745 | Predictive Analytics                  |
| STAT-747 | Principles of Statistical Data Mining |
| STAT-773 | Time Series Analysis and Forecasting  |
| STAT-784 | Categorical Data Analysis             |

**Admission requirements**

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

**Computational Finance, MS**

[www.rit.edu/study/computational-finance-ms](http://www.rit.edu/study/computational-finance-ms)

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**Program overview**

RIT's master's in computational finance produces quantitative analysts who design and implement financial models used by banks and investment companies to generate profits and reduce risk. Computational analytics experts also support other industries and business functions that reach beyond banking and finance. The master's in computational finance will expand your skills, enabling you to apply your expertise to a variety of fields, all of which have great demand for professionals with a background in computational finance. The program is designed for students interested in computational or quantitative finance careers in banking, finance, and a growing number of industries. Professionals in these fields use their strengths in business, modeling, and data analysis to understand and use complex financial models.

**Computational Finance Courses**

The master's in computational finance features a curriculum steeped in the 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 previously in the program's mathematics, analytics, and finance courses. The master's in computational finance is a full-time, 12- to 17-month curriculum beginning in the fall or spring. The program ends with a required non-credit comprehensive exam based on the courses completed by the student.

**Computational Finance Jobs**

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

The master's in computational finance 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.

**Curriculum****Computational Finance, MS degree, typical course sequence**

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

**Analytics electives\***

|          |  |
|----------|--|
| ACCT-745 | Accounting Information and Analytics                     |
| BANA-680 | Data Management for Business Analytics                   |
| BANA-780 | Advanced Business Analytics                              |
| FINC-780 | Financial Analytics                                      |
| MGIS-650 | Introduction to Data Analytics and Business Intelligence |
| MGIS-725 | Data Management and Analytics                            |
| MGIS-760 | Integrated Business Systems                              |
| MKTG-768 | Marketing Analytics                                      |
| STAT-611 | Statistical Software - R                                 |
| STAT-747 | Principles of Statistical Data Mining                    |
| STAT-773 | Time Series Analysis and Forecasting                     |
| STAT-784 | Categorical Data Analysis                                |

\* Additional electives are available with approval.

**University electives\***

|          |                           |
|----------|---------------------------|
| ACCT-7## | Any 700-level ACCT course |
| BANA-6## | Any 600-level BANA course |
| BANA-7## | Any 700-level BANA course |
| DECS-7## | Any 700-level DECS course |
| MATH-6## | Any 600-level MATH course |
| MATH-7## | Any 700-level MATH course |
| MGIS-6## | Any 600-level MGIS course |
| MGIS-7## | Any 700-level MGIS course |
| STAT-7## | Any 700-level STAT course |

\* Any course under Analytics electives may be used if the Analytics electives are already fulfilled.

**Admission requirements**

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Students are required to complete online preparatory coursework in R and Python prior to joining the MS in computational finance program. The coursework does not need to be completed prior to applying, and will take roughly 3-4 weeks to complete.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

**Entrepreneurship and Innovative Ventures, MS**

[www.rit.edu/study/entrepreneurship-and-innovative-ventures-ms](http://www.rit.edu/study/entrepreneurship-and-innovative-ventures-ms)

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**Program overview**

This program is no longer accepting applications for admission. Students interested in entrepreneurship and innovation are encouraged to consider the new technology innovation management and entrepreneurship MS program.

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

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

**Plan of Study**

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

**Curriculum****Entrepreneurship and Innovative Ventures, MS degree, typical course sequence**

| COURSE                             | SEMESTER CREDIT HOURS                     |
|------------------------------------|---|
| FINC-605                           | Financing New Ventures                    |
| MGMT-720                           | Entrepreneurship and New Venture Creation |
| MGMT-730                           | Technology Entrepreneurship               |
| MGMT-755                           | Negotiations                              |
| MGMT-765                           | Applied Venture Creation                  |
|                                    | Open Graduate Electives                   |
|                                    | Program Electives                         |
| <b>Total Semester Credit Hours</b> | <b>30</b>                                 |

**Program electives**

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

**Admission requirements**

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- 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 successful; or (3) Describe your greatest professional achievement and how you added value to your organization. The essay should be typed, double-spaced, and two pages in length.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

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

## Finance, MS

[www.rit.edu/study/finance-ms](http://www.rit.edu/study/finance-ms)

**Matthew Cornwell,**

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### Program overview

Encompassing corporate finance, investment management, banking, insurance, consulting, and more, RIT's master of science in finance unlocks the world of finance and prepares you for managerial careers in corporate finance, investment analysis and portfolio management, financial consulting, and financial institutions.

Top finance masters programs, like our master of science in finance, prepare you to take the Chartered Financial Analysts (CFA) exam—the most respected and recognized investment management designation in the world. In this highly flexible program, you'll choose electives in a wide range of dynamic areas (e.g., portfolio management, financial analytics, financial modeling and analysis, and more) that enhance your marketability and expand your job prospects.

RIT's master of science in finance may be completed in one year for full-time students who begin their studies in the fall semester.

### Curriculum

#### Finance, MS degree, typical course sequence

| COURSE                             |                                    | SEMESTER CREDIT HOURS |
|------------------------------------|------------------------------------|-----------------------|
| <b>First Year</b>                  |                                    |                       |
| ACCT-603                           | Accounting for Decision Makers     | 3                     |
| FINC-721                           | Financial Analysis for Managers    | 3                     |
| FINC-725                           | Securities and Investment Analysis | 3                     |
| FINC-740                           | Options and Futures                | 3                     |
| FINC-790                           | Field Exam Preparatory             | 1                     |
|                                    | Finance Electives                  | 9                     |
|                                    | STEM Electives                     | 9                     |
| <b>Total Semester Credit Hours</b> |                                    | <b>31</b>             |

#### Finance electives

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

#### STEM electives

|          |  |
|----------|--|
| ACCT-745 | Accounting Information and Analytics                     |
| BANA-680 | Data Management for Business Analytics                   |
| BANA-780 | Advanced Business Analytics                              |
| MGIS-650 | Introduction to Data Analytics and Business Intelligence |
| MGIS-725 | Data Management and Analytics                            |
| FINC-761 | Stock Market Algorithmic Trading                         |
| FINC-773 | Debt Analysis  |
| FINC-780 | Financial Analytics                                      |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.

- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

### Deferment

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

## Global Supply Chain Management, MS

[www.rit.edu/study/global-supply-chain-management-ms](http://www.rit.edu/study/global-supply-chain-management-ms)

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### Program overview

Products and services increasingly rely on a globally integrated supply system and the related technologies that enable the efficient movement of these goods and services around the world. In demand are supply chain management professionals who can manage the complex operations that take a product from ideation, sourcing of materials, production, storage and transportation, to purchasing, order fulfillment, distribution, and inventory management. The global supply chain needs to be efficient for companies to remain competitive internationally as they turn raw materials into consumer goods and services and deliver them to consumers. In RIT's supply chain management masters, you will gain a comprehensive understanding of the global supply chain as you gain the analytical, quantitative, and leadership skills needed to design innovative solutions, predict future trends, and become a leader in the fast-moving business landscapes found in the global supply chain system.

Rooted in the strong technology and analytical traditions of RIT's Saunders College of Business, the global supply chain management degree is an interdisciplinary program that integrates concepts from supply chain, operation management, analytics, data visualization, industrial engineering, global business, and management.

### Jobs in Supply Chain Management

RIT's global supply chain management degree prepares you for exciting jobs in supply chain management, which includes careers in planning and logistics, procurement, and sourcing through comprehensive course work and real-world business projects. You'll graduate ready to pursue top positions as a transportation manager, financial analyst, logistics analyst, sourcing manager, purchasing manager, business intelligence analyst, or facilities manager.

### Curriculum

#### Global Supply Chain Management, MS degree, typical course sequence

| COURSE                              | SEMESTER CREDIT HOURS  |
|-------------------------------------|--|
| <b>First Year</b>                   |  |
| DECS-743                            | Operations and Supply Chain Management 3                               |
| DECS-750                            | Supply Chain Analysis 3  |
| INTB-710                            | Global Business Analytics 3  |
| INTB-755                            | Export, Import, and Global Sourcing 3                                  |
| MGMT-755                            | Negotiations 3   |
|                                     | Global Supply Chain Management Electives 12                            |
| <i>Choose one of the following:</i> |  |
| MGMT-791                            | Graduate Project 3   |
| MGMT-790                            | Field Exam Prep (plus one (1) Global Supply Chain Management Elective) |
| <b>Total Semester Credit Hours</b>  |  |
| <b>30</b>                           |  |

#### Global Supply Chain Management Electives

|  |   |
|--|---|
| <i>Choose at least two of the following (6-9 credits):</i> |   |
| BANA-780   | Advanced Business Analytics               |
| DECS-744   | Project Management                        |
| DECS-745   | Quality Control and Improvement           |
| ISEE-682   | Lean Six Sigma Fundamentals               |
| MGIS-725   | Data Management and Analytics             |
| MGIS-760   | Integrated Business Systems               |
| MKTG-768   | Marketing Analytics                       |
| <i>Choose at least one of the following (3-6 credits):</i> |   |
| MGMT-710   | Managing for Environmental Sustainability |
| MGMT-735   | Managing of Innovation                    |
| MGMT-740   | Leading Teams in Organizations            |
| MKTG-761   | Marketing Concepts and Commercialization  |
| MKTG-762   | Strategic Marketing Management            |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

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

## Hospitality and Tourism Management, MS

[www.rit.edu/study/hospitality-and-tourism-management-ms](http://www.rit.edu/study/hospitality-and-tourism-management-ms)

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### Program overview

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

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

### Plan of Study

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

#### Core courses

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

#### Electives

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

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



*Project/Capstone/Thesis options*

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

## Curriculum

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

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

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

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

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

| COURSE                             |  | SEMESTER CREDIT HOURS |
|------------------------------------|--|-----------------------|
| <b>First Year</b>                  |  |                       |
| GRCS-701                           | Research Methods   | 3                     |
| SERQ-710                           | Service Design Fundamentals  | 3                     |
| HSPT-730                           | Strategic Hospitality & Tourism Branding                                 | 3                     |
| HSPT-740                           | Economic Performance Analysis for Hospitality & Tourism                  | 3                     |
| HSPT-750                           | Strategic Processes and Assessment of Hospitality and Tourism Industries | 3                     |
|                                    | Electives  | 6                     |
|                                    | Graduate Level Business Course*  | 3                     |
| <b>Second Year</b>                 |  |                       |
| HSPT-790                           | Research Thesis  | 6                     |
| <b>Total Semester Credit Hours</b> |  | <b>30</b>             |

\* Graduate Level Business Course will be approved by the program director.

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Applicants whose prior undergraduate work has been in areas other than hospitality or tourism may be required to complete additional courses. Students may choose elective courses with the approval of the program director.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### Part Time Study

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



## Human Resource Development, MS

[www.rit.edu/study/human-resource-development-ms](http://www.rit.edu/study/human-resource-development-ms)

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### Program overview

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

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

### Plan of Study

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

#### Electives

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

#### Advising

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

### Curriculum

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

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                  |                       |
| GRCS-701 Research Methods                          | 3                     |
| HRDE-710 Foundations in Human Resource Development | 3                     |
| HRDE-711 Program Evaluation and Design             | 3                     |
| HRDE-712 Performance Analysis and Development      | 3                     |
| HRDE-743 Training for Global Organizations         | 3                     |
| Electives or Concentration Courses                 | 6                     |
| <b>Second Year</b>                                 |                       |
| HRDE-785 Strategic HRD                             | 3                     |
| HRDE-795 Comprehensive Examination                 | 0                     |
| Elective or Concentration Course                   | 3                     |
| Electives  | 6                     |
| <b>Total Semester Credit Hours</b>                 | <b>33</b>             |

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

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                  |                       |
| GRCS-701 Research Methods                          | 3                     |
| HRDE-710 Foundations in Human Resource Development | 3                     |
| HRDE-711 Program Evaluation and Design             | 3                     |
| HRDE-712 Performance Analysis and Development      | 3                     |
| HRDE-743 Training for Global Organizations         | 3                     |
| Electives or Concentration Courses                 | 6                     |
| <b>Second Year</b>                                 |                       |
| HRDE-797 Graduate Capstone Project                 | 3                     |
| Elective or Concentration Course                   | 3                     |
| Electives  | 6                     |
| <b>Total Semester Credit Hours</b>                 | <b>33</b>             |

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

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                  |                       |
| GRCS-701 Research Methods                          | 3                     |
| HRDE-710 Foundations in Human Resource Development | 3                     |
| HRDE-711 Program Evaluation and Design             | 3                     |
| HRDE-712 Performance Analysis and Development      | 3                     |
| HRDE-743 Training for Global Organizations         | 3                     |
| Electives or Concentration Courses                 | 6                     |
| <b>Second Year</b>                                 |                       |
| HRDE-798 Research Thesis                           | 3                     |
| Elective or Concentration Course                   | 3                     |
| Electives  | 6                     |
| <b>Total Semester Credit Hours</b>                 | <b>33</b>             |

### Concentration

| Workplace Learning and Instruction                        | Sem. Cr. Hrs. |
|---|---------------|
| <i>Choose three of the following:</i>                     |               |
| EDLI-723 Group Dynamics and Facilitation Skills           | 3             |
| HRDE-720 Theories of Organizational Development           | 3             |
| HRDE-721 Organizational Learning and Knowledge Management | 3             |
| HRDE-722 Talent Development                               | 3             |

### Electives

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

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.

- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a writing sample. The prompt will be in the application.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Organizational Learning, Adv. Cert.

[www.rit.edu/study/organizational-learning-adv-cert](http://www.rit.edu/study/organizational-learning-adv-cert)

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### Program overview

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

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Organizational Learning, advanced certificate, typical course sequence

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

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Service Leadership and Innovation, Adv. Cert.

[www.rit.edu/study/service-leadership-and-innovation-adv-cert](http://www.rit.edu/study/service-leadership-and-innovation-adv-cert)

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### Program overview

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

Students may later apply the credits earned in the advanced certificate to the MS degree program in service leadership and innovation.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Service Leadership and Innovation, advanced certificate, typical course sequence

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

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements

for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Service Leadership and Innovation, MS

[www.rit.edu/study/service-leadership-and-innovation-ms](http://www.rit.edu/study/service-leadership-and-innovation-ms)

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### Program overview

Today's global economy requires visionary management, a 360-degree view of customers, and breakthrough strategies that lead to product and service innovation. The MS degree in service leadership and innovation enables professionals in any industry to transform their organizations through novel ways of thinking, efficient problem-solving, and projecting current and future needs. By learning how to see and capitalize on opportunities that others miss, graduates of the program are positioned to take employees, products and services, and their own career, to new levels of success.

### What is Service Innovation?

Service innovation refers to developing or modifying services, or the ways in which companies deliver services, by creating or implementing technologies that add value for customers. Service leadership is important because it can help companies and organizations design services or products that address unmet customer needs and stay competitive in the marketplace. An electric car is an example of a service innovation. Customers were looking for vehicles that were more sustainable and environmentally friendly. An electric car is an innovative product that met a customer need. As electric cars grew in demand, companies realized that they must continue to differentiate their electric cars to stay competitive and to meet evolving customer demand. As a result, longer battery life and other innovations became crucial product and service differentiators that added value for customers.

### Service Innovation Course Work

Achieving competitive advantage demands that organizations know how to innovate, and do so not once, but repeatedly over the life of a product or service. Customer demands and expectations evolve, and products and services must continue to meet these changing expectations. Creativity and innovation in product and service development, rapid learning through continuous analysis and improvement, and the ability to turn ideas into action, products, processes, and services are crucial.

In the MS degree in service innovation and leadership, course work emphasizes processes that provide value and service differentiators that create unique experiences for the customer. You'll complete courses that help you master concepts for creating new services or for improving existing services in efficient and effective ways. You'll also learn how individual, team, and organizational dynamics impact innovation across an organization, and how to foster a culture that is conducive to creative innovation.

As part of the program, you'll complete a thesis, a capstone project, or a comprehensive exam as a culminating experience, which allows you to demonstrate your ability to apply the theories and concepts learned throughout the program. Program advisors and/or program faculty will work with you to determine which option is most appropriate based on your career goals and objectives.

## Curriculum

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

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

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

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

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

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

### Concentration

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

### Electives

| COURSE  |  |
|---|--|
| HRDE-711 Program Evaluation and Design                    |  |
| HRDE-712 Performance Analysis and Development             |  |
| HRDE-715 Human Performance Design and Development         |  |
| HRDE-720 Theories of Organizational Development           |  |
| HRDE-721 Organizational Learning and Knowledge Management |  |
| HRDE-722 Talent Development                               |  |
| HRDE-740 Strategic HRD for Global Organizations           |  |
| HRDE-742 Leading Change                                   |  |
| HRDE-743 Training for Global Organizations                |  |
| HRDE-745 Information Systems in HRD                       |  |
| HRDE-780 Internship                                       |  |

| COURSE   |  |
|----------|--|
| SERQ-722 | Customer Centricity                      |
| SERQ-730 | Project Management in the Service Sector |
| SERQ-732 | Assessment of Service Quality            |
| SERQ-735 | Data Mining in the Service Sector        |
| SERQ-745 | Social Psychology of Service             |
| SERQ-747 | Design Thinking and Creativity           |
| SERQ-787 | Service Design and Implementation        |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent), or evidence of relevant professional performance.
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Submit a writing sample designated by the department.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Technology Entrepreneurship, Adv. Cert.

[www.rit.edu/study/technology-entrepreneurship-adv-cert](http://www.rit.edu/study/technology-entrepreneurship-adv-cert)

**Matthew Cornwell,**

**585-475-6916, [mcornwell@saunders.rit.edu](mailto:mcornwell@saunders.rit.edu)**

## Program overview

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

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

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

## Curriculum

### Technology Entrepreneurship, advanced certificate, typical course sequence

| COURSE   | SEMESTER CREDIT HOURS                              |
|--|--|
| <b>First Year</b>  |  |
| FINC-605   | Financing New Ventures 3                           |
| MGMT-720   | Entrepreneurship and Technology Entrepreneurship 3 |
| <i>Choose one of the following:</i>                            |  |
| MGMT-730   | Technology Entrepreneurship 3                      |
| MGMT-735   | Management of Innovation 3                         |
| <i>Choose one of the following:</i>                            |  |
| MGMT-610   | Global Entrepreneurship 3                          |
| MGMT-765   | Applied Venture Creation 3                         |
| Incubator/lab time via MGMT-799 (Independent Study Management) |  |
| <b>Total Semester Credit Hours</b>                             | <b>12</b>  |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.

- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Technology Innovation Management and Entrepreneurship, MS

[www.rit.edu/study/technology-innovation-management-and-entrepreneurship-ms](http://www.rit.edu/study/technology-innovation-management-and-entrepreneurship-ms)

**Matthew Cornwell,**

**585-475-6916, [mcornwell@saunders.rit.edu](mailto:mcornwell@saunders.rit.edu)**

### Program overview

Technology and innovations are emerging at an increasing pace as new products and services are rapidly improving our lives in significant ways. Technology innovation managers and entrepreneurs who know how to lead technological changes in entrepreneurial ways are in high demand to capitalize on process and product development opportunities. As an entrepreneur and innovator, you lead the movement as you grasp how to identify problems and view them differently to create unique and creative solutions.

The MS in technology innovation management and entrepreneurship assists students in creating values for their startups or entrepreneurial corporations through real-life business exposure and leveraging sources via RIT's integrated global network. The program is guided by faculty and industry mentors who possess successful entrepreneurship experiences.

The program offers two tracks. In the technology management track, students develop advanced product development and data analytics skills targeting organizational management and strategy needs. The technology entrepreneurship track develops skills in starting and managing new ventures that utilize research and marketing analytics to evaluate market options and build strategy. Each track consists of core courses and electives in data management and analytics and managerial skills.

### Studying Technology Innovation at RIT

World-renowned resources in business, science, technology, engineering, and design allow innovation and entrepreneurship to thrive at RIT. Your advantage is a rich entrepreneurial culture, with access to facilities such as the Simone Center for Innovation and Entrepreneurship, The Construct (a world-class makerspace), and Venture Creations, RIT's business incubator. Teachers, industry mentors, an applied approach, and access to science, technology, engineering, and design resources prepare you to focus on entrepreneurial and innovation processes by which inventions and creative new ideas are brought to market.

Saunders College professors bring industry experience and include entrepreneurs, C-level executives, vice presidents, and leading scholars in disciplines like technology management. You will benefit from small class sizes and dedicated faculty advisors that provide one-on-one guidance. As a graduate of the program, you will have a unique combination of technical and business expertise relevant to large incumbent firms and new startup ventures.



## Curriculum

### Technology Innovation Management and Entrepreneurship (Technology Management Option), MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS   |
|------------------------------------|---|
| <b>First Year</b>                  |   |
| DECS-744                           | Project Management 3  |
| MGMT-740                           | Leading Teams in Organizations 3                              |
| MGMT-735                           | Management of Innovation 3                                    |
| INTB-710                           | Global Business Analytics 3                                   |
| MGMT-780                           | Technology Strategy 3   |
| Choose one of the following:       | 3   |
| MGMT-791                           | Graduate Project  |
| MGMT-790                           | Field Exam Prep plus an additional Managerial Skills Elective |
|                                    | Data Management and Analytics Electives 6                     |
|                                    | Managerial Skills Electives 6                                 |
| <b>Total Semester Credit Hours</b> | <b>30</b>   |

### Electives

#### Data Management and Analytics Electives

| COURSE   |  |
|----------|--|
| MGIS-650 | Introduction to Data Analytics and Business Intelligence |
| MGIS-725 | Data Management and Analytics                            |
| BANA-680 | Data Management for Business Analytics                   |
| DECS-782 | Statistical Analysis for Decision Making                 |

#### Managerial Skills Electives

| COURSE   |  |
|----------|--|
| MGMT-743 | Advanced Topics in Technology Management |
| MGMT-755 | Negotiations                             |
| HRDE-742 | Leading Change                           |
| ACCT-603 | Accounting for Decision Makers           |
| MGMT-7## | Any other 700-level "MGMT" course        |

### Technology Innovation Management and Entrepreneurship (Technology Entrepreneurship Option), MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS                              |
|------------------------------------|--|
| <b>First Year</b>                  |  |
| DECS-744                           | Project Management 3                               |
| MGMT-740                           | Leading Teams in Organizations 3                   |
| MGMT-720                           | Entrepreneurship and Technology Entrepreneurship 3 |
| MGMT-780                           | Technology Strategy 3                              |
| MKTG-768                           | Marketing Analytics 3                              |
| MGMT-765                           | Applied Venture Creation 3                         |
|                                    | Data Management and Analytics Electives 6          |
|                                    | Managerial Skills Electives 6                      |
| <b>Total Semester Credit Hours</b> | <b>30</b>  |

### Electives

#### Data Management and Analytics Electives

| COURSE   |  |
|----------|--|
| MGIS-650 | Introduction to Data Analytics and Business Intelligence |
| MGIS-725 | Data Management and Analytics                            |
| BANA-680 | Data Management for Business Analytics                   |
| DECS-782 | Statistical Analysis for Decision Making                 |

#### Managerial Skills Electives

| COURSE   |   |
|----------|---|
| MGMT-610 | Global Entrepreneurship                         |
| MGMT-755 | Negotiations                                    |
| MKTG-778 | Commercialization and Marketing of New Products |
| FINC-605 | Financing New Ventures                          |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Letters of recommendation are optional.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

## Faculty

### Dean's Office

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

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

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

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

### Finance and Accounting

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

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

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

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

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

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

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

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

**Ashok J. Robin**, B.Comm., University of Madras (India); MBA,

Ph.D., State University of New York at Buffalo—Professor

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

**Daniel D. Tesson**, BBA, St. John Fisher College; MS, Clarkson College of Technology; Ph.D., Syracuse University; CPA, New York—Daniel D. Tesson Endowed Professor for Accounting

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

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

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

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

### Management

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

**Kristin Bain**, BA, University of Northern Colorado; MA, University of Denver; Ph.D., University of Utah, Salt Lake City—Assistant Professor

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

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

**Richard DeMartino**, BA, Roanoke College; MPA, Ph.D., University of Virginia—Professor

**John E. Ettlie**, BS, MS, Ph.D., Northwestern University—Professor

**Kenan Guler**, MS, New York University; Ph.D., Rutgers University—Assistant Professor

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

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

**Martin Lawlor**, BA, State University of New York at Buffalo; MLS, State University College at Geneseo; MBA, Rochester Institute of Technology—Senior Lecturer

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

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

**Molly McGowan**, BA, State University College at Geneseo; MPA, State University College at Brockport—Senior Lecturer; Director, The Leadership Academy at Saunders

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

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

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

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

**Sandra L. Rothenberg**, BS, Syracuse University; MS, Ph.D., Massachusetts Institute of Technology—Professor

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

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

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

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

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

### Management Information Systems, Marketing, and Digital Business

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

**Duygu (Kayiran) Adkevelioğlu**, BS, MS, Bilkent University (Turkey); Ph.D., University of California, Irvine—Assistant Professor

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

**Michael Caceci**, BA, City University of New York; MBA, Pace University—Lecturer

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

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

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

**Neil Hair**, BS, Cardiff University (United Kingdom); DIPM, Chartered Institute of Marketing; MS, Sheffield Hallam University (United Kingdom); Ph.D., Cranfield University (United Kingdom)—Associate Professor

**Saiwu Lin**, MS, University of Arizona—Lecturer

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

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

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

Manchester (United Kingdom)—  
Assistant Professor

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

**Victor J. Perotti**, BS, MA, MS, Ph.D., The Ohio State University—Benjamin Forman Professor for Collaborative Research

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

**Jing Tang**, BS, University of Science and Technology of China (China); MS, University of Chinese Academy of Sciences (China); MPhil., EMLYON Business School (France); Ph.D., Case Western Reserve University—Assistant Professor

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

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

### International Hospitality and Service Innovation

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

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

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

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

**Muhammet Kesgin**, BSc, MSc, Akdeniz University (Turkey);

Ph.D., Coventry University (United Kingdom)—Associate Professor

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

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

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

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

### Distinguished Professorships

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#### J. Warren McClure Research Professorship in Marketing

*Established:* 1977

*Donor:* Mr. and Mrs. J. Warren McClure

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

*Held by:* Rajendran Sriramachandra Murthy, Ph.D.

#### Madelon and Richard Rosett Professorship for Research

*Established:* 2000

*Donor:* Madelon and Richard Rosett

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

*Held by:* Hao Zhang

#### Benjamin Forman Professorship for Collaborative Research

*Established:* 2008

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

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

*Held by:* Vic Perotti

#### Benjamin Forman Professorship for Research

*Established:* 2008

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

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

*Held by:* Zhi Tang, Ph.D.; Rong Yang, Ph.D.

#### Daniel D. Tessoni Professorship in Accounting

*Established:* 2015

*Donor:* Friends and Alumni of Dan Tessoni and Saunders College of Business

*Purpose:* To honor Daniel D. Tessoni for his teaching contributions and his lifelong impact on students

*Held by:* Daniel Tessoni, Ph.D.

# Golisano College of Computing and Information Sciences

Anne R. Haake, Dean  
[rit.edu/computing](http://rit.edu/computing)

## Programs of Study

|   |    |
|---|----|
| Artificial Intelligence in Computer Science, Adv. Cert. | 52 |
| Big Data Analytics, Adv. Cert.                          | 53 |
| Computer Science, MS                                    | 54 |
| Computing and Information Sciences, Ph.D.               | 55 |
| ⊕ Computing Security, MS                                | 57 |
| ⊕ Cybersecurity, Adv. Cert.                             | 59 |
| ⊕ Data Science, MS                                      | 60 |
| Game Design and Development, MS                         | 61 |
| ⊕ Health Informatics, MS                                | 62 |
| ⊕ Human-Computer Interaction, MS                        | 63 |
| ⊕ Information Technology and Analytics, MS              | 65 |
| Software Engineering, MS                                | 67 |
| Web Development, Adv. Cert.                             | 68 |

⊕ Online learning option available.

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

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

Please visit the college's website—[www.rit.edu/computing](http://www.rit.edu/computing)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

## 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.

## Artificial Intelligence in Computer Science, Adv. Cert.

[www.rit.edu/study/artificial-intelligence-computer-science-adv-cert](http://www.rit.edu/study/artificial-intelligence-computer-science-adv-cert)

**Zachary Butler, Professor**

**585-475-6155, [zxbvcs@rit.edu](mailto:zxbvcs@rit.edu)**

### Program overview

The advanced certificate in artificial intelligence for computer science is intended for traditional graduate students as well as professionals who want to advance their understanding of artificial intelligence. You will learn how to apply deep learning, natural language processing, and knowledge representation to solve problems which have been considered unsolvable until recently. This artificial intelligence graduate certificate will enable you to develop the skills needed to work in the many industries currently dealing with problems in the field of artificial intelligence.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Artificial Intelligence in Computer Science, advanced certificate, typical course sequence

| COURSE                    | SEMESTER CREDIT HOURS                    |
|---------------------------|--|
| <b>First Year</b>         |  |
| CSCI-630                  | Foundations of Artificial Intelligence 3 |
| CSCI-635                  | Introduction to Machine Learning 3       |
|                           | Elective 3                               |
| <b>Second Year</b>        |  |
|                           | Elective 3                               |
| <b>Total Credit Hours</b> |  |
|                           | <b>12</b>                                |

### Admission requirements

To be considered for admission to the advanced certificate in artificial intelligence for computer science, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in science, computing, or engineering, with college-level experience in probability and statistics and college-level knowledge of computer programming.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.

- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### Study Options

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



## Big Data Analytics, Adv. Cert.

[www.rit.edu/study/big-data-analytics-adv-cert](http://www.rit.edu/study/big-data-analytics-adv-cert)

**Hans-Peter Bischof, Professor**  
585-475-5568, [hxbics@rit.edu](mailto:hxbics@rit.edu)

### Program overview

The mass amount of data being collected by industries, retailers, and organizations requires knowledgeable professionals who can manage, process, and analyze this information to identify and understand trends and to make meaningful business decisions.

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—where knowledge in data analysis is in demand.

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.

The curriculum consists of two required courses and two elective courses selected by the student in topic areas related to big data.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Big Data Analytics, advanced certificate, typical course sequence

| COURSE                            | CR. HRS.  |
|-----------------------------------|-----------|
| <b>First Year</b>                 |           |
| CSCI-620 Introduction to Big Data | 3         |
| CSCI-720 Big Data Analytics       | 3         |
| Elective                          | 3         |
| <b>Second Year</b>                |           |
| Elective                          | 3         |
| <b>Total Credit Hours</b>         | <b>12</b> |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in science, computing, engineering, or a related major.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.

- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in probability and statistics, computer programming in a high-level language, and database systems.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### Study Options

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



## Computer Science, MS

[www.rit.edu/study/computer-science-ms](http://www.rit.edu/study/computer-science-ms)

**Hans-Peter Bischof, Professor**  
585-475-5568, [hxbics@rit.edu](mailto:hxbics@rit.edu)

### Program overview

The computer science masters 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. You'll apply theoretical principles underlying computer science, ensuring you acquire the intellectual tools necessary to keep up-to-date in this rapidly evolving discipline. With focused course work in areas such as computer graphics and visualization, data management, distributed systems, intelligent systems, programming languages and tools, and security, you'll be prepared for career advancement in a range of areas.

The program consists of a core curriculum, a diverse set of clusters, and many additional electives. The clusters provide students with the opportunity to obtain depth in a computer science discipline. The electives add the necessary breadth of knowledge required by industry. This combination prepares our graduates to engineer modern computing systems and contribute to all aspects of systems life cycles.

Clusters are offered in a variety of areas, including computer graphics and visualization, data management, distributed systems, intelligent systems, programming languages and tools, security, and theory. Certain pre-approved courses from other departments also may be counted toward the degree.

The computer science master's helps students prepare for academic and research careers in computer science or a related discipline. The program is designed for students who have an undergraduate major or minor in computer science as well as those who have a strong background in a field in which computers are applied.

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

### Plan of Study

The program consists of one core course, three courses in a cluster, four electives, and a thesis or project. For those choosing to complete a project in place of a thesis, students complete one additional elective. The degree is offered on a full- or part-time basis.

Full-time students take three or four courses per semester and may be able to complete the course work in three semesters. Full-time students who are required to take additional bridge courses may be able to complete the course work in four semesters.

Part-time students take one or two courses per semester and may be able to complete the course work in four to five semesters. The time required to complete a master's project is one semester. To complete a master's thesis, two semesters is typical.

### Clusters

Students select three cluster courses from the following areas:

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.

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.

The distributed systems cluster 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 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).

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.

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.

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 a 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 Computer Science MS Project. Students participate in required in-class presentations that are critiqued. A summary project report and public presentation of the student's project (in poster form) occurs at the end of the semester.

## Curriculum

### Computer Science (thesis option), MS degree, typical course sequence

| COURSE                              | SEMESTER CREDIT HOURS |
|-------------------------------------|-----------------------|
| CSCI-665 Foundations of Algorithms  | 3                     |
| CSCI-790 Computer Science MS Thesis | 6                     |
| Cluster Courses                     | 9                     |
| Electives                           | 12                    |
| <b>Total Semester Credit Hours</b>  | <b>30</b>             |

### Computer Science (project option), MS degree, typical course sequence

| COURSE                               | SEMESTER CREDIT HOURS |
|--------------------------------------|-----------------------|
| CSCI-665 Foundations of Algorithms   | 3                     |
| CSCI-788 Computer Science MS Project | 3                     |
| Cluster Courses                      | 9                     |
| Electives                            | 15                    |
| <b>Total Semester Credit Hours</b>   | <b>30</b>             |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## 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).

## 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.

## Computing and Information Sciences, Ph.D.

[www.rit.edu/study/computing-and-information-sciences-phd](http://www.rit.edu/study/computing-and-information-sciences-phd)

**Pengcheng Shi, Professor**

**585-475-6147, [spcast@rit.edu](mailto:spcast@rit.edu)**

## Program overview

In the Ph.D. in computing and information sciences, you will conduct both foundational and applied research to address diverse and important challenges within and beyond computing, and benefit from world-class faculty, diverse academic offerings, and modern facilities. Our graduates are poised to excel in both computing and interdisciplinary environments in academia, government, and industry.

The doctoral program in computing and information sciences highlights two of the most unique characteristics of the Golisano College for Computing and Information Sciences: 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 cyber-infrastructure 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.

## Intradisciplinary Knowledge

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

#### Domain applications

- Accessibility and inclusion
- Biomedical computing

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

### Plan of Study

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

#### Required Courses

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

#### Electives

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

#### Dissertation and Research

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

#### Assessments

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

##### 1. Research potential assessment: qualifying exam

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

##### 2. Thesis proposal defense: candidacy exam

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

##### 3. Dissertation defense

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

## Curriculum

### Computing and Information Sciences, Ph.D. degree, typical course sequence

| COURSE                             |  | SEMESTER CREDIT HOURS |
|------------------------------------|--|-----------------------|
| <b>First Year</b>                  |  |                       |
| CISC-810                           | Research Foundations                             | 3                     |
| CISC-820                           | Quantitative Foundations                         | 3                     |
| CISC-830                           | Cyberinfrastructure Foundations                  | 3                     |
| CISC-890                           | Dissertation and Research                        | 6                     |
| CISC-896                           | Colloquium in Computing and Information Sciences | 0                     |
|                                    | Infrastructure Elective                          | 3                     |
|                                    | Interaction Elective                             | 3                     |
|                                    | Informatics Elective                             | 3                     |
| <b>Second Year</b>                 |  |                       |
| CISC-807                           | Teaching Skills Workshop                         | 2                     |
| CISC-890                           | Dissertation and Research                        | 7                     |
| CISC-896                           | Colloquium in Computing and Information Sciences | 0                     |
|                                    | Electives  | 9                     |
| <b>Third Year</b>                  |  |                       |
| CISC-890                           | Dissertation and Research                        | 18                    |
| <b>Total Semester Credit Hours</b> |  | <b>60</b>             |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college. 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.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Submit professional or research paper sample(s), if available.
- Have completed at least 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.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## 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 virtually.

## 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 interdisciplinary program of study and research interests.

## Assistantships

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

## Residency Requirement

One year of full-time on-campus residency is required.

## Computing Security, MS

[www.rit.edu/study/computing-security-ms](http://www.rit.edu/study/computing-security-ms)

**Sumita Mishra, Professor**

**585-475-4475, [sumita.mishra@rit.edu](mailto:sumita.mishra@rit.edu)**

## Program overview

There is critical importance to building security and survivability into the hardware and software of computing systems as they are designed and developed, 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. This cybersecurity masters enables students to develop a strong theoretical and practical foundation in secure computing, preparing them for leadership positions in the computing security industry, academia, or research careers, or to pursue a more advanced degree in a computing discipline.

The cyber security master's 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 program is offered online and on campus.

The curriculum consists of three required core courses, up to six technical electives (depending on the capstone option chosen), and a thesis, project, or capstone course.

## Electives

Students can develop a specialization in one of several security-related areas by selecting technical electives under the guidance of a faculty advisor. Students are required to choose up to six technical electives.

## Curriculum

### Computing Security (thesis option), MS degree, typical course sequence

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

### Computing Security (project option), MS degree, typical course sequence

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



**Computing Security (capstone course option), MS degree, typical course sequence**

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

**Admission requirements**

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in computing security, computer science, software engineering, information technology, networking, computer engineering, electrical engineering, applied mathematics, or computer engineering technology (exceptional students from other fields may be admitted on a contingent basis).
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- One letter of recommendation is required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

**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. For more information on the bridge program, please consult the Computer Security MS Handbook.



## Cybersecurity, Adv. Cert.

[www.rit.edu/study/cybersecurity-adv-cert](http://www.rit.edu/study/cybersecurity-adv-cert)

**Sumita Mishra, Professor**

**585-475-4475, [sumita.mishra@rit.edu](mailto:sumita.mishra@rit.edu)**

### Program overview

Gain the fundamental knowledge and expertise in network security and forensics that is necessary for security in networked environments. In the advanced certificate in cybersecurity, you'll learn to make computers and networks resistant to attack by monitoring intrusions and closing off vulnerabilities.

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.

#### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Cybersecurity, advanced certificate, typical course sequence

| COURSE                                       | SEMESTER CREDIT HOURS                   |
|--|---|
| <b>First Year</b>                            |   |
| <i>Choose four of the following courses:</i> |   |
| CSEC-603                                     | Enterprise Security                     |
| CSEC-730                                     | Advanced Computer Forensics             |
| CSEC-733                                     | Information Security Risk Management    |
| CSEC-742                                     | Computer System Security                |
| CSEC-743                                     | Computer Viruses and Malicious Software |
| CSEC-744                                     | Network Security                        |
| <b>Total Semester Credit Hours</b>           | <b>12</b>                               |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- One letter of recommendation is required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.

- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

#### Bridge Program

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

#### Study Options

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

## Data Science, MS

[www.rit.edu/study/data-science-ms](http://www.rit.edu/study/data-science-ms)

### For On-Campus Program

**Travis Desell, Associate Professor**

**585-475-2991, [tjdvs@rit.edu](mailto:tjdvs@rit.edu)**

### For Online Program

**Karen Palmer, Graduate and Online Recruitment Coordinator 585-475-5656, [kbpges@rit.edu](mailto:kbpges@rit.edu)**

## Program overview

One of the hottest fields in computing, the data science masters gives you the practical and theoretical skills to handle large-scale data management and analysis challenges that arise in today's data-driven organizations. This program appeals to professionals looking to enhance their skill set, and includes opportunities for customized course work within the broad field of data science and its various application areas.

In response to the growing need to generate and analyze meaningful data across all industries, demand is on the rise for a new breed of professionals skilled in both analytics and computing. The MS in data science encourages students to work with faculty experts in the field of data science, analytics, and infrastructure who provide hands-on experience solving real problems. The curriculum includes opportunities for students to choose elective courses to pursue a variety of career paths within the broad field of data science and its various application areas. The program prepares students—regardless of their scientific, engineering, or business background—to pursue a career in data science.

RIT's colleges of Science and Computing and Information Sciences came together to deliver the MS in data science, which combines the expertise and knowledge from faculty in both colleges to provide you with a unique understanding of math, computing, and technology. This approach enhances your learning outcomes and increases career marketability.

## Curriculum

### Data Science, MS degree, typical course sequence (on-campus program)

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| DSCI-601                           | Applied Data Science I                    | 3                     |
| DSCI-633                           | Foundations of Data Science and Analytics | 3                     |
| DSCI-644                           | Software Engineering for Data Science     | 3                     |
| ISTE-608                           | Database Design And Implementation        | 3                     |
| STAT-614                           | Applied Statistics                        | 3                     |
| SWEN-601                           | Software Construction                     | 3                     |
|                                    | Electives                                 | 3                     |
| <b>Second Year</b>                 |   |                       |
| DSCI-602                           | Applied Data Science II                   | 3                     |
|                                    | Electives                                 | 6                     |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>             |

### Data Science, MS degree, typical course sequence (online program)

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| DSCI-633                           | Foundations of Data Science and Analytics | 3                     |
| ISTE-608                           | Database And Implementation               | 3                     |
| STAT-614                           | Applied Statistics                        | 3                     |
| SWEN-601                           | Database Design And Implementation        | 3                     |
|                                    | Elective                                  | 3                     |
| <b>Second Year</b>                 |   |                       |
| DSCI-644                           | Software Engineering for Data Science     | 3                     |
| DSCI-799                           | Graduate Capstone                         | 3                     |
|                                    | Electives                                 | 9                     |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>             |

### Data Science, MS degree, typical course sequence (online + edX program)

| COURSE                             |                                       | SEMESTER CREDIT HOURS |
|------------------------------------|---------------------------------------|-----------------------|
| <b>First Year</b>                  |                                       |                       |
| ISTE-608                           | Database Design And Implementation    | 3                     |
| SWEN-601                           | Software Construction                 | 3                     |
|                                    | edX Micromasters                      | 9                     |
|                                    | Elective                              | 3                     |
| <b>Second Year</b>                 |                                       |                       |
| DSCI-644                           | Software Engineering for Data Science | 3                     |
| DSCI-799                           | Graduate Capstone                     | 3                     |
|                                    | Electives                             | 6                     |
| <b>Total Semester Credit Hours</b> |                                       | <b>30</b>             |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in computer programming and statistics.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

## Game Design and Development, MS

[www.rit.edu/study/game-design-and-development-ms](http://www.rit.edu/study/game-design-and-development-ms)

David Simkins, Associate Professor

[dwsimkins@mail.rit.edu](mailto:dwsimkins@mail.rit.edu)

### Program overview

Explore the simulation, edutainment, or visualization landscape as you enhance your game design and development skills to create truly innovative games.

In the game design and development masters, students explore the entertainment technology landscape as well as other related areas. The program simultaneously covers the breadth of the game design and development landscape through study in topics such as computer graphics, game engines, interactive narrative, and game world design. The program is characterized by a clear focus on development, but also educates developers in the design process. The degree is intended specifically for students who aspire to hold careers within the professional games industry or a related field such as simulation, edutainment or visualization.

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

### Capstone Experience

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

### Creative Industry Day

RIT's Office of Career Services and Cooperative Education hosts Creative Industry Day, which connects students majoring in art, design, film and animation, photography, and select computing majors with companies, organizations, creative agencies, design firms, and more. The 2021 Creative Industry Day will be a week-long virtual event where you'll be able to network with company representatives and interview directly for open co-op and permanent employment positions.

### Curriculum

#### Game Design and Development, MS degree, typical course sequence

| COURSE                             | SEMESTER                                  | CREDIT HOURS |
|------------------------------------|---|--------------|
| <b>First Year</b>                  |   |              |
| 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            |
| <b>Second Year</b>                 |   |              |
| IGME-695                           | Colloquium in Game Design and Development | 1            |
| IGME-788                           | Capstone Design                           | 3            |
| IGME-789                           | Capstone Development                      | 3            |
|                                    | Advanced Electives                        | 6            |
| <b>Total Semester Credit Hours</b> |   | <b>33</b>    |

### Advanced electives

| 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            |
| IGME-621 | Board and Card Game Design and Development                  |
| IGME-622 | Game Balance  |
| IGME-623 | Theory and Design of Role Play and Interactive Narrative    |
| IGME-624 | Tabletop Role-Playing Game Design and Development           |
| IGME-670 | Digital Audio Production                                    |
| IGME-671 | Interactive Game and Audio                                  |
| IGME-680 | IGM Production Studio                                       |
| IGME-681 | Innovation & Invention                                      |
| IGME-690 | IGM Graduate Seminar  |
| IGME-730 | Game Design and Development for Casual and Mobile Platforms |
| IGME-740 | Game Graphics Programming                                   |
| IGME-742 | Level Design  |
| IGME-750 | Game Engine Design and Development                          |
| IGME-753 | Console Development   |
| IGME-760 | Artificial Intelligence for Gameplay                        |
| IGME-790 | Graduate Seminar in IGM                                     |
| IGME-796 | Advanced Topics in Game Design*                             |
| IGME-797 | Advanced Topics in Game Development*                        |
| IGME-799 | Independent Study   |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in a relevant field such as information technology, computer science, software engineering, or computer graphics. Students with undergraduate degrees in related disciplines such as digital media or human-computer interaction may be considered.
- Recommended minimum cumulative GPA of 3.25 (or equivalent) or a first-class international degree with distinction. Domestic students with a GPA below 3.25 are required to submit GRE scores.
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### 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 prereq-

visits, additional course work may be recommended to bridge any educational gaps.

## Health Informatics, MS

[www.rit.edu/study/health-informatics-ms](http://www.rit.edu/study/health-informatics-ms)

**Qi Yu, Professor**

**585-475-6929, [Qi.Yu@rit.edu](mailto:Qi.Yu@rit.edu)**

### Program overview

With an increase in the application and use of computing in the health care industry, there is an unprecedented need for professionals who can harness the creative power of information technology to make an impact on the acquisition, storage, management, and retrieval of patient data, as well as access medical data needed to improve patient care, research, and education. A health informatics masters provides professionals with an understanding of formal medical terminology, clinical processes, and guidelines; and an understanding of how information and communication systems can be used to successfully deliver patient information in various health care settings.

### Plan of study

The MS in health informatics is only available online. It applies the creative power of information technology to the information and data needs of health care. The program offers two tracks: the clinician track and analyst track.

The program is designed for working professionals in diverse health care clinical and technology settings. The curriculum consists of seven core courses and concentration selections from six track courses. These track courses will focus on software development, system integration, data analysis, clinical application building, systems analysis, and project management. The MS in health informatics draws upon the interdisciplinary strengths of the colleges within RIT, along with its health care partner, Rochester Regional Health System (RRH).

### Curriculum

#### Health Informatics, MS degree, typical course sequence

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| HCIN-610                           | Foundations of Human-Computer Interaction | 3                     |
| MEDI-701                           | Introduction to Health Informatics        | 3                     |
| MEDI-704                           | Practice of Health Care (summer)          | 3                     |
| MEDI-610                           | Scripting Fundamentals                    | 3                     |
| MEDI-735                           | Clinical Information Systems              | 3                     |
| <b>Second Year</b>                 |   |                       |
| CINT-628                           | Introduction to Applied Informatics       | 3                     |
| ISTE-608                           | Database Design And Implementation        | 3                     |
| ISTE-764                           | Project Management                        | 3                     |
| MEDI-731                           | System Integration Concepts               | 3                     |
| MEDI-788                           | Capstone in Health Informatics            | 3                     |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>             |

### Admission requirements

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

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit two letters of recommendation from individuals who are able to assess the applicant's potential for success in the program.
- Submit a current resume or curriculum vitae.

- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.
- Applicants from international universities are required to submit GRE scores.
- It is recommended that applicants have a minimum of three years of experience in a health care, health-related, or information technology organization. Applicants who do not meet this requirement may be asked to complete certain undergraduate/graduate level courses as a prerequisite.
- An interview with the program's admissions committee may also be required.

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

### Prerequisites

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

### Bridge program

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

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

## Human-Computer Interaction, MS

[www.rit.edu/study/human-computer-interaction-ms](http://www.rit.edu/study/human-computer-interaction-ms)

**Qi Yu, Professor**

**585-475-6929, [Qi.Yu@rit.edu](mailto:Qi.Yu@rit.edu)**

### Program overview

Explore the design methods, evaluation, and implementation of interactive computing systems for human use. Building on decades of research in psychology and human behavior, the human-computer interaction

master's degree focuses on the skills needed by user-experience researchers and computing professionals, including observing how people interact with websites and software and the design new technologies to help them accomplish their goals. With computing moving rapidly away from the traditional desktop, companies need professionals that understand how evolving technologies can be designed to be intuitive, effective, and compelling for users.

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

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

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

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

#### Program electives

Students select two elective courses. In select cases, students can petition for approval to include a course complementary to the degree program as a program elective.

#### Application domain courses

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

**e-Learning Technologies**—The recent boom in online learning has created a need for professionals to design such systems. Students learn the fundamentals of instructional technology and interactive courseware.

**Geographical Information Science and Technology**—Research how digital technology is revolutionizing how humans view earth with topics in thematic cartography and geographic visualization.

**Self-defined Application Domain**—Design your own concentration.

**Smart Device Application Design and Development**—Smart devices are no longer limited to phones. Design and study human interaction with cutting edge mobile technology.

**Web Development**—Study the foundations of web technologies, enabling students to better understand how The Internet can be built to improve the experience of a diverse range of end users.

#### Thesis/Capstone project

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

### Creative Industry Day

RIT's Office of Career Services and Cooperative Education hosts Creative Industry Day, which connects students majoring in art, design, film and animation, photography, and select computing majors with companies, organizations, creative agencies, design firms, and more. The 2021 Creative Industry Day will be a week-long virtual event where you'll be able to network with company representatives and interview directly for open co-op and permanent employment positions.

## Curriculum

### Human-Computer Interaction (capstone project option), MS degree, typical course sequence

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

### Human-Computer Interaction (thesis option), MS degree, typical course sequence

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

### Human-Computer Interaction (directed final project option\*), MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS                       |
|------------------------------------|---|
| <b>First Year</b>                  |   |
| HCIN-600                           | Research Methods 3                          |
| HCIN-610                           | Foundations of Human-Computer Interaction 3 |
| HCIN-620                           | Information and Interaction Design 3        |
| HCIN-630                           | Usability Testing 3                         |
|                                    | Application Domain Courses 6                |
|                                    | Program Electives 6                         |
| <b>Second Year</b>                 |   |
| HCIN-797                           | MS HCI Directed Final Project 3             |
|                                    | Program Elective 3                          |
| <b>Total Semester Credit Hours</b> | <b>30</b>                                   |

\* Directed Final Project Option is for online students.

### Application domain courses

#### e-Learning technologies

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

#### Geographic information science and technology

| COURSE   |   |
|----------|---|
| IGME-770 | Geographic Information Science and Technology |
| IGME-772 | Geographic Visualization                      |

#### Smart device application design and development

| COURSE   |  |
|----------|--|
| HCIN-720 | Prototyping Wearable and Internet of Things Devices                      |
| HCIN-722 | Human-Computer Interaction with Mobile, Wearable, and Ubiquitous Devices |

#### Web development

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

### Program electives

| COURSE   |  |
|----------|--|
| HCIN-660 | Fundamentals of Instructional Technology                                 |
| HCIN-661 | Interactive Courseware   |
| HCIN-700 | Current Topics in HCI  |
| HCIN-720 | Prototyping Wearable and Internet of Things Devices                      |
| HCIN-722 | Human-Computer Interaction with Mobile, Wearable, and Ubiquitous Devices |
| HCIN-730 | User-Centered Design Methods   |
| HCIN-794 | MS Human Computer Interaction Capstone Proposal                          |
| IGME-770 | Geographic Information Science and Technology                            |
| IGME-772 | Geographic Visualization   |
| ISTE-645 | Foundations of Web Technologies I  |
| ISTE-646 | Foundations of Web Technologies II                                       |
| ISTE-782 | Visual Analytics   |
| MEDI-701 | Introduction to Health Informatics                                       |
| PSYC-712 | Graduate Cognition   |
| PSYC-715 | Graduate Perception  |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in computing; however, study in other disciplines will be given consideration.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## 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.

## Information Technology and Analytics, MS

[www.rit.edu/study/information-technology-and-analytics-ms](http://www.rit.edu/study/information-technology-and-analytics-ms)

**Qi Yu, Professor**

**585-475-6929, [Qi.Yu@rit.edu](mailto:Qi.Yu@rit.edu)**

## Program overview

Technology has woven itself into the fabric of society, binding people and information closer together than ever before. This new digital era brings with it exciting innovations. It also brings a host of new, unexplored problems that can be unlocked through data analytics. The MS in information sciences and technologies provides an opportunity for in-depth, career-oriented study that explores how information is understood and leverages the most current data analytics techniques to address industry problems.

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

Graduate study in a computing discipline that only focuses on traditional computing approaches is not flexible enough to meet the needs of the real world. New hardware and software tools are continually introduced into the market. IT professionals must have a specific area of expertise, as well as adaptability, to tackle the next new thing. Or, just as often, retrofit available technologies to help users adapt to the latest trends.

The MS in information technology and analytics provides an opportunity for in-depth study to prepare for today's high-demand computing careers. Companies are drowning in data—structured, semi-structured, and unstructured. Big data is not just high transaction volumes; it is also data in various formats, with high velocity change, and increasing complexity. Information is gleaned from unstructured sources—such as web traffic or social networks—as well as traditional ones; and information delivery must be immediate and on demand.

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

The information sciences and technologies program addresses the web systems and integration technologies, and the information management and database technology pillars, of the IT academic discipline, along with the additional option of discovery informatics.

The program can be completed on-campus or online. The on-campus program consists of 30 semester credit hours of graduate study and includes four core courses, four or five track or domain electives (depending upon capstone option chosen), and either a thesis or project. The online option consist of 9 core courses and a capstone project.

## Domain Electives

Chosen only by those enrolled in the on-campus option, domain electives are available in: analytics, information management and database technology, or web systems and integration technologies. With permission of the graduate program director, students may select the special topics track to fulfill this requirement. See the graduate program director for more information.

### Thesis/Capstone Options

For the on-campus option of the program, students may choose a project or a thesis to build upon their domain of study. The project option is 3 credit hours and requires one additional 3 credit domain elective. The thesis option is 6 credit hours and does not require an additional elective. The online option consist of a capstone project.

## Curriculum

### Information Technology and Analytics (thesis and project options), MS degree, typical course sequence

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>   |                       |
| DSCI-633 Foundations of Data Science and Analytics            | 3                     |
| ISTE-605 Scholarship In Information Sciences And Technologies | 3                     |
| ISTE-610 Non-Relational Data Management                       | 3                     |
| ISTE-612 Information Retrieval and Text Mining                | 3                     |
| Domain Electives  | 12                    |
| <b>Second Year</b>  |                       |
| Choose one of the following:                                  | 6                     |
| ISTE-790 Thesis in Information Sciences and Technologies      | 6                     |
| or  |                       |
| ISTE-791 Project In Information Sciences And Technologies     | 3                     |
| Domain Elective   | 3                     |
| <b>Total Semester Credit Hours</b>                            | <b>30</b>             |

### Domain electives

| COURSE   |
|--|
| Data Analytics                                 |
| ISTE-724 Data Warehousing                      |
| ISTE-732 IOT Analytics                         |
| ISTE-780 Data Driven Knowledge Discovery       |
| ISTE-782 Visual Analytics                      |
| Information Management and Database Technology |
| ISTE-721 Information Assurance Fundamentals    |
| ISTE-722 Database Connectivity and Access      |
| ISTE-724 Data Warehousing                      |
| ISTE-726 Database Management and Access        |
| ISTE-728 Database Management and Access II     |
| Other approved electives                       |
| ISTE-730 Foundations of IOT                    |
| ISTE-764 Project Management                    |
| ISTE-792 Capstone Guidance Colloquium          |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students

below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### 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.

## Software Engineering, MS

[www.rit.edu/study/software-engineering-ms](http://www.rit.edu/study/software-engineering-ms)

**J Scott Hawker, Associate Professor**

**585-475-2705, [jshvse@rit.edu](mailto:jshvse@rit.edu)**

### Program overview

As you pursue a software engineering master's degree your educational experience will parallel the realities of the industry as you learn how to define, design, develop, and deliver modern software. Utilize computer science theories to create software that allows computers to meet the demands of an ever-changing, technologically-dependent society. Conduct research in many areas including data science for software engineering, artificial intelligence applications in software engineering, software modeling. Gain hands-on experience through team-based projects that help you master modern software engineering techniques.

Our program accepts students from many educational backgrounds, including recent undergraduates and professionals interested in pursuing a software engineering career. An introductory course, Software Construction, helps students get up to speed on programming and basic computing concepts. We also have an introductory core course, Software Engineering Fundamentals. Students with degrees in engineering, science, business, and education have all been successful graduates of our program. Our students master modern software engineering techniques in a team setting using state-of-the-art tools and platforms.

RIT is renowned for its cooperative education program, one of the oldest and largest programs in the world. Co-op is full-time, paid work experience in industry. The software engineering master's degree has had a number of graduates accept positions for full-time employment at companies such as Citrix, SpaceX, Intuit, Amazon, Microsoft, and many others.

### Plan of Study

RIT's software engineering master's degree focuses on team-based activities. Since these systems are rarely the result of a single individual's effort, our team-based approach recognizes the significant role teams play in the design, development, and implementation of software systems of varying size and complexity. Our students are actively engaged in software architecture, software security, and mining of software repositories research. They also are involved in the software engineering department's emerging areas of research in data science for software engineering and software engineering for data science. As a result, our software engineering masters degree prepares you to contribute to and lead software development projects from day one.

With careful selection of your electives and the topics chosen for your course projects and capstone project or thesis research, you may focus on core software engineering topics, or you may specialize in the applications of software engineering to numerous fields, including:

- Data Science: Courses are available in areas such as Foundations of Data Science, Software Engineering for Data Science, Applied Data Science, Engineering Cloud Software Systems, etc.
- Full-Stack Web Development: Courses are available in areas such as Software Architecture, Client Design and Development, Server Design and Development, and Secure Web Application Development.
- Technology and Project Management: You may take courses from RIT's MS in business analytics or MS in technology innovation management and entrepreneurship.

In RIT's software engineering department, you will learn and receive personalized attention from faculty who are working in many areas of software engineering and its applications. Outfitted with the latest hardware and software technology, our facilities include studio labs, project

labs, team rooms, a collaboration lab, and a real-time and embedded systems lab—all designed to help you collaborate on projects, polish your skills, and collaborate with faculty. The department has partnered with a number of software companies to provide you with access to a wide range of software products for learning and research.

### Curriculum

#### Software Engineering (thesis option), MS degree, typical course sequence

| COURSE                                       | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                            |                       |
| SWEN-601 Software Construction               | 3                     |
| SWEN-610 Foundations of Software Engineering | 3                     |
| SWEN-640 Research Methods                    | 3                     |
| SWEN-746 Model-Driven Development            | 3                     |
| SWEN-732 Collaborative Software Development  | 3                     |
| Elective                                     | 3                     |
| <b>Second Year</b>                           |                       |
| SWEN-755 Software Architecture               | 3                     |
| SWEN-777 Software Quality Assurance          | 3                     |
| SWEN-790 Thesis                              | 6                     |
| SWEN-799 Independent Study                   | 3                     |
| Elective                                     | 3                     |
| <b>Total Semester Credit Hours</b>           | <b>36</b>             |

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

| COURSE                                       | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                            |                       |
| SWEN-601 Software Construction               | 3                     |
| SWEN-610 Foundations of Software Engineering | 3                     |
| SWEN-640 Research Methods                    | 3                     |
| SWEN-746 Model-Driven Development            | 3                     |
| SWEN-732 Collaborative Software Development  | 3                     |
| Elective                                     | 3                     |
| <b>Second Year</b>                           |                       |
| SWEN-755 Software Architecture               | 3                     |
| SWEN-777 Software Quality                    | 3                     |
| SWEN-780 Capstone Research Project           | 3                     |
| Electives                                    | 6                     |
| SE Elective                                  | 3                     |
| <b>Total Semester Credit Hours</b>           | <b>36</b>             |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students

below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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

### 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.

[www.rit.edu/study/web-development-adv-cert](http://www.rit.edu/study/web-development-adv-cert)

**Qi Yu, Professor**

**585-475-6929, Qi.Yu@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.

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.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

## Curriculum

### Web Development, advanced certificate, typical course sequence

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| HCIN-610                           | Foundations of Human-Computer Interaction | 3                     |
| ISTE-645                           | Foundations of Web Technologies I         | 3                     |
| ISTE-646                           | Foundations Of Web Technologies II        | 3                     |
| HCIN-636                           | Interactive Programming                   | 3                     |
| <b>Total Semester Credit Hours</b> |   | <b>12</b>             |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students



below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

**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.

## Faculty

### Dean's Office

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**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—Senior 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 and Scholarship

### Computer Science

---

**Mohan Kumar**, BE, Bangalore University (India); MTech, Ph.D., Indian Institute of Science (India)—Professor

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

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

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

**TJ. Borrelli**, BS, St. John Fisher College; MS, Rochester Institute of Technology—Principal Lecturer

**Jeremy Brown**, BS, Rochester Institute of Technology; MS, Florida Institute of Technology—Lecturer

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

**Ting Cao**, BS, Changsha University of Science and Technology (China); MS, University of Edinburgh (United Kingdom)—Lecturer

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

**Maria Cepeda**, BS, Antonio Machado Education Institute

(Spain); MS, Rochester Institute of Technology—Lecturer

**Aaron Deeveer**, BS, Pennsylvania State University; Ph.D., Cornell University—Senior Lecturer, Associate Undergraduate Program Director

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

**Peizhao Hu**, BS, University of Wales (United Kingdom); Ph.D., University of Queensland (Australia)—Associate Professor

**Scott Johnson**, BS, MS, Rochester Institute of Technology—Senior Lecturer

**Thomas Kinsman**, BS, University of Delaware; MS, Carnegie Mellon University; Ph.D., Rochester Institute of Technology—Senior Lecturer

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

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

**Michael Mior**, BS, University of Ontario (Canada); MS, University of Toronto (Canada); Ph.D., University of Waterloo (Canada)—Assistant Professor

**Arthur Nunes-Harwitt**, BS, Brandeis University; MS, University of Pittsburgh; Ph.D., Rochester Institute of Technology—Senior Lecturer

**Ifeoma Nwogu**, BS, University of Lagos (Nigeria); MS, University of

Pennsylvania; Ph.D., University of Buffalo—Assistant Professor

**Jansen Orfan**, BS, Monmouth University; MS, University of Rochester—Lecturer

**Alex Ororbia**, BS, Bucknell University; MS, Ph.D., Pennsylvania State University—Assistant Professor

**Monika Polak**, BS, MS, Ph.D., Maria Curie-Sktodowska University (Poland)—Lecture

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

**Muhammed Mustapha Rafique**, BS, National University of Computer and Emerging Sciences (Pakistan); MS, Ph.D. Virginia Tech University—Assistant Professor

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

**Leonid Reznik**, Degree of Electronics, Leningrad Institute of Aeronautical Construction (Russia); MS, St. Petersburg Aircraft Academy (Russia); Ph.D., St. Petersburg Polytechnic Institute (Russia)

**Carlos Rivero Osuna**, BS, MS, Ph.D., University of Seville (Spain)—Associate Professor

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

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

### Computing Security

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

**Hrishikesh Acharya**, BS, Indian Institute of Technology Kharagpur (India); Ph.D., University of Texas at Austin—Assistant Professor

**Ivan De Oliveira Nunes**, BE, Federal University of Espirito Santo; MS, Federal University of Minas Gerais; Ph.D., University of California Irvine—Assistant Professor

**Yidan Hu**, BE, MS, Hangzhou Dianzi University; Ph.D. University of Delaware—Assistant Professor

**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—Professor; Graduate Program Director

**Rob Olson**, BS, MS, State University of New York at Fredonia; MS, Nova Southeastern University—Senior Lecturer

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

**Hanif Rahbari**, BS, Sharif University of Technology (Iran); MS, Amirkabir University (Iran); Ph.D., University of Arizona—Assistant Professor

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

**Jonathan S. Weissman**, BS, College of Staten Island; MA, Brooklyn College—Senior Lecturer

**Matthew Wright**, BS, Harvey Mudd College; MS, Ph.D., University of Massachusetts at Amherst—Professor

### School of Information

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**Matt Huenerfauth**, MS, University of Delaware; MSc, University College Dublin (Ireland); Ph.D., University of Pennsylvania—School Director; 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

**Stephen Cady**, BA, Brooks Institute; BA, Antioch

University; MFA, University of Illinois—Lecturer

**Mingming Fan**, B.E., Beijing University of Posts and Telecommunications (China); MS, Tsinghua University (China); Ph.D., University of Toronto (Canada)—Assistant Professor

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

**Bruce H. Hartpence**, BS, MS, Ph.D., Rochester Institute of Technology—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

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

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

**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—Senior Lecturer

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

**Roshan L. Peiris**, BS, University of Moratuwa (Sri Lanka); Ph.D., National University of Singapore (Singapore)—Assistant 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

**Kristen Shinohara**, BS, University of Puget Sound; MS, University of Washington-Tacoma; Ph.D., University of Washington-Seattle—Assistant Professor

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

**Qi Yu**, BE, Zhejiang University (China); MS, National University of Singapore (Singapore); Ph.D., Virginia Polytechnic Institute and State University—Professor; Graduate Program Director

**Stephen Zilora**, BS, University of Rochester; MS, New Jersey Institute of Technology—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—Professor

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

**Carlos Castellanos**, BA, San Francisco State University; MFA, San Jose State University; Ph.D., Simon Fraser University—Assistant Professor

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

**Owen Gottlieb**, AB, MA, MA, Ph.D., New York University—Associate Professor

**W. Michelle Harris**, BS, Carnegie Mellon University; MPS, New York University—Associate Professor

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**Elizabeth Lane Lawley**, AB, MLS, University of Michigan; Ph.D., University of Alabama—Professor

**Sten McKinzie**, BS, MS, Rochester Institute of Technology—Lecturer

**Elouise Oyzon**, BFA, MFA, Rochester Institute of Technology—Associate Professor

**Konstantinos Papangelis**, BS, University of Huddersfield (United Kingdom); MS, University of Lancaster (United Kingdom); Ph.D., University of Aberdeen (United Kingdom); Fellow of the Royal Society of the Arts—Assistant Professor

**Chao Peng**, B.Arch, Hebei University of Engineering (China); MFA, University of Alaska Fairbanks; MS, Ph.D., Virginia Polytechnic Institute and State University—Assistant Professor

**David Simkins**, BA, Earlham College; MS, Ph.D., University of Wisconsin-Madison—Associate Professor

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

## Software Engineering

**Naveen Sharma**, MS, Indian Institutes of Sciences (India); Ph.D., Kent State University—Department Chair; Professor

**Travis Desell**, BS, MS, Ph.D., Rensselaer Polytechnic Institute—Associate Professor; Data Science Graduate Program Director

**J. Scott Hawker**, BS, MS, Texas Tech University; Ph.D., Lehigh University—Software Engineering Graduate Program Director; Associate Professor

**Daniel Krutz**, BS, St. John Fisher College; MS, Rochester Institute of Technology; Ph.D., Nova Southeastern University—Assistant Professor

**Andrew Meneely**, BA, Calvin College; Ph.D., North Carolina State University—Associate Professor

**Mehdi Mirakhorli**, BS, Teacher Training University (Iran); MS, National University (Iran); Ph.D., DePaul University—Assistant Professor

**Mohamed Wiem Mkaouer**, BS, University of Tunis (Tunisia); MS, University of Geneva (Switzerland); Ph.D., University of Michigan—Assistant Professor

**Christian Newman**, BS, MS, Ph.D., Kent State University—Assistant Professor

**Nidhi Rastogi**, BS, University of Delhi; MS, University of Cincinnati; Ph.D., Rensselaer Polytechnic Institute—Assistant Professor

**Zhe Yu**, BS, MS, Shanghai Jiao Tong University (China); Ph.D., North Carolina State University—Assistant Professor

**Xueling Zhang**, BS, Chongqing University, China; PhD, University of Texas—Assistant 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

**Yu Kong**, BS, Anhui University (China); MS, Ph.D., Beijing Institute of Technology (China)—Assistant Professor

**Rui Li**, BS, Harbin Institute of Technology (China); MS, Tianjin University of Technology (China); Ph.D., Rochester Institute of Technology—Assistant Professor

**Linwei Wang**, BS, Zhejiang University (China); M.Phil., Hong Kong University of Science and Technology (Hong Kong); Ph.D., Rochester Institute of Technology—Professor

# Kate Gleason College of Engineering

**Doreen Edwards, Dean**

[rit.edu/engineering](http://rit.edu/engineering)

## Programs of Study

|   |    |
|---|----|
| Biomedical and Chemical Engineering, Ph.D.  | 72 |
| Computer Engineering, MS                    | 74 |
| Electrical and Computer Engineering, Ph.D.  | 76 |
| Electrical Engineering, MS                  | 78 |
| Engineering Management, ME                  | 80 |
| Engineering, Ph.D.                          | 81 |
| Industrial and Systems Engineering, MS      | 82 |
| ⊕ Lean Six Sigma, Adv. Cert.                | 83 |
| ⊕ Manufacturing Leadership, MS              | 84 |
| Mechanical and Industrial Engineering Ph.D. | 86 |
| Mechanical Engineering, ME                  | 87 |
| Mechanical Engineering, MS                  | 88 |
| Microelectronic Engineering, MS             | 90 |
| Microsystems Engineering, Ph.D.             | 92 |
| ⊕ Product Development, MS                   | 94 |
| Sustainable Engineering, MS                 | 96 |
| Vibrations, Adv. Cert.                      | 97 |

⊕ 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 nano-systems. 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.

Please visit the college's website—[www.rit.edu/engineering](http://www.rit.edu/engineering)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

## 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.

## Biomedical and Chemical Engineering, Ph.D.

[www.rit.edu/study/biomedical-and-chemical-engineering-phd](http://www.rit.edu/study/biomedical-and-chemical-engineering-phd)

**Tom Gaborski, Associate Professor**

**585-475-4117, [trgbme@rit.edu](mailto:trgbme@rit.edu)**

### Program overview

The biomedical and chemical engineering Ph.D. program provides you with the knowledge, training, and expertise to tackle important problems in industry, academia, government, and health care.

In the biomedical and chemical engineering Ph.D. program you will complete a number of classes in your first two years of study, including foundational courses with other engineering doctorate students, discipline-specific courses within biomedical and chemical engineering, and elective courses you select with your research advisor. You will complete a research thesis project with your faculty advisor in their lab and may have the opportunity to complete a complementary industrial co-op or internship. You will graduate from the program as a highly skilled researcher who is well positioned to be a leader in the next generation of engineers who will help tackle the challenging and complex problems facing our society.

### Plan of Study

The curriculum for the biomedical and chemical engineering Ph.D. program provides the knowledge and skills to develop successful independent researchers.

**Core Courses:** Core courses, which are usually completed during the first two semesters of the program, serve as foundational preparation for elective courses. They develop your core competency skills for research, introduce the research landscape in biomedical and chemical engineering, and helping prepare you for the qualifying exam.

**Discipline Concentration Elective Courses:** The discipline concentration elective courses provide rigorous education in a field of research in biomedical and chemical engineering. Students may choose elective courses in consultation with the dissertation and research advisor, and from courses offered by the department of biomedical engineering and the department of chemical engineering.

**Focus Area Elective Courses:** Focus area elective courses provide the flexibility for you to engage in trans-disciplinary learning. In consultation with your dissertation and research advisor, you will select graduate level elective courses offered by any of the departments in the Kate Gleason College of Engineering. In addition, and subject to the program director's approval, you may choose graduate courses offered by any of the RIT colleges.

**Qualifying Exam:** You will complete a qualifying exam at the end of your first year of study. The exam evaluates your aptitude, potential, and competency in conducting doctorate-level research. Through written documentation and a presentation of your work, you will critically review a recent peer-reviewed journal article in your field and propose a creative extension of the work.

**Dissertation Proposal and Candidacy Exam:** You will present and defend a dissertation proposal to your dissertation committee typically during your third year of study. The proposal provides the opportunity for you to elaborate on your research plans and to obtain feedback from your dissertation committee on the direction and approach of your research.

**Research Review Meetings:** Research review meetings provide comprehensive feedback regarding your dissertation research progress and expected outcomes prior to the defense of your full dissertation.

**Dissertation Presentation and Defense:** You will prepare an original, technically rigorous, and well-written dissertation that describes your research body of work and novel contributions that have resulted from your doctoral studies in biomedical and chemical engineering. You will present and defend your dissertation and its accompanying research to your dissertation committee.

### Experiential Learning

#### Internships

You may apply for internships in industry or at one of the national laboratories that align with your thesis research. Internships provide an opportunity for hands-on research experience, professional networking, and can serve to advance your thesis work. In addition, you may identify research opportunities at the National Labs Career Fair, an annual event hosted by RIT that brings representatives to campus from the United States' federally-funded research and development labs.

### Curriculum

#### Biomedical and Chemical Engineering, Ph.D. degree, typical course sequence

| COURSE                             | SEMESTER                            | CREDIT HOURS |
|------------------------------------|-------------------------------------|--------------|
| <b>First Year</b>                  |                                     |              |
| ENGR-701                           | Inter-disciplinary Research Methods | 3            |
| ENGR-702                           | Translating Discovery into Practice | 3            |
| ENGR-795                           | Doctoral Seminar                    | 2            |
| ENGR-892                           | Graduate Research                   | 3            |
|                                    | Engineering Foundation 1, 2*        | 6            |
|                                    | Discipline Concentration 1, 2†      | 6            |
| <b>Second Year</b>                 |                                     |              |
| ENGR-795                           | Doctoral Seminar                    | 1            |
| ENGR-892                           | Graduate Research                   | 6            |
|                                    | Discipline Concentration 3†         | 3            |
|                                    | Focus Area Elective 1, 2, 3, 4‡     | 12           |
| <b>Third Year</b>                  |                                     |              |
| ENGR-890                           | Dissertation and Research           | 21           |
| <b>Total Semester Credit Hours</b> |                                     | <b>66</b>    |

\*Engineering Foundation Electives:

|          |  |
|----------|--|
| ENGR-707 | Engineering Analysis                                 |
| ENGR-709 | Advanced Engineering Mathematics                     |
| BIME-750 | Statistical Analysis and Modeling of Biomedical Data |

† Discipline Concentration: Any graduate level course offered by the departments of biomedical or chemical engineering, exclusive of capstones.

‡ Focus Area Elective: Any graduate level course offered by the Kate Gleason College of Engineering, exclusive of capstones.

### Admission requirements

To be considered for admission to the Ph.D. program in biomedical and chemical engineering, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a bachelor's or master's degree (or equivalent) from an accredited university or college in engineering. Other degrees may also be accepted, but students may be required to take bridge courses. Please contact the program director for more information.
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work.



- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a Statement of Purpose for Research.
- Submit a current resume or curriculum vitae highlighting educational background and experiences.
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral candidates must be confidential and must be submitted directly from the referee to RIT.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) or IELTS score of 7.0 is required.

Students are strongly encouraged to contact individual faculty members to discuss research interests and potential opportunities available in each faculty members' laboratories.

## Computer Engineering, MS

[www.rit.edu/study/computer-engineering-ms](http://www.rit.edu/study/computer-engineering-ms)

**Andres Kwasinski, Professor**

**585-475-5139, [ak@mail.rit.edu](mailto:ak@mail.rit.edu)**

### Program overview

The computer engineering masters focuses on the design and development of computer and computer-integrated systems, with consideration to such engineering factors as function, performance, security, and sustainability. Computer engineers design and build these systems to meet application and system requirements with attention to the hardware-software interaction. The program emphasizes the careful adoption of design methodology and the application of sophisticated engineering tools. The intensive programming and laboratory work requirements ensure significant, high level, specialized knowledge and experience with modern facilities and state-of-the-art design tools.

The MS degree in computer engineering provides students with a high level of specialized knowledge in computer engineering, strengthening their ability to successfully formulate solutions to current technical problems, and offers a significant independent learning experience in preparation for further graduate study or for continuing professional development at the leading edge of the discipline. The program accommodates applicants with undergraduate degrees in computer engineering or related programs such as electrical engineering or computer science. (Some additional bridge courses may be required for applicants from undergraduate degrees outside of computer engineering).

### Program Goals and Learning Objectives

The MS in computer engineering prepares graduate students to:

- demonstrate independent learning, which is necessary in order to update their skills in a changing workplace and economy, and
- successfully formulate solutions to current technical problems in computer engineering or related disciplines.

The program's student learning outcomes are:

- Tools and Techniques: The ability to utilize state-of-the-art tools and techniques in the field of computer engineering.
- Depth: A depth of knowledge in a specialty area of computer engineering.
- Research: The ability to perform independent research.

### Plan of Study

The degree requires one required course, two flexible core courses, four graduate electives, two semesters of graduate seminar, and options to conduct thesis research or a graduate project. The core courses and graduate electives provide breadth and depth of knowledge. The Computer Engineering Graduate Seminar (CMPE-795) provides students with exposure to the state-of-the-art research in computer engineering and related disciplines.

### Thesis Research

Thesis research is an independent investigation of a research problem that contributes to the state of the art. Students who pursue the thesis option take nine semester credit hours of thesis research to answer a fundamental science/engineering question that contributes to new knowledge in the field. Students are expected to formulate the problem under a faculty advisor's guidance and conduct extensive quantitative or qualitative analyses with sound methodology. The student's thesis committee must have at least three and no more than four faculty members, including the primary thesis advisor. Two of the committee members must be computer engineering faculty. The findings through thesis research should be repeatable and generalizable, with sufficient quality to make

them publishable in technical conferences and/or journals. For detailed information on thesis research timeline and requirements, please refer to Computer Engineering Thesis Research.

#### Graduate Project

The graduate project is a scholarly undertaking that addresses a current technical problem with tangible outcomes. Students who pursue the graduate project option take six semester credits of project focus graduate electives and three semester credits of Graduate Project, to obtain specialized education through additional courses and conduct a professionally executed project under the supervision of a faculty advisor. The project generally addresses an immediate and practical problem, a scholarly undertaking that can have tangible outcomes. Typical projects may implement, test and evaluate a software and/or hardware system, conduct a comprehensive literature review with comparative study, etc. Students are expected to give a presentation or demonstration of the final deliverables of the project. For detailed information on graduate project timeline and requirements, please refer to Computer Engineering Graduate Project.

#### Flexible Core

One course is chosen from each of the following core clusters with faculty advisor's guidance.

- Computer Architecture and Digital Design
- CMPE-630 Digital Integrated Circuit Design
- CMPE-660 Reconfigurable Computing
- CMPE-755 High Performance Architectures
- Computing, Communications and Algorithms
- CMPE-670 Data and Communication Networks
- CMPE-655 Multiple Processor Systems
- CMPE-677 Machine Intelligence

#### Graduate Electives

Computer engineering graduate electives are 600 level and above. With advisor and department approval, students may request to take graduate courses outside of the department. The graduate electives are selected among the available research tracks. Students are encouraged to choose most of their graduate electives within a single track, by consulting with their advisor. Each student must take a minimum of two electives from the department of computer engineering. For graduate level math courses as electives, students may choose from the following:

- SEE-601 Systems Modeling and Optimization
- ISEE-701 Linear Programming
- ISEE-702 Integer and Nonlinear Programming
- MATH-603 Optimization Theory
- MATH-605 Stochastic Processes
- MATH-611 Numerical Analysis
- MATH-651 Combinatorics and Graph Theory I

#### Research Tracks

Students are encouraged to choose most of their graduate electives within a single research track, by consulting with their advisor. Each student must take a minimum of two electives from the department of computer engineering. Students are allowed to take relevant courses from other academic programs, including electrical engineering, computer science, and software engineering, for specific research focus. The following research tracks are available:

- Computer Architecture—Computer architecture area deals with hardware resource management, instruction set architectures and their close connection with the underlying hardware, and the interconnection and communication of those hardware components. Some of the current computer architecture challenges that are being tackled in the computer engineering department include energy efficient

architectures, high performance architectures, graphic processing units (GPUs), reconfigurable hardware, chip multiprocessors, and Networks-on-Chips.

- 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 will open unimaginable opportunities as well as challenges to computer engineers. This research focuses designing computers with emerging novel technologies in the presence of severe physical constraints; investigating dynamic reconfigurability to exploit the power of nanoscale electronics for building reliable computing systems; and studying the applicability of emerging technologies to address challenges in computing hardware of the future.
- Networks and Security—The prevalence of interconnected computing, sensing and actuating devices have transformed our way of life. Ubiquitous access to data using/from these devices with reliable performance as well as security assurance presents exciting challenges for engineers and scientists. Resilient to environmental uncertainty, system failures and cyber attacks requires advances in hardware, software and networking techniques. This research track focuses on intelligent wireless and sensor networks, cryptographic engineering, and predictive cyber situation awareness.
- Signal Processing, Control, and Embedded Systems—This research area is concerned with algorithms and devices used at the core of system that interacts with our physical world. As such, this area considers the sensing, analysis and modeling of dynamic systems with the intent of measuring information about a system, communicating this information and processing it to adapt its behavior. Application areas are robust feedback-based control where uncertainty in the dynamics and environment must be considered during the design process and signal processing algorithms and devices for system sensing and adaptation.

## Curriculum

### Computer Engineering (thesis option), MS degree, typical course sequence

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                  |                       |
| CMPE-610 Analytical Topics in Computer Engineering | 3                     |
| CMPE-795 Graduate Seminar                          | 0                     |
| Choose one of the following flexible core courses: | 3                     |
| CMPE-630 Digital Integrated Circuit Design         |                       |
| CMPE-660 Reconfigurable Computing                  |                       |
| CMPE-755 High Performance Architectures            |                       |
| Choose one of the following flexible core courses: | 3                     |
| CMPE-655 Multiple Processor Systems                |                       |
| CMPE-670 Data and Communication Networks           |                       |
| CMPE-677 Machine Intelligence                      |                       |
| Graduate Electives*                                | 9                     |

| COURSE                             | SEMESTER CREDIT HOURS |
|------------------------------------|-----------------------|
| <b>Second Year</b>                 |                       |
| CMPE-790 Thesis                    | 9                     |
| Graduate Elective                  | 3                     |
| <b>Total Semester Credit Hours</b> | <b>30</b>             |

\* At least two graduate electives must come from the computer engineering department.

### Computer Engineering (project option), MS degree, typical course sequence

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                  |                       |
| CMPE-610 Analytical Topics in Computer Engineering | 3                     |
| CMPE-795 Graduate Seminar                          | 0                     |
| Choose one of the following flexible core courses: | 3                     |
| CMPE-630 Digital Integrated Circuit Design         |                       |
| CMPE-660 Reconfigurable Computing                  |                       |
| CMPE-755 High Performance Architectures            |                       |
| Choose one of the following flexible core courses: | 3                     |
| CMPE-655 Multiple Processor Systems                |                       |
| CMPE-670 Data and Communication Networks           |                       |
| CMPE-677 Machine Intelligence                      |                       |
| Graduate Electives*                                | 9                     |

|                                    |           |
|------------------------------------|-----------|
| <b>Second Year</b>                 |           |
| CMPE-792 Graduate Project          | 3         |
| Project Focus Electives            | 6         |
| Graduate Elective*                 | 3         |
| <b>Total Semester Credit Hours</b> | <b>30</b> |

\* At least two graduate electives must come from the computer engineering department.

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in computer engineering or a related field.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Electrical and Computer Engineering, Ph.D.

[www.rit.edu/study/electrical-and-computer-engineering-phd](http://www.rit.edu/study/electrical-and-computer-engineering-phd)

**Andres Kwasinski, Professor**

**585-475-5139, [ak@mail.rit.edu](mailto:ak@mail.rit.edu) Rebecca Ziebarth, Project manager**

**KGCOE Doctoral Programs**

**585-475-2033, [razeqa@rit.edu](mailto:razeqa@rit.edu)**

### Program overview

These are exciting times in electrical and computer engineering. Humanity is in the midst of a revolution that started with the harnessing of electric energy and has evolved to today's ubiquitous access and use of information. Electrical and computer engineering occupies the leading role in driving this revolution.

Electrical and computer engineering provides the devices and methods to collect, process, communicate and store information. These fields of engineering also contribute fundamental technology to solve our society's most pressing problems as the evolution towards electrification of infrastructure to address environmental challenges. Researchers in electrical and computer engineering have provided such advances as wireless access to the internet, super-fast communications across the world, control systems that deliver man to the moon, portable computing devices, self-driving vehicles, robotics, the smart grid powered from renewable energy, and so much more.

The mission of the doctorate in electrical and computer engineering is to form the next generation of leaders in today's information age. You will become a successful independent researcher that thrives and enjoys a successful career in academia, industry, or government. Graduates of the program become members of the selected group of global experts pushing the boundaries of knowledge in electrical and computer engineering in order to bring the next wave of transformational advances to society.

We form researchers. Research is a craft that requires intellectual dexterity and an educated creativity. As is the case with all crafts, where a student learns by working side-by-side with an expert in the craft, to become independent researchers students in the Ph.D. in electrical and computer engineering do research under the tutelage of the world-class researchers that make up our faculty. This research is often associated with some of the many centers and laboratories across RIT, including the Center for Human-aware AI and the Global Cybersecurity Institute.

### Plan of Study

André Gide, the 1947 Nobel Prize laureate in Literature, once said that "Man cannot discover new oceans unless he has the courage to lose sight of the shore." This is a poetical but nonetheless true thought on the process of discovery. Yet, with our engineer's pragmatic thinking, we would add that to succeed in the discovery process we not only need courage, but we also need knowledge (after all, a sailor needs to know navigation to venture beyond the sight of the shore!) The curriculum for the Ph.D. in electrical and computer engineering provides the knowledge and skills to develop successful independent researchers by providing disciplinary and interdisciplinary courses, research mentorship, and seminars.

Core courses: Core courses are usually completed during the first two semesters of the program since they serve as foundational preparation for elective courses, developing core competency skills for research, introducing the research landscape in electrical and computer engineering, and helping prepare for the qualifying exam.

Discipline Concentration Elective Courses: The discipline concentration elective courses provide rigorous education in a student's field of research in electrical and computer engineering. Students may choose elective courses in consultation with the dissertation and research advisor.

sor, and from courses offered by the department of electrical and micro-electronic engineering or the department of computer engineering.

**Focus Area Elective Courses:** Focus area elective courses provide the curriculum flexibility for students to engage in trans-disciplinary learning. Students, in consultation with the dissertation and research advisor, graduate courses offered by any of the departments in the Kate Gleason College of Engineering. In addition, and subject to the program director's approval, students can choose graduate courses offered by any of the RIT colleges.

**Qualifying Exam:** Students complete a qualifying exam at the end of their first year of study. The exam evaluates the student's aptitude, potential, and competency in conducting Ph.D. level research.

**Dissertation Proposal and Candidacy Exam:** Students must present a dissertation proposal to their dissertation committee no sooner than six months after the qualifying exam and at least twelve months prior to the dissertation defense exam. The proposal provides the opportunity for the student to elaborate on their research plans and to obtain feedback on the direction and approach to their research from his/her dissertation committee.

**Research Review Meetings:** Research review meetings provide comprehensive feedback to the student regarding their dissertation research progress and expected outcomes prior to the defense of their full dissertation. Research review meetings must be held at least every six months following the conclusion of the dissertation proposal and candidacy exam until the dissertation defense.

**Dissertation Presentation and Defense:** Each doctoral candidate prepares an original, technically rigorous, and well-written dissertation that describes the candidates' research body of work and novel contributions that have resulted from their doctoral studies in the discipline of electrical and computer engineering. Each doctoral candidate presents and defends their dissertation and its accompanying research to their dissertation committee.

## Research

Advancement of world-class impactful research is the ethos of the Ph.D. in electrical and computer engineering. Our faculty and students work every day to bring the next wave of transformational advances for our information age society by doing research in any of the following four areas:

- Architectures and Devices for Computing
- Communications, Networking, and Security
- Machine Learning and Artificial Intelligence
- Cyber-physical and Embedded Systems

## Curriculum

### Electrical and Computer Engineering, Ph.D. degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS               |
|------------------------------------|-------------------------------------|
| <b>First Year</b>                  |                                     |
| ENGR-701                           | Inter-disciplinary Research Methods |
| ENGR-702                           | Translating Discovery into Practice |
| ENGR-795                           | Doctoral Seminar                    |
| ENGR-892                           | Graduate Research                   |
|                                    | Engineering Foundation 1, 2*        |
|                                    | Discipline Concentration 1, 2†      |
| <b>Second Year</b>                 |                                     |
| ENGR-795                           | Doctoral Seminar                    |
| ENGR-892                           | Graduate Research                   |
|                                    | Discipline Concentration 3†         |
|                                    | Focus Area Elective 1, 2, 3, 4‡     |
| <b>Third Year</b>                  |                                     |
| ENGR-890                           | Dissertation and Research           |
| <b>Total Semester Credit Hours</b> |                                     |
| <b>66</b>                          |                                     |

\*Engineering Foundation Electives:

|                   |   |
|-------------------|---|
| EEEE-707/ENGR-707 | Engineering Analysis                      |
| EEEE-709/ENGR-709 | Advanced Engineering Mathematics          |
| CMPE-610          | Analytical Topics in Computer Engineering |

† Discipline Concentration: Any graduate level course offered by the departments of Electrical and Microelectronic Engineering or Computer Engineering, exclusive of capstones.

‡ Focus Area Elective: Any graduate level course offered by the Kate Gleason College of Engineering, exclusive of capstones.

## Admission requirements

To be considered for admission to the doctorate program in electrical and computer engineering, candidates must complete a graduate application and fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in electrical or computer engineering or in related field in science, engineering, or computing.
- Submit official transcripts (in English) for all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a Statement of Purpose for Research.
- Submit a current resume or curriculum vitae highlighting educational background and experiences.
- Submit at least two letters of academic and/or professional recommendation. Letters for doctoral candidates must be confidential and must be submitted directly from the referee to RIT.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Participate in an on-campus or teleconference interview (when applicable).
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 94 (internet-based) is required. A minimum IELTS score of 7.0 is required.



## Electrical Engineering, MS

[www.rit.edu/study/electrical-engineering-ms](http://www.rit.edu/study/electrical-engineering-ms)

Jayanti Venkataraman, Professor

585-475-2143, [jnveee@rit.edu](mailto:jnveee@rit.edu)

### Program overview

In the electrical engineering masters, students can customize a specialty of their choosing while working closely with electrical engineering faculty in a contemporary, applied research area. The MS degree in electrical engineering allows students to customize their course work while working closely with electrical engineering faculty in a contemporary, applied research area. The program gives you the skills to solve business and industry challenges, and deploy high-level solutions to problems affecting the world of engineering technology today. Students may choose among the following eight options: communications, controls, digital systems, electromagnetics, integrated electronics, MEMs, robotics, or signal and image processing.

The MS degree is awarded upon the successful completion of a minimum of 30 credit hours. Students have the option of completing a thesis or graduate paper. For those who choose the graduate paper, an additional course is required. Students may also choose a course-only option with a comprehensive exam (0 credits). All students are expected to attend Graduate Seminar (EEEE-795) every semester they are on campus.

### Program Goals and Learning Objectives

The MS in electrical engineering prepares graduate students to:

- Have specialized training in a concentrated field of study and develop professional attributes that include communication skills, and ethics to deal with the impact of technology in a global and societal context.
- Encourage independent thinking and creativity that prepares students to pursue doctoral degrees in electrical engineering or related disciplines.

The program's student learning outcomes are:

- Independent Thinker: Demonstrate an ability to work independently and/or in a team setting and possess the skills to continue to do so, on a global level.
- Career Focus: Demonstrate a proficiency in a concentrated course of study and research in a specialty area or subfield of electrical engineering,
- Communication: Demonstrate the ability to effectively communicate both in written and oral form.

### Graduate Paper/Thesis

In order to earn the MS in electrical engineering, all students must complete a graduate paper or a graduate thesis. Of the minimum 30 credit hours needed to earn the degree, a typical student earns 24 to 27 credit hours from course work and the remaining credit hours from the graduate paper or the thesis.

Thesis and graduate paper credits do not affect GPA. A grade of 'R' is given upon registration. At completion, the advisor approves the paper with his or her signature. The graduate paper mandates a minimum of 3 credits while the thesis credit mandates a minimum of 6 credits.

## Curriculum

### Electrical Engineering (communications focus area), MS degree, typical course sequence

| COURSE                             | SEMESTER                         | CREDIT HOURS |
|------------------------------------|----------------------------------|--------------|
| <b>First Year</b>                  |                                  |              |
| EEEE-602                           | Random Signals and Noise         | 3            |
| EEEE-692                           | Communication Networks           | 3            |
| EEEE-693                           | Digital Data Communication       | 3            |
| EEEE-707                           | Engineering Analysis             | 3            |
| EEEE-709                           | Advanced Engineering Mathematics | 3            |
| EEEE-794                           | Information Theory               | 3            |
| EEEE-795                           | Graduate Seminar                 | 0            |
| <b>Second Year</b>                 |                                  |              |
| EEEE-790                           | Thesis                           | 6            |
| EEEE-797                           | Wireless Communication           | 3            |
|                                    | Graduate Elective                | 3            |
| <b>Total Semester Credit Hours</b> |                                  | <b>30</b>    |

### Electrical Engineering (controls focus area), MS degree, typical course sequence

| COURSE                             | SEMESTER                         | CREDIT HOURS |
|------------------------------------|----------------------------------|--------------|
| <b>First Year</b>                  |                                  |              |
| EEEE-602                           | Random Signals and Noise         | 3            |
| EEEE-661                           | Modern Control Theory            | 3            |
| EEEE-707                           | Engineering Analysis             | 3            |
| EEEE-709                           | Advanced Engineering Mathematics | 3            |
| EEEE-765                           | Optimal Control                  | 3            |
| EEEE-766                           | Multivariable Modeling           | 3            |
| EEEE-795                           | Graduate Seminar                 | 0            |
| <b>Second Year</b>                 |                                  |              |
| EEEE-790                           | Thesis                           | 6            |
|                                    | Graduate Electives               | 6            |
| <b>Total Semester Credit Hours</b> |                                  | <b>30</b>    |

### Electrical Engineering (digital systems focus area), MS degree, typical course sequence

| COURSE                             | SEMESTER                                   | CREDIT HOURS |
|------------------------------------|--|--------------|
| <b>First Year</b>                  |  |              |
| EEEE-620                           | Design of Digital Systems                  | 3            |
| EEEE-621                           | Design of Computer Systems                 | 3            |
| EEEE-707                           | Engineering Analysis                       | 3            |
| EEEE-709                           | Advanced Engineering Mathematics           | 3            |
| EEEE-720                           | Advanced Topics in Digital Systems Design  | 3            |
| EEEE-721                           | Advanced Topics in Computer Systems Design | 3            |
| EEEE-795                           | Graduate Seminar                           | 0            |
| <b>Second Year</b>                 |  |              |
| EEEE-790                           | Thesis                                     | 6            |
|                                    | Graduate Electives                         | 6            |
| <b>Total Semester Credit Hours</b> |  | <b>30</b>    |

### Electrical Engineering (electromagnetics focus area), MS degree, typical course sequence

| COURSE                             | SEMESTER   | CREDIT HOURS |
|------------------------------------|--|--------------|
| <b>First Year</b>                  |  |              |
| EEEE-602                           | Random Signals and Noise                         | 3            |
| EEEE-617                           | Microwave Circuit Design                         | 3            |
| EEEE-629                           | Antenna Theory                                   | 3            |
| EEEE-707                           | Engineering Analysis                             | 3            |
| EEEE-709                           | Advanced Engineering Mathematics                 | 3            |
| EEEE-710                           | Advanced Electromagnetic Theory                  | 3            |
| EEEE-795                           | Graduate Seminar                                 | 0            |
| <b>Second Year</b>                 |  |              |
| EEEE-692                           | Communication Networks                           | 3            |
| EEEE-718                           | Design and Characterization of Microwave Systems | 3            |
| EEEE-790                           | Thesis   | 6            |
| <b>Total Semester Credit Hours</b> |  | <b>30</b>    |



**Electrical Engineering (integrated electronics focus area), MS degree, typical course sequence**

| COURSE                             |                                    | SEMESTER CREDIT HOURS |
|------------------------------------|------------------------------------|-----------------------|
| <b>First Year</b>                  |                                    |                       |
| EEEE-610                           | Analog Electronics Design          | 3                     |
| EEEE-707                           | Engineering Analysis               | 3                     |
| EEEE-709                           | Advanced Engineering Mathematics   | 3                     |
| EEEE-712                           | Advanced Field Effect Devices      | 3                     |
| EEEE-713                           | Solid State Physics                | 3                     |
| EEEE-726                           | Mixed-Signal IC Design             | 3                     |
| EEEE-795                           | Graduate Seminar                   | 0                     |
| <b>Second Year</b>                 |                                    |                       |
| EEEE-711                           | Advanced Carrier Injection Devices | 3                     |
| EEEE-790                           | Thesis                             | 6                     |
|                                    | Graduate Elective                  | 3                     |
| <b>Total Semester Credit Hours</b> |                                    | <b>30</b>             |

**Electrical engineering (MEMS focus area), MS degree, typical course sequence**

| COURSE                             |                                  | SEMESTER CREDIT HOURS |
|------------------------------------|----------------------------------|-----------------------|
| <b>First Year</b>                  |                                  |                       |
| EEEE-661                           | Modern Control Theory            | 3                     |
| EEEE-689                           | Fundamentals of MEMS             | 3                     |
| EEEE-707                           | Engineering Analysis             | 3                     |
| EEEE-709                           | Advanced Engineering Mathematics | 3                     |
| EEEE-787                           | MEMS Evaluation                  | 3                     |
| EEEE-795                           | Graduate Seminar                 | 0                     |
| MCEE-770                           | Microelectromechanical Systems   | 3                     |
| <b>Second Year</b>                 |                                  |                       |
| EEEE-790                           | Thesis                           | 6                     |
| MCEE-601                           | Microelectronic Fabrication      | 3                     |
|                                    | Graduate Elective                | 3                     |
| <b>Total Semester Credit Hours</b> |                                  | <b>30</b>             |

**Electrical Engineering (robotics focus area), MS degree, typical course sequence**

| COURSE                             |                                      | SEMESTER CREDIT HOURS |
|------------------------------------|--------------------------------------|-----------------------|
| <b>First Year</b>                  |                                      |                       |
| EEEE-602                           | Random Signals and Noise             | 3                     |
| EEEE-636                           | Biorobotics/Cybernetics              | 3                     |
| EEEE-647                           | Artificial Intelligence Explorations | 3                     |
| EEEE-685                           | Principle of Robotics                | 3                     |
| EEEE-707                           | Engineering Analysis                 | 3                     |
| EEEE-709                           | Advanced Engineering Mathematics     | 3                     |
| EEEE-795                           | Graduate Seminar                     | 0                     |
| <b>Second Year</b>                 |                                      |                       |
| EEEE-661                           | Modern Control Theory                | 3                     |
| EEEE-784                           | Advanced Robotics                    | 3                     |
| EEEE-790                           | Thesis                               | 6                     |
| <b>Total Semester Credit Hours</b> |                                      | <b>30</b>             |

**Electrical Engineering (signal and image processing focus area), MS degree, typical course sequence**

| COURSE                             |                                  | SEMESTER CREDIT HOURS |
|------------------------------------|----------------------------------|-----------------------|
| <b>First Year</b>                  |                                  |                       |
| EEEE-602                           | Random Signals and Noise         | 3                     |
| EEEE-678                           | Digital Signal Processing        | 3                     |
| EEEE-707                           | Engineering Analysis             | 3                     |
| EEEE-709                           | Advanced Engineering Mathematics | 3                     |
| EEEE-768                           | Adaptive Signal Processing       | 3                     |
| EEEE-779                           | Digital Image Processing         | 3                     |
| EEEE-795                           | Graduate Seminar                 | 0                     |
| <b>Second Year</b>                 |                                  |                       |
| EEEE-780                           | Digital Video Processing         | 3                     |
| EEEE-790                           | Thesis                           | 6                     |
|                                    | Graduate Elective                | 3                     |
| <b>Total Semester Credit Hours</b> |                                  | <b>30</b>             |

**Admission requirements**

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in engineering or a related field.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Applicants with a bachelor's degree in fields outside of electrical engineering may be considered for admission, however, bridge courses may be required to ensure the student is adequately prepared for graduate study.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Engineering Management, ME

[www.rit.edu/study/engineering-management-me](http://www.rit.edu/study/engineering-management-me)

**Katie McConky, Associate Professor**

**585-475-6062, [Katie.McConky@rit.edu](mailto:Katie.McConky@rit.edu)**

### Program overview

The engineering management masters combines technical expertise with managerial skills to focus on the management of engineering and technological enterprises. Students learn the technology involved in engineering projects and the business processes through which technology is applied. The objective is to provide a solid foundation in the areas commonly needed by managers who oversee engineers and engineering projects: organizational behavior, finance, and accounting.

The master of engineering in engineering management is a blend of courses from the department of industrial and systems engineering in RIT's Kate Gleason College of Engineering and RIT's Saunders College of Business. This creates a focused curriculum on the management of the engineering and technological enterprise. It combines technological expertise with managerial skills.

Engineering management is concerned with understanding the technology involved in an engineering project and the management process through which the technology is applied. This combination deals with the dual role of the engineering manager, both as a technologist and a manager. The objective is to provide a background in areas commonly needed in this role, such as organizational behavior, finance, and accounting, in addition to industrial engineering expertise. Students develop a program of study in conjunction with their advisor, which contains courses from Saunders College of Business to complement engineering course work.

### Curriculum

#### Engineering Management, ME degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS                        |
|------------------------------------|--|
| <b>First Year</b>                  |  |
| ACCT-794                           | Cost Management in Technical Organizations 3 |
| ISEE-750                           | Systems and Project Management 3             |
| ISEE-760                           | Design of Experiments 3                      |
| ISEE-771                           | Engineering of Systems I 3                   |
|                                    | Engineering Management Elective 3            |
|                                    | Elective 3                                   |
| <b>Second Year</b>                 |  |
| ISEE-792                           | Engineering Capstone 3                       |
|                                    | Engineering Management Electives 6           |
|                                    | Elective 3                                   |
| <b>Total Semester Credit Hours</b> |  |
|                                    | <b>30</b>                                    |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in engineering, mathematics, or science, from an accredited institution,
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.

- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Engineering, Ph.D.

[www.rit.edu/study/engineering-phd](http://www.rit.edu/study/engineering-phd)

**Edward Hensel, Professor**

**585-475-7684, [echeme@rit.edu](mailto:echeme@rit.edu)**

### Program overview

The engineering doctorate produces graduates who are subject matter experts in a knowledge domain within an engineering discipline. Instead of restricting graduates to individual engineering fields, the engineering Ph.D. provides students with the flexibility to become discipline-specific subject matter experts and engineering innovators in an open-architecture environment, fostering intellectual growth along both interdisciplinary pathways and within the bounds of conventional engineering disciplines. With this approach, the program develops world-class researchers who can capitalize on the most promising discoveries and innovations, regardless of their origin within the engineering field, to develop interdisciplinary solutions for real-world challenges.

The engineering Ph.D. 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 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.

#### *Discipline Foundation Courses*

Foundation courses build depth within a disciplinary field of engineering, such as mechanical engineering, electrical and microelectronics engineering, computer engineering, industrial and systems engineering, chemical engineering, or biomedical engineering.

#### *Application Domain Courses*

This rigorous set of engineering courses provides students with comprehensive coverage of engineering challenges and solution approaches in one of the four key industry areas associated with the program: health care, energy, communications, and transportation. Students choose a focus area and work with the program director to identify a set of focus area courses appropriate to their research and professional interests. Students can also take additional courses from their selected industry as electives.

#### *Qualifying Exam*

Students complete a qualifying exam at the end of their first year of study. The exam evaluates the student's aptitude, potential, and competency in conducting Ph.D. level research.

#### *Dissertation proposal and candidacy exam*

Students must present a dissertation proposal to their dissertation committee no sooner than six months after the qualifying exam and at least twelve months prior to the dissertation defense exam. The proposal provides the opportunity for the student to elaborate on their research plans and to obtain feedback on the direction and approach to their research from his/her dissertation committee.

#### *Research Review Meetings*

Research review meetings provide comprehensive feedback to the student regarding their dissertation research progress and expected outcomes prior to defense of their full dissertation. Research review meetings must be held at least every six months following the conclusion of the dissertation proposal and candidacy exam until the dissertation defense.

#### *Dissertation Presentation and Defense*

Each doctoral candidate prepares an original, technically sound, and well-written dissertation. They present and defend their dissertation and its accompanying research to their dissertation committee.

## Curriculum

### Engineering, Ph.D. degree, typical course sequence

| COURSE                             |                                     | SEMESTER CREDIT HOURS |
|------------------------------------|-------------------------------------|-----------------------|
| <b>First Year</b>                  |                                     |                       |
| ENGR-701                           | Interdisciplinary Research Methods  | 3                     |
| ENGR-702                           | Translating Discovery into Practice | 3                     |
| ENGR-795                           | Doctoral Seminar                    | 2                     |
|                                    | Discipline Concentration Courses    | 6                     |
|                                    | Engineering Foundation Courses      | 6                     |
| <b>Second Year</b>                 |                                     |                       |
| ENGR-795                           | Doctoral Seminar                    | 2                     |
| ENGR-892                           | Graduate Research                   | 6                     |
|                                    | Discipline Concentration Course     | 3                     |
|                                    | Focus Area Electives                | 9                     |
| <b>Third Year</b>                  |                                     |                       |
| ENGR-795                           | Doctoral Seminar                    | 2                     |
| ENGR-890                           | Dissertation and Research           | 24                    |
| <b>Total Semester Credit Hours</b> |                                     | <b>66</b>             |

## Admission requirements

To be considered for admission to the Ph.D. program in engineering, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in an engineering discipline.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience highlighting educational background and experiences.

- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Industrial and Systems Engineering, MS

[www.rit.edu/study/industrial-and-systems-engineering-ms](http://www.rit.edu/study/industrial-and-systems-engineering-ms)

**Katie McConky, Associate Professor**  
**585-475-6062, [Katie.McConky@rit.edu](mailto:Katie.McConky@rit.edu)**

### Program overview

Focused on the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy, this master of science in industrial and systems engineering allows you to customize your course work while working closely with industrial and systems engineering faculty in a contemporary, applied research area. You will graduate with a variety of skills in the areas of contemporary manufacturing processes, product development, ergonomic analysis, logistics and supply chain management, and sustainable design and development.

Our industrial engineering master's degree allows you to customize your course work while working closely with industrial and systems engineering faculty in a contemporary, applied research area. Faculty members are currently conducting applied project and research work in the areas of contemporary manufacturing processes/systems, ergonomic/biomedical analysis, logistics and supply chain management, sustainable design and development, systems engineering/product development, and systems simulation.

### Curriculum

#### Industrial and Systems Engineering, MS degree, typical course sequence

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| ISEE-601                           | Systems Modeling and Optimization                   | 3                     |
| ISEE-760                           | Design of Experiments                               | 3                     |
| ISEE-771                           | Engineering of Systems I                            | 3                     |
| ISEE-795                           | Graduate Seminar*                                   | 0                     |
|                                    | Electives   | 9                     |
| <b>Second Year</b>                 |   |                       |
|                                    | Electives   | 6                     |
| Choose one of the following:       |   | 6                     |
| ISEE-788                           | Project with Paper, plus one Engineering Elective   |                       |
| ISEE-790                           | Thesis  |                       |
| ISEE-792                           | Engineering Capstone, plus one Engineering Elective |                       |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>             |

\* Graduate Seminar (ISEE-795) must be completed twice in the first year of study.

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in engineering, mathematics, or science.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.

- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Lean Six Sigma, Adv. Cert.

[www.rit.edu/study/lean-six-sigma-adv-cert](http://www.rit.edu/study/lean-six-sigma-adv-cert)

**Rebecca Ziebarth,**  
585-475-2033, [razeqa@rit.edu](mailto:razeqa@rit.edu)

### Program overview

Lean Six Sigma is a methodology for increasing organizational productivity and efficiency through a structured problem solving process called DMAIC (define, measure, analyze, improve, and control). The focus is on improving organizational systems and work processes.

The advanced certificate in Lean Six Sigma is for engineers, process-improvement facilitators, and other practitioners looking to increase their effectiveness or enhance their qualifications to broaden their careers. Industry certifications such as lean six sigma green belt and black belt are not the focus of this academic program, but students interested in obtaining these credentials are well prepared to do so after the deep topical coverage offered in this advanced certificate program. See Lean Six Sigma for Students on the Center for Quality and Applied Statistics website or contact the program office for details.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Lean Six Sigma, advanced certificate, typical course sequence

| COURSE                              |                                     | SEMESTER CREDIT HOURS |
|-------------------------------------|-------------------------------------|-----------------------|
| <b>First Year</b>                   |                                     |                       |
| ISEE-682                            | Lean Six Sigma Fundamentals         | 3                     |
| <i>Choose one of the following:</i> |                                     | 3                     |
| ISEE-660                            | Applied Statistical Quality Control |                       |
| STAT-621                            | Statistical Quality Control         |                       |
| <i>Choose one of the following:</i> |                                     | 3                     |
| ISEE-760                            | Design of Experiments               |                       |
| STAT-670                            | Design of Experiments               |                       |
| <b>Elective</b>                     |                                     | 3                     |
| <b>Total Semester Credit Hours</b>  |                                     | <b>12</b>             |

### Electives

| COURSE   |  |
|----------|--|
| BANA-680 | Data Management for Business Analytics                   |
| PROF-710 | Project Management                                       |
| PROF-711 | Advanced Project Management                              |
| PROF-712 | International Project Management                         |
| PROF-714 | Agile Project Management                                 |
| DECS-743 | Operations and Supply Chain Management                   |
| DECS-744 | Project Management                                       |
| DECS-745 | Quality Control and Improvement                          |
| INTB-710 | Global Business Analytics                                |
| ISEE-626 | Contemporary Production Systems                          |
| ISEE-703 | Supply Chain Management                                  |
| ISEE-704 | Logistics Management                                     |
| ISEE-720 | Production Control                                       |
| ISEE-723 | Global Facilities Planning                               |
| ISEE-728 | Production Systems Management                            |
| ISEE-745 | Manufacturing Systems                                    |
| ISEE-750 | Systems and Project Management                           |
| ISEE-751 | Decision and Risk Benefit Analysis                       |
| ISEE-771 | Engineering of Systems I                                 |
| ISEE-786 | Lifecycle Assessment                                     |
| MGIS-650 | Introduction to Data Analytics and Business Intelligence |
| SERQ-723 | Service Analytics  |
| STAT-611 | Statistical Software - R                                 |



| COURSE   |                                       |
|----------|---------------------------------------|
| STAT-641 | Applied Linear Models - Regression    |
| STAT-642 | Applied Linear Models - ANOVA         |
| STAT-745 | Predictive Analytics                  |
| STAT-747 | Principles of Statistical Data Mining |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- One letter of recommendation is required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in statistics (at least one course in probability and statistics).
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Students currently enrolled in master's degree programs at RIT may add the advanced certificate in Lean Six Sigma as part of their current program of study in consultation with their academic advisor. Students must have a satisfactory background in statistics (at least one course in probability and statistics) to be eligible. Students should complete the Adding a Certificate or Advanced Certificate form to add the lean six sigma advanced certificate program to their master's degree program. The form should be submitted to [cqas@rit.edu](mailto:cqas@rit.edu).

## Prerequisites

Students should have a basic familiarity with MINITAB statistical software. This may be obtained by self-study or through a short course.

## Manufacturing Leadership, MS

[www.rit.edu/study/manufacturing-leadership-ms](http://www.rit.edu/study/manufacturing-leadership-ms)

**Christine Fisher,**  
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## Program overview

The master of science in manufacturing leadership is for experienced engineers, business, and technical professionals who aspire to high-level positions in operations, supply chain management, and process improvement. The program integrates business and engineering management courses, delivering them online or on-campus where students continue to work while taking classes.

Manufacturing leadership is a focused program developed jointly by the Kate Gleason College of Engineering and Saunders College of Business. Particular emphasis is placed on supply chain management, global manufacturing and operations, lean systems thinking, leadership, and decision making. A capstone project, oriented to the solution of a manufacturing or service management problem or process improvement initiative, enables students to apply new skills and capabilities to the solution of a pressing real-world problem, with significant financial benefit to sponsors. The program can also be taken on a full-time basis, with several courses available on campus. Students may start any term (fall, spring, summer) and complete courses at their own pace.

## Sponsorship

Most students are sponsored by an employer, who is committed to improving leadership capabilities in operational excellence. Sponsorship includes financial support and a commitment to work with the student to provide clear expectations and a well-articulated career development plan that builds upon the program. Candidates are welcome to sponsor themselves. Students should contact Financial Aid and Scholarship for more information.

## Related Programs

Visit the Engineering Leadership department for information on related offerings, including the master of science in product development, graduate certificate programs, and non-credit workshops and training programs.

Programs are available online, on-campus, or onsite at your location. Contact us for information about partnerships and customized programs for your organization.

## Curriculum

### Educational Objective

To prepare graduates to lead teams and organizations within a manufacturing or service enterprise for successful competition in a complex global economy, through the integration of business and technical skills.

### Key Capabilities of Graduates

- Ability to make sound business decisions in a complex global economy: business planning with full understanding of outsourcing and offshoring; financial management and total/life-cycle cost; agile decision-making.
- Ability to manage the global supply chain: supply chain strategy development and execution; logistics management (quality and delivery assurance); systems needs for supply chain management; and supply chain optimization.
- Ability to manage global, multi-site production and operations: managing distributed teams; process technology transfer to domestic and

international locations; service operations; enterprise and manufacturing strategies; lean operations; location strategy and facility design; state-of-the-art tools; regulatory issues and established norms.

- Comprehensive understanding of quality and continuous improvement principles, with application to the manufacturing and operations management.
- Strong leadership and management skills applied to global high technology manufacturing: systems thinking, planning, and management; applications (“hands-on”) orientation; project management expertise (planning, relationship management, control, risk management and decision-making); creative leadership to drive innovative solutions; enhanced ability to recognize barriers to success early, when corrective actions are least costly.

### Manufacturing Leadership, MS degree

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| ISEE-682 Lean Six Sigma Fundamentals                | 3                     |
| ISEE-703 Supply Chain Management                    | 3                     |
| ISEE-723 Global Facilities Planning                 | 3                     |
| ISEE-745 Manufacturing Systems                      | 3                     |
| ISEE-771 Engineering of Systems I                   | 3                     |
| MGMT-740 Leading Teams in Organizations             | 3                     |
| Choose one of the following:                        | 3                     |
| PROF-710 Project Management                         |                       |
| PROF-714 Agile Project Management                   |                       |
| ISEE-750 Systems and Project Management             |                       |
| Choose one of the following:                        | 3                     |
| ACCT-603 Accounting for Decision Makers             |                       |
| ACCT-794 Cost Management in Technical Organizations |                       |
| Choose one of the following:                        | 3                     |
| ISEE-792 Engineering Capstone                       |                       |
| ISEE-793 Manufacturing Leadership Capstone          |                       |
| Engineering Elective or other non-Business Elective | 3                     |
| <b>Total Semester Credit Hours</b>                  | <b>30</b>             |

### Elective courses

An elective course offers students the opportunity to better meet personal and organizational needs. Students may select from a long list of courses. Recommended electives include such offerings as Decision and Risk Benefit Analysis, Advanced or International Project Management, Breakthrough Thinking and Creativity, Customer Centricity, and others.

### Capstone project

Students complete a project during the final academic year of the program, based on a real problem often identified in the companies where they work. The corporate-oriented capstone project is directed at the solution of a manufacturing or services management problem or process improvement initiative. It enables students to broaden the educational experience and demonstrate the knowledge and skills essential to business leadership. The project provides immediate benefits to sponsoring organizations and is an excellent opportunity for students to gain visibility and recognition. Projects often result in substantial cost savings or improved efficiencies. View our list of capstone projects for examples of projects past students have completed as part of the program.

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.

- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- One letter of recommendation is required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have at least two years of experience in a manufacturing-related organization or business environment.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Applications are accepted on a rolling basis and students may begin the program in any semester.

### Prerequisite Knowledge

Admitted students must possess knowledge and skills at the introductory course level in probability and statistics, engineering economy, or basic accounting. Areas that need strengthening may be addressed by guided reading, independent study, or formal course work.

### Format

Students may start the program during any semester and complete the course work at their own pace. Classes are available online but several courses may be taken on campus for local or full-time students. Students may take up to three courses on a nonmatriculated basis. Credits earned while enrolled as a nonmatriculated student may be applied to the degree program following formal admission.

### Tuition

The program's tuition is calculated using the part-time graduate tuition rate (12 credits or less). For information on tuition, scholarships, and financial aid, please visit Financial Aid and Scholarships. Discounts are available for groups.

## Mechanical and Industrial Engineering, Ph.D.

[www.rit.edu/study/mechanical-and-industrial-engineering-phd](http://www.rit.edu/study/mechanical-and-industrial-engineering-phd)

**Katie McConky, Associate Professor**

**585-475-6062, [Katie.McConky@rit.edu](mailto:Katie.McConky@rit.edu)**

### Program overview

The mechanical and industrial engineering doctorate program produces graduates with a depth of knowledge in mechanical or industrial engineering, while allowing students to engage in cutting-edge, cross-disciplinary research. The flexible curriculum encourages students to gain domain-specific knowledge from courses offered throughout the college's portfolio of engineering programs. The curriculum, coupled with depth of knowledge in mechanical or industrial engineering disciplines, creates graduates who are ready to tackle the world's most pressing societal and industrial challenges. The program develops world-class researchers who can capitalize on the most promising discoveries and innovations to develop interdisciplinary solutions for real-world challenges.

The mechanical and industrial Ph.D. requires students to address fundamental technical problems of national and global importance for the 21st century. The program finds its roots tackling global problems in energy, transportation, health care, communications, and manufacturing. The mechanical and industrial engineering departments offer a broad range of technological research strengths including additive and advanced manufacturing, nanotechnology, robotics and mechatronics, heat transfer and thermo-fluids, simulation, modeling and optimization, ergonomics, biomimetic systems, wearable sensors, health care data analytics, prognostics and fault detection, and energy systems. Students collaborate with faculty advisors to build on these technological strengths to solve problems of global significance in order to prepare them, and for careers in both industry and academia.

### Curriculum

#### Mechanical and Industrial Engineering, Ph.D. degree, typical course sequence

| COURSE                             |                                     | SEMESTER CREDIT HOURS |
|------------------------------------|-------------------------------------|-----------------------|
| <b>First Year</b>                  |                                     |                       |
| ENGR-701                           | Inter-disciplinary Research Methods | 3                     |
| ENGR-702                           | Translating Discovery into Practice | 3                     |
| ENGR-795                           | Doctoral Seminar                    | 2                     |
| ENGR-892                           | Graduate Research                   | 3                     |
|                                    | Engineering Foundation 1, 2*        | 6                     |
|                                    | Discipline Concentration 1, 2†      | 6                     |
| <b>Second Year</b>                 |                                     |                       |
| ENGR-795                           | Doctoral Seminar                    | 1                     |
| ENGR-892                           | Graduate Research                   | 6                     |
|                                    | Discipline Concentration 3†         | 3                     |
|                                    | Focus Area Elective 1, 2, 3, 4‡     | 12                    |
| <b>Third Year</b>                  |                                     |                       |
| ENGR-890                           | Dissertation and Research           | 21                    |
| <b>Total Semester Credit Hours</b> |                                     | <b>66</b>             |

† Discipline Concentration: Any graduate level course offered by the departments of mechanical or industrial and systems engineering, exclusive of capstones.

‡ Focus Area Elective: Any graduate level course offered by the Kate Gleason College of Engineering, exclusive of capstones.

### Electives

#### Engineering Foundation Electives

| COURSE            |                                   |
|-------------------|-----------------------------------|
| MECE-707/ENGR-707 | Engineering Analysis              |
| MECE-709/ENGR-709 | Advanced Engineering Mathematics  |
| ISEE-601          | Systems Modeling and Optimization |
| ISEE-760          | Design of Experiments             |
| ISEE-771          | Engineering of Systems I          |

### Admission requirements

To be considered for admission to the doctorate program in mechanical and industrial engineering, candidates must complete a graduate application and fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in the physical sciences or engineering.
- Submit official transcripts (in English) from all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a current resume or curriculum vitae.
- Submit a personal statement of educational objectives which specifically addresses research interests.
- Submit two letters of academic and/or professional recommendation.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 100 (internet-based) is required. A minimum IELTS score of 7.0 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

## Mechanical Engineering, ME

[www.rit.edu/study/mechanical-engineering-me](http://www.rit.edu/study/mechanical-engineering-me)

**Michael Schrlau, Associate Professor**

**585-475-2139, [mgseme@rit.edu](mailto:mgseme@rit.edu)**

### Program overview

The mechanical engineering masters prepares graduates to support the design of engineered systems through the application of the fundamental knowledge, skills, and tools of mechanical engineering. Students will work independently as well as collaboratively with leaders in industry, while demonstrating the professional and ethical responsibilities of the engineering profession. Ultimately, graduates will enhance their skills through formal education and training, independent inquiry, and professional development.

The ME in mechanical engineering is intended to be a terminal degree program designed for those who do not expect to pursue a doctoral degree, but who wish to become a leader within the mechanical engineering field. This program is particularly well-suited for students who wish to study part time, for those interested in updating their technical skills, or for those who are not focused on a research-oriented master of science degree, which requires a thesis. A conventional thesis is not required for the program. In its place, students complete a capstone experience, which may be a design project leadership course or a well-organized and carefully chosen industrial internship. A research methods course may also fulfill the capstone experience; however, this option is primarily intended for students who are considering transitioning to the MS program in mechanical engineering. (Courses taken within the ME program are transferrable to the mechanical engineering MS program.)

### Educational Objectives

The ME in mechanical engineering program has outlined the following educational objectives to prepare graduates to:

- practice mechanical engineering in support of the design of engineered systems through the application of the fundamental knowledge, skills, and tools of mechanical engineering.
- enhance their skills through formal education and training, independent inquiry, and professional development.
- work independently as well as collaboratively with others, while demonstrating the professional and ethical responsibilities of the engineering profession.

### Plan of Study

In addition to the two required courses, students choose three courses from nine different focus areas and four elective courses. Focus areas include automotive systems, business, controls, manufacturing, mechanics-design/materials, product development, sustainability, thermo/fluids engineering, and vibrations engineering.

All full-time equivalent students are required to attend graduate seminar weekly for each semester they are on campus. Up to three courses may be taken outside the mechanical engineering department. Students may complete the program's requirements within one calendar year with summer study. Students may also augment their education through co-operative education employment opportunities. Although co-op is not a requirement of the program, it provides students an opportunity to gain valuable employment experience within the field.

## Curriculum

### Mechanical Engineering, ME degree, typical course sequence

| COURSE                                    | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                         |                       |
| MECE-707 Engineering Analysis             | 3                     |
| MECE-709 Advanced Engineering Mathematics | 3                     |
| MECE-795 Graduate Seminar                 | 0                     |
| Graduate Focus Courses I, II              | 6                     |
| Graduate Electives I, II                  | 6                     |
| <b>Second Year</b>                        |                       |
| Choose one of the following:              | 3                     |
| MECE-730 Design Project Leadership*       |                       |
| MECE-777 Graduate Internship†             |                       |
| MECE-792 Project with Paper‡              |                       |
| MECE-795 Graduate Seminar                 | 0                     |
| Graduate Focus Course III                 | 3                     |
| Graduate Electives III, IV                | 6                     |
| <b>Total Semester Credit Hours</b>        | <b>30</b>             |

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 MECE-BS/ME program.

† Graduate Internship (MECE-777) is an option for all MECE-ME students and students enrolled in the accelerated MECE-BS/ME program.

‡ Project with Paper (MECE-792) is an option for all MECE-ME students and students enrolled in the MECE-BS/ME program.

### Focus areas

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>Automotive systems</b>  |                       |
| 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-650 Sustainable Energy Use in Transportation                      | 3                     |
| MECE-658 Introduction to Engineering Vibrations                        | 3                     |
| MECE-670 Manufacturing Processes and Engineering                       | 3                     |
| MECE-689 Grad. Lower Level Special Topic #4: Computational Gear Design | 3                     |
| MECE-739 Alternative Fuels and Energy Efficiency                       | 3                     |
| MECE-752 Tribology Fundamentals  | 3                     |
| MECE-756 Boiling and Condensation                                      | 3                     |
| <b>Business</b>  |                       |
| ACCT-603 Accounting for Decision Makers                                | 3                     |
| MGMT-740 Leading Teams in Organizations                                | 3                     |
| Choose one of the following:   |                       |
| ACCT-706 Cost Management   | 3                     |
| HRDE-742 Leading Change  | 3                     |
| INTB-730 Cross-Cultural Management                                     | 3                     |
| MGMT-735 Management of Innovation                                      | 3                     |
| <b>Controls</b>  |                       |
| MECE-643 Classical Controls  | 3                     |
| Choose two of the following:   |                       |
| EEEE-661 Modern Control Theory   | 3                     |
| EEEE-733 Robust Control  | 3                     |
| EEEE-765 Optimal Control   | 3                     |
| MECE-606 Systems Modeling  | 3                     |
| MECE-743 Digital Controls  | 3                     |
| MECE-744 Nonlinear Controls  | 3                     |
| <b>Manufacturing</b>   |                       |
| Choose three of the following:   |                       |
| ISEE-626 Contemporary Production Systems                               | 3                     |
| ISEE-682 Lean Six Sigma Fundamentals                                   | 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                     |
| MECE-670 Manufacturing Processes and Engineering                       | 3                     |
| MECE-689 Grad. Lower Level Special Topic #4: Computational Gear Design | 3                     |
| <b>Mechanics-Design/Materials</b>                                      |                       |
| Choose three of the following:   |                       |
| MECE-605 Finite Elements   | 3                     |
| MECE-620 Introduction to Optimal Design                                | 3                     |
| MECE-623 Powertrain Systems and Design                                 | 3                     |
| MECE-644 Introduction to Composite Materials                           | 3                     |
| MECE-657 Applied Biomaterials  | 3                     |
| MECE-670 Manufacturing Processes and Engineering                       | 3                     |



| COURSE                         |   | SEMESTER CREDIT HOURS |
|--------------------------------|---|-----------------------|
| MECE-689                       | Grad. Lower Level Special Topic #4: Computational Gear Design | 3                     |
| MECE-751                       | Convective Phenomena  |                       |
| MECE-752                       | Tribology Fundamentals  | 3                     |
| MECE-785                       | Mechanics of Solids   | 3                     |
| Product development            |   |                       |
| Choose three of the following: |   |                       |
| PROF-710                       | Project Management*   | 3                     |
| DECS-744                       | Project Management*   | 3                     |
| ISEE-750                       | Systems and Project Management*                               | 3                     |
| ISEE-741                       | 3D Printing   | 3                     |
| ISEE-751                       | Decision and Risk Benefit Analysis                            | 3                     |
| ISEE-771                       | Engineering of Systems I                                      | 3                     |
| ISEE-772                       | Engineering of Systems II                                     | 3                     |
| Sustainability                 |   |                       |
| Choose three of the following: |   |                       |
| ISEE-785                       | Fundamentals of Sustainable Engineering                       | 3                     |
| ISEE-786                       | Lifecycle Assessment  | 3                     |
| ISEE-787                       | Design for the Environment                                    | 3                     |
| MECE-629                       | Renewable Energy Systems                                      | 3                     |
| MECE-650                       | Sustainable Energy Use in Transportation                      | 3                     |
| MECE-739                       | Alternative Fuels and Energy Efficiency                       | 3                     |
| Thermo/Fluids Engineering      |   |                       |
| Choose three of the following: |   |                       |
| MCSE-610                       | Applied Biofluid Mechanics and Microcirculation               | 3                     |
| MECE-725                       | Fundamentals of Computational Fluid Dynamics                  | 3                     |
| MECE-731                       | Computational Fluid Dynamics                                  | 3                     |
| MECE-738                       | Ideal Flows   | 3                     |
| MECE-751                       | Convective Phenomena  | 3                     |
| MECE-755                       | Microfluidics   | 3                     |
| MECE-756                       | Boiling and Condensation                                      | 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                     |

\* Only one of these classes may be used toward the focus area.

Students with a specific career interest may develop an individually customized focus area based on mutual agreement between the student and the department.

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in mechanical engineering, physics, or a related field.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Mechanical Engineering, MS

[www.rit.edu/study/mechanical-engineering-ms](http://www.rit.edu/study/mechanical-engineering-ms)

**Michael Schrlau, Associate Professor**

**585-475-2139, [mgseme@rit.edu](mailto:mgseme@rit.edu)**

### Program overview

The mechanical engineering masters produces graduates who are leaders in their respective fields who are ready to tackle high-level problems as practicing professionals. Designed for students who desire advanced training in specific areas of mechanical engineering, the master of science acts as a prelude to a career in either research or industry. Students can choose to focus on a variety of disciplines including dynamics, robotics, nanotechnology, biomechanics, energy systems, or more.

### Educational Objectives

The MS in mechanical engineering program has set the following educational objectives to prepare graduates to:

- practice mechanical engineering in support of the design of engineered systems through the application of the fundamental knowledge, skills, and tools of mechanical engineering.
- enhance their skills through formal education and training, independent inquiry, and professional development.
- work independently as well as collaboratively with others, while demonstrating the professional and ethical responsibilities of the engineering profession.
- successfully pursue graduate degrees at the doctoral levels, should they choose.

### Plan of Study

The program includes core courses, focus area courses, elective courses, and a thesis. All full-time and full-time equivalent students are required to attend the weekly graduate seminar each semester they are on campus.

#### Focus Area Courses

All students must develop a focus area of study, with prior approval from their advisor and the department head. The focus area should consist of at least 9 semester credit hours of graduate study in mechanical engineering and be related to the student's technical and professional development interests. Examples of focus areas include automotive systems, business, controls, manufacturing, mechanics-design/materials, product development, sustainability, thermo/fluids engineering, and vibrations engineering.

#### Independent Study

Students may earn a limited number of credits by doing an independent study with guidance from a member of the graduate faculty. Areas for independent study include selected topics in applied mathematics, analytical mechanics, nonlinear mechanics, fracture mechanics, heat transfer, fluid mechanics, thermodynamics, control systems, optimal control, thermal stresses, composite materials, and biomechanics.

#### Thesis

Prior to completing 24 semester credit hours of graduate work, students should prepare and present a formal thesis proposal to their faculty advisor. An acceptable proposal (including a statement of work, extensive literature search, and proposed timeline), signed by the student and approved by their faculty advisor and department head, is required prior to registering for thesis credits. Students must form a graduate thesis committee in coordination with their advisor and present their proposal to their committee for review and approval during the first semester in which they have registered for thesis credit. Students are required to deliver a successful written and oral presentation of their thesis.



## Curriculum

### Mechanical Engineering, MS degree, typical course sequence

| COURSE                                    | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                         |                       |
| MECE-707 Engineering Analysis             | 3                     |
| MECE-709 Advanced Engineering Mathematics | 3                     |
| MECE-795 Graduate Seminar                 | 0                     |
| Graduate Focus Courses I, II              | 6                     |
| Graduate Electives I, II                  | 6                     |
| <b>Second Year</b>                        |                       |
| MECE-790 Thesis                           | 6                     |
| MECE-795 Graduate Seminar                 | 0                     |
| Graduate Focus Course III                 | 3                     |
| Graduate Elective III                     | 3                     |
| <b>Total Semester Credit Hours</b>        | <b>30</b>             |

\* Three semesters of Graduate Seminar (MECE-795) are required for all full-time and full-time equivalent students.

### Focus areas

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>Automotive systems</b>  |                       |
| <i>Choose three of the following:</i>                                  |                       |
| 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-650 Sustainable Energy Use in Transportation                      | 3                     |
| MECE-658 Introduction to Engineering Vibrations                        | 3                     |
| MECE-670 Manufacturing Processes and Engineering                       | 3                     |
| MECE-689 Grad. Lower Level Special Topic #4: Computational Gear Design | 3                     |
| MECE-739 Alternative Fuels and Energy Efficiency                       | 3                     |
| MECE-752 Tribology Fundamentals  | 3                     |
| MECE-756 Boiling and Condensation                                      | 3                     |
| <b>Business</b>  |                       |
| ACCT-603 Accounting for Decision Makers                                | 3                     |
| MGMT-740 Leading Teams in Organizations                                | 3                     |
| <i>Choose one of the following:</i>                                    |                       |
| ACCT-706 Cost Management   | 3                     |
| HRDE-742 Leading Change  | 3                     |
| INTB-730 Cross-Cultural Management                                     | 3                     |
| MGMT-735 Management of Innovation                                      | 3                     |
| <b>Controls</b>  |                       |
| MECE-643 Classical Controls  | 3                     |
| <i>Choose two of the following:</i>                                    |                       |
| EEEE-661 Modern Control Theory   | 3                     |
| EEEE-733 Robust Control  | 3                     |
| EEEE-765 Optimal Control   | 3                     |
| MECE-606 Systems Modeling  | 3                     |
| MECE-743 Digital Controls  | 3                     |
| MECE-744 Nonlinear Controls  | 3                     |
| <b>Manufacturing</b>   |                       |
| <i>Choose three of the following:</i>                                  |                       |
| ISEE-626 Contemporary Production Systems                               | 3                     |
| ISEE-682 Lean Six Sigma Fundamentals                                   | 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                     |
| MECE-670 Manufacturing Processes and Engineering                       | 3                     |
| MECE-689 Grad. Lower Level Special Topic #4: Computational Gear Design | 3                     |
| <b>Mechanics-Design/Materials</b>                                      |                       |
| <i>Choose three of the following:</i>                                  |                       |
| MECE-605 Finite Elements   | 3                     |
| MECE-620 Introduction to Optimal Design                                | 3                     |
| MECE-623 Powertrain Systems and Design                                 | 3                     |
| MECE-644 Introduction to Composite Materials                           | 3                     |
| MECE-657 Applied Biomaterials  | 3                     |
| MECE-670 Manufacturing Processes and Engineering                       | 3                     |
| MECE-689 Grad. Lower Level Special Topic #4: Computational Gear Design | 3                     |
| MECE-751 Convective Phenomena  | 3                     |
| MECE-752 Tribology Fundamentals  | 3                     |
| MECE-785 Mechanics of Solids   | 3                     |

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>Product development</b>                               |                       |
| <i>Choose three of the following:</i>                    |                       |
| PROF-710 Project Management*                             | 3                     |
| DECS-744 Project Management*                             | 3                     |
| ISEE-750 Systems and Project Management*                 | 3                     |
| ISEE-741 3D Printing                                     | 3                     |
| ISEE-751 Decision and Risk Benefit Analysis              | 3                     |
| ISEE-771 Engineering of Systems I                        | 3                     |
| ISEE-772 Engineering of Systems II                       | 3                     |
| <b>Sustainability</b>                                    |                       |
| <i>Choose three of the following:</i>                    |                       |
| ISEE-785 Fundamentals of Sustainable Engineering         | 3                     |
| ISEE-786 Lifecycle Assessment                            | 3                     |
| ISEE-787 Design for the Environment                      | 3                     |
| MECE-629 Renewable Energy Systems                        | 3                     |
| MECE-650 Sustainable Energy Use in Transportation        | 3                     |
| MECE-739 Alternative Fuels and Energy Efficiency         | 3                     |
| <b>Thermo/Fluids Engineering</b>                         |                       |
| <i>Choose three of the following:</i>                    |                       |
| MCSE-610 Applied Biofluid Mechanics and Microcirculation | 3                     |
| MECE-725 Fundamentals of Computational Fluid Dynamics    | 3                     |
| MECE-731 Computational Fluid Dynamics                    | 3                     |
| MECE-738 Ideal Flows                                     | 3                     |
| MECE-751 Convective Phenomena                            | 3                     |
| MECE-755 Microfluidics                                   | 3                     |
| MECE-756 Boiling and Condensation                        | 3                     |
| <b>Vibrations Engineering</b>                            |                       |
| MECE-658 Introduction to Engineering Vibrations          | 3                     |
| MECE-758 Intermediate Engineering Vibrations             | 3                     |
| <i>Choose one of the following:</i>                      |                       |
| EEEE-602 Random Signals and Noise                        | 3                     |
| EEEE-678 Digital Signal Processing                       | 3                     |
| MECE-606 System Modeling                                 | 3                     |

\* Only one of these classes may be used toward the focus area.

Students with a specific career interest may develop an individually customized focus area based on mutual agreement between the student and the department.

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in mechanical engineering, physics, or a related field.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### Transfer Credit

A limited number of credit hours may be transferred from graduate courses taken outside the university, provided such courses complement a student's proposed graduate program in the mechanical engineering department. An adviser will review course work for possible transfer credit. Upon matriculation into the MS program, the student should formulate a plan of study in consultation with an advisor.

## Microelectronic Engineering, MS

[www.rit.edu/study/microelectronic-engineering-ms](http://www.rit.edu/study/microelectronic-engineering-ms)

**Sean Rommel, Professor**

**585-475-4723, [slremc@rit.edu](mailto:slremc@rit.edu)**

### Program overview

Integrated microelectronic or nanoelectronic circuits and sensors drive our global economy, increase our productivity, and help improve our quality of life. Semiconductor and photonic devices impact virtually every aspect of human life, from communication, entertainment, and transportation to health, solid state lighting, and solar cells. RIT's microelectronic engineering program is considered a world leader in the education of semiconductor process engineers.

The microelectronic engineering masters provides a unique combination of physics, chemistry, and engineering in a state-of-the-art facility to prepare graduates for the real world. With internationally renowned professors with years of experience, courses are grounded in reality – practical skill and advanced theory, combine for comprehensive learning. Put your knowledge to work with a microelectronic engineering masters from RIT.

The objective of the microelectronic engineering master's degree 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 program consists of core courses, graduate electives, 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 advisor.

### 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                        |
|-------------------------------------|--|
| <b>First Year</b>                   |  |
| MCEE-601                            | Microelectronic Fabrication 3                |
| MCEE-602                            | Semiconductor Process Integration 3          |
| MCEE-603                            | Thin Films 3                                 |
| MCEE-605                            | Lithography Materials and Processes 3        |
| MCEE-732                            | Microelectronics Manufacturing 3             |
| MCEE-795                            | Microelectronics Research Methods* 2         |
|                                     | Graduate Elective 3                          |
| <b>Second Year</b>                  |  |
| MCEE-704                            | Physical Modeling of Semiconductor Devices 3 |
| MCEE-799                            | Graduate Independent Study* 2                |
|                                     | Graduate Elective 3                          |
| <i>Choose one of the following:</i> |  |
| EEEE-792                            | Graduate Paper, plus one Graduate Elective 6 |
| MCEE-790                            | MS Thesis                                    |
| <b>Total Semester Credit Hours</b>  | <b>32</b>                                    |

\* Students who are enrolled in the program and take courses on campus must complete MCEE-795 in the first year. Students who are enrolled in the program online do not take MCEE-795. Instead, they complete MCEE-799 in the second year.

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in engineering or a related field.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Applicants 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.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Assistantships and Fellowships

A limited number of assistantships and fellowships may be available for full-time students. Appointment as a teaching assistant carries a 12-hour-per-week commitment to a teaching function and permits a student to take graduate work at the rate of 9 credits per semester. Appointment as a research assistant also permits taking up to 9 credits per semester while the remaining time is devoted to the research effort, which often serves as a thesis subject. Students in the MS program are eligible for research

fellowships. Appointments provide full or partial tuition and stipend. Applicants for financial aid should contact the program director for details.

## Microsystems Engineering, Ph.D.

[www.rit.edu/study/microsystems-engineering-phd](http://www.rit.edu/study/microsystems-engineering-phd)

**Stefan Preble, Professor**

**585-475-2625, [sfpeen@rit.edu](mailto:sfpeen@rit.edu)**

### Program overview

The multidisciplinary doctorate degree in microsystems engineering builds on the fundamentals of traditional engineering and science combined with curriculum and research activities addressing the numerous technical challenges of micro- and nano-systems. These include the manipulation of electrical, photonic, optical, mechanical, chemical, and biological functionality to process, sense, and interface with the world at a nanometer scale. This nanotechnology Ph.D. program provides a foundation to explore future technology through research in nano-engineering, design methods, and technologies and their integration into micro- and nano-scaled systems.

The microsystems engineering doctorate includes the following areas of exploration:

- Next-generation nanoelectronics including: development of new techniques, processes and architectures for nanoelectronic and nano-optoelectronic devices; exploration into new materials research including germanium, III-V materials, carbon nanotubes, and spintronics
- Photovoltaic research in silicon, compound semiconductor, and organic solar cells
- Photonics and nanophotonics imaging, communications, and sensing research including couplers, micro-lasers, microdetectors, integrated silicon waveguides, silicon spectrometers, and biosensors
- MEMS (micro-electro-mechanical systems), MEOMS (micro-electro-optical-mechanical systems), and NEMS (nano-electro-mechanical systems) device, processing, and materials research for smart sensors, actuators, biochips, and micro-implantable appliances
- Scaled micro- and nano- electronics for integration into biomedical systems
- New and improved technologies in organic electronic components and devices
- Nanomaterials research including carbon nanotubes, nanoparticles, quantum dots, self-assembly materials and their applications in electronics, optics, and materials science
- Microfluidics research on the behavior, control, and manipulation of fluids at the micro-scale

### Mission

The program fulfills a critical need for an expanded knowledge base and expertise in the innovation, design, fabrication, and application of micro- and nano-scale materials, process, devices, components, and systems. RIT is an internationally recognized leader in education and research in the fields of microsystems and nanoscale engineering.

The curriculum is structured to provide a sound background and a thorough foundation in engineering and science through world-class education in the innovative application of educational technologies and research experiences.

### Program highlights

The program is designed for students with a strong background in engineering and the physical sciences, and with an interest in hands on exploration into new fields of micro- and nano-systems.

- The program has a renowned, multidisciplinary faculty that shares resources and expertise over a wide variety of micro- and nano-scale technologies. 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 combination of graduate course work and research are required for completion of the program. The course work requires a combination of foundation courses, major and minor technical area courses, and electives. The student must pass the qualifying exam, the candidacy exam and the dissertation defense exam to complete the degree requirements.

**Phase 1–Qualifying:** The first phase prepares students with the foundation in science and engineering required for the program as well as to determine the student's ability to do independent research. This includes the foundation and specialization courses taken during the first year together with the successful completion of the qualifying exam. The qualifying exam tests the student's ability to think and learn independently, to critically evaluate current research work in microsystems engineering, and to use good judgment and creativity to determine appropriate directions for future research work.

**Phase 2–Candidacy:** The second phase continues students course work and preliminary dissertation research. Much of this course work supports the dissertation research to be conducted in the third phase. This phase is completed when the student has finished most of the formal course work as prescribed in the program of study, has prepared the dissertation proposal, and has passed the candidacy examination.

**Phase 3–Defense:** The third phase includes the completion of the experimental and/or theoretical work needed to complete the student's dissertation along with the required publication of results. The research review milestone is held as a meeting during this phase, as is the defense of the dissertation, which consists of a public oral presentation and examination.

The course work requirements are divided into four parts to ensure that students complete a well-rounded program of study with the necessary concentration in their specialized field.

#### Foundation courses

Four foundation courses and the Microsystems Ph.D. Seminar (MCSE-795) are mandatory for all students. Foundation courses consist of Microelectronic Fabrication (MCEE-601), Introduction to Nanotechnology and Microsystems (MCSE-702), Material Science for Microsystems Engineering (MCSE-703), and Theoretical Methods in Materials Science and Engineering (MTSE-704).

#### Major technical interest area

Students complete a sequence of three courses in the major technical research area and a sequence of two courses in a support area.

#### Minor technical interest areas

Students complete a two-course sequence in a minor technical area which should be outside of the student's undergraduate degree major.

#### Elective courses

Students complete at least two elective courses, in addition to the foundation and technical interest courses.

### General course requirements

The total number of credit hours required for the degree depends upon the highest degree level completed by the student before entering the program. Students entering without prior graduate work must complete a minimum of 39 credit hours of course work as outlined above. A minimum of 18 research credits and a total of 66 total credits are required. Credits beyond the minimum of 39 course and 18 research requirements can be taken from either category to reach the 66 credit total.

Students entering the program with a master's degree may be permitted up to 24 course credit hours toward those required for the degree, based on the approval of the program director.

All students are required to maintain a cumulative grade-point average of 3.0 (on a 4.0 scale) to remain in good standing in the program.

### Preparing a program of study

Students should prepare a program of study after passing the qualifying exam and no later than the spring semester of the second year. The program of study should be reviewed periodically by the student and the advisor, and modifications should be made as necessary. Leading up to or upon completion of the candidacy exam, the student's advisor and advisory committee may add additional course work requirements to ensure the student is sufficiently prepared to carry out and complete their dissertation research.

### Qualifying examination

Every student must take the qualifying examination, which tests student's ability to think and learn independently, to critically evaluate current research work in the field of microsystems engineering, and to use good judgment and creativity to determine appropriate directions for future research work. The exam must be completed successfully before a student can submit a thesis proposal and attempt the candidacy examination.

### Research proposal

A research topic chosen by the student and their research advisor becomes the basis for the dissertation. The research proposal sets forth both the exact nature of the matter to be investigated and a detailed account of the methods to be employed. In addition, the proposal usually contains material supporting the importance of the topic selected and the appropriateness of the research methods to be employed.

### Advising

Doctoral students' work is overseen by an advisor, the advisory committee, and the program's director.

### Candidacy examination

The candidacy examination is an oral examination based on the dissertation research proposal and allows the advising committee to judge the student's ability to execute a research task and to communicate the results. The exam also serves to evaluate the proposed topic to ensure that if completed as posed it constitutes an original contribution to knowledge.

### Research review milestone

The research review milestone is administered by the student's advisor and the advisory committee between the time the student passes the candidacy exam and registers for the dissertation defense. This normally occurs approximately six months prior to the Dissertation Defense.

### Dissertation defense and examination

The culmination of a student's work toward the doctorate degree is the publication of their research. In addition to developing experimental and technical skills during the creation of research, a student needs to acquire the necessary literary skills to communicate results to others. The preparation of the proposal and the dissertation manuscripts will demonstrate

these skills. It is also expected that these skills are developed through the publication of technical papers and communications. The dissertation defense and examination is scheduled after all course requirements for the degree have been successfully completed.

Additional details regarding program requirements can be found in the Microsystems Engineering Ph.D. Graduate Student Manual.

## Curriculum

### Microsystems Engineering, Ph.D. degree, typical course sequence

| COURSE                      |  | SEMESTER CREDIT HOURS |
|-----------------------------|--|-----------------------|
| First Year                  |  |                       |
| MCSE-601                    | Microelectronic Fabrication                              | 3                     |
| MCSE-702                    | Introduction to Nanotechnology and Microsystems          | 3                     |
| MCSE-703                    | Material Science for Microsystems Engineering            | 3                     |
| MCSE-795                    | Microsystems Ph.D. Seminar                               | 2                     |
| MTSE-704                    | Theoretical Methods in Materials Science and Engineering | 3                     |
|                             | Major Technical Area Electives                           | 6                     |
| Second Year                 |  |                       |
| MCSE-795                    | Microsystems Ph.D. Seminar                               | 2                     |
| MCSE-890                    | MCSE-Dissertation  | 2                     |
|                             | Major Technical Area Electives                           | 6                     |
|                             | Minor Technical Area Electives                           | 6                     |
| Third Year                  |  |                       |
| MCSE-795                    | Microsystems Ph.D. Seminar                               | 2                     |
| MCSE-890                    | MCSE-Dissertation  | 9                     |
|                             | Technical Elective                                       | 3                     |
| Fourth Year                 |  |                       |
| MCSE-890                    | MCSE-Dissertation  | 16                    |
| Total Semester Credit Hours |  | 66                    |

## Admission requirements

To be considered for admission to the doctorate program in microsystems engineering, candidates must complete a graduate application and fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in the physical sciences or engineering.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.



## Product Development, MS

[www.rit.edu/study/product-development-ms](http://www.rit.edu/study/product-development-ms)

**Christine Fisher,**  
585-475-7971, [Christine.Fisher@rit.edu](mailto:Christine.Fisher@rit.edu)

### Program overview

The master of science in product development is a leadership program for experienced engineers and technical specialists who aspire to high-level positions associated with product innovation. The program integrates business and engineering management courses, delivering them in online or on-campus where students continue to work while taking classes.

New products and services are the lifeblood of today's high technology firms, and companies need more technically grounded leaders to drive the engine for business growth. The product development master's degree integrates business and engineering courses consistent with cross-functional, end-to-end product development and the systems perspective critical to conceive, create, launch, and support today's complex product portfolios. Participants acquire the foundation skills and strategic perspective necessary to become future leaders and senior managers responsible for driving business growth through new products and services. In short, the product development program prepares today's technical experts for successful careers as project leaders and technically grounded senior managers of their enterprises.

To stay on the cutting edge, the program was designed by academic and industry leaders to integrate formal education with state-of-the-art research and best practices from industry. It includes a year-long capstone project that generates significant return-on-investment to sponsoring organizations. Electives and the capstone project provide flexibility to tailor the program's content to specific learning objectives of students and sponsoring organizations. The program is offered fully online or as a blend of online and on-campus courses. Students may start any term (fall, spring, summer) and complete courses at their own pace.

### Sponsorship

Most students are sponsored by an employer who is committed to improving leadership capabilities in product development. Sponsorship includes financial support and a commitment to work with the student to provide clear expectations and a well-articulated career development plan that builds upon the program. Candidates are welcome to sponsor themselves. Students should contact Financial Aid and Scholarship for more information.

### Curriculum

#### Educational objective

To develop a leadership perspective and knowledge base of the total life cycle product development system, integrating management and (systems) engineering elements. To establish the foundation for the systems approach needed to conceive, create, launch, and support products and platforms. The program considers new product development in a larger framework: how a company's business strategy, vision, and core capabilities coupled with the voice of the customer combine to determine product strategy and create best-in-class product portfolios.

#### Key capabilities of graduates

- Leadership expertise of the product development process and of high-performing product development teams and organizations.
- Improved leadership through structured systems thinking, design, and management.
- A strategic, enterprise-wide and global perspective.

- An innovative mindset receptive to changing markets, new technologies, and new opportunities.
- Decision making in uncertain and fast-paced environments.
- A market-oriented product development focus – i.e. the ability to transform customer problems, needs, and market opportunities into successful product portfolios.
- Economic analysis and the application of sound business principles to effective management in the product development domain.
- Project management: business and technical planning, relationship management and outsourcing, program control, structured decision making and risk management.
- Enhanced ability to recognize barriers to success early, when corrective actions are less costly.
- In-depth understanding and application of state-of-the-art tools for design, analysis, and management in the product development domain.

#### Embedded engineering competencies

The product development leader must apply engineering competencies to the development of strategic product architectures that relate to the business value chain of the corporation, to the integration of enabling technologies, and to the creation of realizable design concepts. These capabilities are supported by the abilities to:

- Assess the merits and risks associated with emerging technologies.
- Create products with acceptable product liability, life cycle cost, and environmental impact.
- Create products consistent with manufacturing and supply chain capabilities.
- Coordinate the product architecture with organizational structure.
- Select which competencies are core to the business and which can be outsourced.
- Create and implement an organization's decision processes.
- Identify and implement enabling technologies and tools.

The 30 semester-credit program consists of 9 business and engineering courses, including one elective, plus a capstone project (3 credits).

#### Product Development, MS degree

| COURSE                              | SEMESTER CREDIT HOURS                      |
|-------------------------------------|--|
| <b>First Year</b>                   |  |
| ACCT-603                            | Accounting for Decision Makers 3           |
| DECS-743                            | Operations and Supply Chain Management 3   |
| ISEE-751                            | Decision and Risk Benefit Analysis 3       |
| ISEE-771                            | Engineering of Systems I 3                 |
| ISEE-772                            | Engineering of Systems II 3                |
| ISEE-781                            | Excellence in New Product Development 3    |
| ISEE-798                            | Product Development Capstone II 3          |
| MKTG-761                            | Marketing Concepts and Commercialization 3 |
| <i>Choose one of the following:</i> |  |
| PROF-710                            | Project Management 3                       |
| PROF-714                            | Agile Project Management 3                 |
| ISEE-750                            | Systems and Project Management 3           |
|                                     | Engineering or Business Elective 3         |
| <b>Total Semester Credit Hours</b>  | <b>30</b>                                  |

#### Elective courses

An elective course offers students the opportunity to better meet personal and organizational needs. Students may select from a long list of courses. Recommended electives include such offerings as Managing Research and Innovation, Lean Six Sigma Fundamentals, Advanced or International Project Management, Breakthrough Thinking and Creativity, Customer Centricity, and others.

#### Capstone project

Students complete a project during the final academic year of the program, based on a real problem often identified in the companies where they work. The corporate-oriented capstone project encompasses the

broad integrative aspects of new product development – it synthesizes, increases, and demonstrates the student's understanding of previous program material and underscores the behaviors essential to product development leadership. The capstone project generates immediate benefits to sponsoring organizations. View our list of capstone projects for examples of projects past students have completed as part of the program.

### Related programs

Visit the Engineering Leadership department for information on related offerings, including the master of science in manufacturing leadership, graduate certificate programs, and non-credit workshops and training programs.

Programs are available online, on-campus, or onsite at your location. Contact us for information about partnerships and customized programs for your organization.

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in engineering (or a related scientific or technical field),
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- One letter of recommendation is required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have at least two years of experience in product development or a related business environment.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Exceptions may be considered on a case-by-case basis. No graduate entrance exam is required, although candidates are welcome to support their application with results from the Graduate Management Admission Test (GMAT) or the Graduate Record Exam (GRE).

Applications are accepted on a rolling basis and students may begin the program in any semester.

### Format

Students may start the program during any semester and complete the course work at their own pace. Classes are available online but several courses may be taken on campus for local or full-time students. Students may take up to three courses on a nonmatriculated basis. Credits earned while enrolled as a nonmatriculated student may be applied to the degree program following formal admission.

### Tuition

The program's tuition is calculated using the part-time graduate tuition rate (12 credits or less). For information on tuition, scholarships, and financial aid, please visit Financial Aid and Scholarships. Discounts are available for groups.

## Sustainable Engineering, MS

[www.rit.edu/study/sustainable-engineering-ms](http://www.rit.edu/study/sustainable-engineering-ms)

**Brian Thorn, Professor**

**585-475-6166, [bkteie@rit.edu](mailto:bkteie@rit.edu)**

### Program overview

Sustainable engineering refers to the integration of social, environmental, and economic considerations into the design of products, processes, and energy systems. Additionally, sustainable engineering encourages the consideration of the complete product and process lifecycle during the design effort. The intent is to minimize environmental impacts across the entire lifecycle of a product or process while simultaneously maximizing the benefits to social and economic stakeholders. This environmental engineering degree builds on RIT's work in sustainability research and education, and offers students the flexibility to develop tracks in areas such as renewable energy systems, systems modeling and analysis, product design, and engineering policy and management.

### Educational objectives

The sustainable engineering degree is designed to accomplish the following educational objectives:

- Heighten awareness of issues in areas of sustainability (e.g., global warming, ozone layer depletion, deforestation, pollution, ethical issues, fair trade, gender equity, etc.).
- Establish a clear understanding of the role and impact of various aspects of engineering (design, technology, etc.) and engineering decisions on environmental, societal, and economic problems. Particular emphasis is placed on the potential trade-offs between environmental, social, and economic objectives.
- Strong ability to apply engineering and decision-making tools and methodologies to sustainability-related problems.
- Demonstrate a capacity to distinguish professional and ethical responsibilities associated with the practice of engineering.

### Plan of study

The MS in sustainable engineering builds on RIT's work in sustainability research and education and offers students the flexibility to develop tracks in areas such as renewable energy systems, systems modeling and analysis, product design, and engineering policy and management. Course work is offered on campus and available on a full- or part-time basis. Technical in nature, the program equips engineers with the tools they need to meet the challenges associated with delivering goods, energy, and services through sustainable means. In addition to basic course work in engineering and classes in public policy and environmental management, students are required to complete a research thesis directly related to sustainable design challenges impacting society. Many of these thesis projects support the sustainability-themed research being conducted by RIT faculty in the areas of fuel-cell development, life-cycle engineering, and sustainable process implementation.

Students must successfully complete four required core courses, two graduate engineering electives in an area of interest (such as energy, modeling, manufacturing and materials, transportation and logistics, or product design and development), one social context elective, one environmental technology elective, two semesters of Graduate Seminar, 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 |
|--|-----------------------|
| <b>First Year</b>  |                       |
| ISEE-771 Engineering of Systems I                            | 3                     |
| ISEE-785 Fundamentals of Sustainable Engineering             | 3                     |
| ISEE-786 Lifecycle Assessment                                | 3                     |
| ISEE-795 Graduate Seminar*                                   | 0                     |
| MECE-629 Renewable Energy Systems                            | 3                     |
| Engineering Electives  | 6                     |
| <b>Second Year</b>   |                       |
| Technology Elective  | 3                     |
| Social Context Elective                                      | 3                     |
| Choose one of the following:                                 | 6                     |
| ISEE-788 Project with Paper, plus one Engineering Elective   |                       |
| ISEE-790 Thesis  |                       |
| ISEE-792 Engineering Capstone, plus one Engineering Elective |                       |
| <b>Total Semester Credit Hours</b>                           | <b>30</b>             |

\* Graduate Seminar (ISEE-795) must be completed twice in the first year of study.

### Admission requirements

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

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in engineering, mathematics, or science.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Submit scores from the GRE.
- Submit a statement of purpose.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit three letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 79 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

## Vibrations, Adv. Cert.

[www.rit.edu/study/vibrations-adv-cert](http://www.rit.edu/study/vibrations-adv-cert)

**Michael Schrlau, Associate Professor**

**585-475-2139, mgseme@rit.edu**

### Program overview

Engineers with skills in vibration engineering contribute to creating manufacturing production systems, aerospace systems, automotive engineering, medical product development, consumer product development, and a host of industrial equipment and process systems in which vibration must be minimized or controlled. Students utilize sophisticated software tools, analytical techniques, and experimental methods to design, develop, and implement solutions for vibration control and minimization in engineering systems.

The advanced certificate in vibrations takes students beyond the preparation in vibration engineering that students typically complete during their undergraduate program of study. Students learn to use sophisticated software tools, analytical techniques and experimental methods to design, develop, and implement solutions for problems of vibration control and minimization in engineering systems. Students are exposed to modern technologies used in industry to ensure that they are prepared for their specialized job market. The curriculum answers a need for graduate level instruction for practicing engineers in a field of importance for the 21st century.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Vibrations, advanced certificate, typical course sequence

| COURSE                             |  | SEMESTER CREDIT HOURS        |
|------------------------------------|--|------------------------------|
| <b>First Year</b>                  |  |                              |
| MECE-658                           | Introduction to Engineering Vibrations | 3                            |
| MECE-707                           | Engineering Analysis                   | 3                            |
| MECE-709                           | Advanced Engineering Mathematics       | 3                            |
| MECE-758                           | Intermediate Engineering Vibrations    | 3                            |
| Choose one of the following:       |  | Choose one of the following: |
| EEEE-602                           | Random Signals and Noise               | 3                            |
| EEEE-678                           | Digital Signal Processing              |                              |
| MECE-606                           | Systems Modeling                       |                              |
| <b>Total Semester Credit Hours</b> |  | <b>15</b>                    |

### Admission requirements

For information regarding the admission requirements for the advanced certificate in vibrations, contact the department head or the Office of Graduate Enrollment.

## Faculty

### Dean's Office

**Doreen Edwards**, BS, South Dakota School of Mines and Technology; Ph.D., Northwestern University—Dean; Professor

**Edward Hensel**, BS, Clarkson University; Ph.D., New Mexico State University—Associate Dean, Research and Graduate Studies

**Matthew M. Marshall**, BS, Rochester Institute of Technology; MS, Ph.D., University of Michigan—Associate Dean, Undergraduate Studies

### Biomedical Engineering

**Steven Day**, BS, Ph.D., University of Virginia—Department Head; Associate Professor, Bioengineering, Implantable Devices, Fluids in Biosystems

**Vinay Abhyankar**, BS, Binghamton University; MS, Ph.D., University of Wisconsin-Madison—Assistant Professor, Microfluidics, Tissue Engineering, Lab-On-Chip Platforms

**Iris Asllani**, B.Sc., Nuclear Physics, University of Tirana (Albania); M.Sc., Ph.D., Bioengineering, University of Washington, Seattle—Associate Research Professor, Neuroimaging, Functional MRI, NMR Physics

**Jennifer Bailey**, BS, Ph.D., Purdue University—Senior Lecturer

**Edward E. Brown, Jr.**, BS, University of Pennsylvania; MS, Ph.D., Vanderbilt University—Associate Professor, Rehabilitation, Robotics, Control Systems, Biomechanics, Engineering Education

**Thomas Gaborski**, BS, Cornell University; MS, Ph.D., University of Rochester—Associate Professor, Ph.D. Program Director, Nanomaterials, Bioseparations, Cellular Mechanics

**Blanca Lapizco-Encinas**, BS, Instituto Tecnológico de Sonora (Mexico); MS, Instituto Tecnológico de Celaya (Mexico); Ph.D., University of Cincinnati—Professor, Microfluidics, Microscale Electrokinetics and Bioseparations

**Cristian Linte**, BS, University of Windsor (Canada); MS, Ph.D., University of Western Ontario (Canada)—Associate Professor, Biomedical Image Analysis, Image Computing, Modeling and Visualization

**Zhe (Jenny) Zheng**, BS, Xidian University (China); MS, Ph.D., Vanderbilt University—Assistant Professor, Intelligent Interactive Systems, Human-Machine Interaction, Human-Centered Computing, Computer Vision, Machine Learning, Pattern Recognition and Data Mining

**Michael Richards**, BS, University of Rochester; Ph.D., Boston University—Assistant Professor, Image Processing, Mechanical Properties and Interactions of Biological Tissues

**Karin Wuertz**, BS, MS, University of Regensburg (Germany); MBA, University of Cumbria (United Kingdom); Ph.D., University of Ulm (Germany)—Kate Gleason Professor, Regenerative Medicine and Tissue Engineering, Inflammation, Mechanobiology

### 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

**Jairo A. Diaz**, BSE, National University of Columbia; (Columbia); Ph.D., Purdue University—Assistant Professor, Macromolecular and Interfacial Phenomena; Optical, Acoustic and Magnetic Control of Matter

**Matt Ganter**, BS, St. John Fisher College; MS, Ph.D., Rochester Institute of Technology—Assistant Research Professor

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**Alexander D. Roth**, BS, ME, Cornell University; MS, The Ohio State University; Ph.D., Cleveland State University—Lecturer

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### Computer Engineering

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**Louis Beato**, BS, MS, Rochester Institute of Technology—Lecturer, Microcontrollers, Embedded Hardware/Software Systems

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**Lynn F. Fuller**, BS, MS, Rochester Institute of Technology; Ph.D., State University of New York at Buffalo—Professor Emeritus, IC Design, Semiconductor Manufacturing, MEMS and Microsystems

**Jamison Heard**, BS, University of Evansville; MS, Ph.D., Vanderbilt University—Assistant Professor, Robotics, Human-Machine Systems, and Human-Robot Interaction

**Jason Hoople**, BS, MS, Rochester Institute of Technology; Ph.D., Cornell University—Visiting Lecturer, Analog Circuits and Systems, Integrated Piezoelectric Transducers, Integrated CMOS Technology

**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

**Jason Hoople**, BS, MS, Rochester Institute of Technology; Ph.D., Cornell University—Visiting Lecturer, Analog Circuits and Systems, Integrated Piezoelectric Transducers, Integrated CMOS Technology

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**Mark Indovina**, BS, MS, Rochester Institute of Technology; Senior Lecturer, Integrated Circuits Design and Digital Signal Processing

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**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

**Sergey Lyshevski**, MS, Ph.D., Kiev Polytechnic Institute (Ukraine)—Professor, Microsystems, Mechatronics, Control Systems, Non-Linear Control

**Panos Markopoulos**, BS, MS, Technical University of Crete (Greece); Ph.D., University at Buffalo—Assistant Professor, Communication and Signal Processing, Machine Learning, Autonomous Communication

**Parsian Katal Mohseni**, BS, Ph.D., McMaster University (Canada)—Assistant Professor, Nanomaterials Growth and Characterization, III-V Epitaxy, Nanofabrication, Optoelectronics, Photovoltaics, MacEtch

**James Moon**, BS, Carnegie Mellon University; MBA, University of Rochester; MS, Ph.D., University of California at Berkeley—Professor, Semiconductor and Solid State Physics, Integrated Circuit Design, Microfluidic MEMS

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**Bruce W. Smith**, BS, MS, Ph.D., Rochester Institute of Technology—Distinguished Professor, Microlithography, Nanopatterning and Nanomaterials, Thin Films Materials and Processes

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**Jing Zhang**, BS, Huazhong University (China); Ph.D., Lehigh University—Assistant Associate Professor, Devices fabrication of III-Nitride semiconductors for photonics

## Industrial and Systems Engineering

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**Marcos Esterman**, BS, MS, Massachusetts Institute of Technology; Ph.D., Stanford University—Professor, Systems Engineering and Product Development, Medical Device Development, Engineering Design for Social Impact

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**Michael Schrlau**, BS, University of Pittsburgh; Ph.D., University of Pennsylvania—Assistant Associate Professor, Bioengineering and Microsystems

**Bruce W. Smith**, BS, MS, Ph.D., Rochester Institute of Technology—Distinguished Professor, Microlithography, Nanopatterning and Nanomaterials, Thin Films Materials and Processes

**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 Engineering Technology

**S. Manian Ramkumar, Dean**

[rit.edu/engineeringtechnology](http://rit.edu/engineeringtechnology)

## Programs of Study

|   |  |     |
|---|--|-----|
|   | Communication Networks, MS                           | 103 |
| ⊕ | Construction Management, MS                          | 104 |
| ⊕ | Environmental, Health and Safety Management, MS      | 105 |
|   | Manufacturing and Mechanical Systems Integration, MS | 107 |
|   | Packaging Science, MS                                | 109 |
|   | Print and Graphic Media Science, MS                  | 110 |
| ⊕ | Workplace Learning and Instruction, Adv. Cert.       | 111 |
| ⊕ | Online learning option available.                    |     |

The diverse, graduate-level programs offered by the College of Engineering 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.

Please visit the college's website—[www.rit.edu/engineeringtechnology](http://www.rit.edu/engineeringtechnology)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

## 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.

## Communication Networks, MS

[www.rit.edu/study/communication-networks-ms](http://www.rit.edu/study/communication-networks-ms)

**James Lee, Associate Professor**

**585-475-2899, [jhleme@rit.edu](mailto:jhleme@rit.edu)**

### Program overview

Communication is an ever changing industry, with new services and products being created and offered through the internet, mobility via wireless technology, extreme capacity created by fiber optics, as well as the evolution of policy and regulation. These are all shaping the telecommunication industry and networks of the future.

The MS in communication networks develops an advanced level of skill and knowledge needed by the future leaders of the telecommunications industry. This program is designed for individuals who seek advancement into managerial roles in the dynamic, evolving communications environment.

### Options

To help students achieve the level of expertise they are seeking, the program offers three options: fiber-optic and photonic communications, wireless communications, and network design and management. Each was designed to develop advanced knowledge in a specialty area. Alternatively, students may choose to not pursue a program option. Instead, they may select specific electives from a number of RIT's graduate programs to achieve more specific career goals.

### Curriculum

#### Communication Networks (thesis option), MS degree, typical course sequence

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| TCET-601*                          | Programming & Problem Solving in Telecommunications | 3                     |
| TCET-715                           | Converged Network Concepts                          | 3                     |
| TCET-740                           | Fiber Optic Communications                          | 2                     |
| TCET-741                           | Fiber Optic Communications Lab                      | 1                     |
| TCET-751                           | Wireless Communications                             | 3                     |
| GRCS-701                           | Research Methods                                    | 3                     |
|                                    | Electives   | 12                    |
| <b>Second Year</b>                 |   |                       |
| TCET-788                           | Thesis Planning                                     | 3                     |
| TCET-790                           | Thesis  | 3                     |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>             |

#### Communication Networks (graduate project option), MS degree, typical course sequence

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| TCET-601*                          | Programming & Problem Solving in Telecommunications | 3                     |
| TCET-715                           | Converged Network Concepts                          | 3                     |
| TCET-740                           | Fiber Optic Communications                          | 2                     |
| TCET-741                           | Fiber Optic Communications Lab                      | 1                     |
| TCET-751                           | Wireless Communications                             | 3                     |
| GRCS-701                           | Research Methods                                    | 3                     |
|                                    | Electives   | 12                    |
| <b>Second Year</b>                 |   |                       |
| TCET-797                           | Graduate Project                                    | 3                     |
|                                    | Elective  | 3                     |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>             |

#### Communication Networks (comprehensive exam option), MS degree, typical course sequence

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| TCET-601*                          | Programming & Problem Solving in Telecommunications | 3                     |
| TCET-715                           | Converged Network Concepts                          | 3                     |
| TCET-740                           | Fiber Optic Communications                          | 2                     |
| TCET-741                           | Fiber Optic Communications Lab                      | 1                     |
| TCET-751                           | Wireless Communications                             | 3                     |
| GRCS-701                           | Research Methods                                    | 3                     |
|                                    | Electives   | 12                    |
| <b>Second Year</b>                 |   |                       |
| TCET-795                           | TCET Comprehensive Exam                             | 0                     |
|                                    | Electives   | 6                     |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>             |

\* TCET-601 is a bridge course that can be waived by qualification exam. Credits for course or waiver do not count toward degree.

Students must use the curriculum electives to complete at least 9 credits from a list of courses approved by the faculty to earn an option. Students may complete courses listed in any option or choose courses from a list of approved elective courses to complete the required number of electives. A student is not required to complete any option but may pick and choose courses that fulfill their educational objectives from any of the listed options of approved elective courses. The currently-approved courses by option are:

### Options

#### Fiber Optic and Photonic Communications Option

| COURSE  |   |
|---|---|
| <i>Choose three from the list below for 9 credits</i> |   |
| TCET-745  | Advanced Fiber-Optic Communications     |
| TCET-748  | Fiber Optic Test & Measurement          |
| EEEE-771  | Optoelectronics                         |
| MFET-655  | Surface Mount Electronics Manufacturing |

#### Network Design and Management Option

| COURSE  |  |
|---|--|
| <i>Choose three from the list below for 9 credits</i> |  |
| TCET-620  | Applied Machine Learning               |
| TCET-723  | Telecommunications Network Engineering |
| TCET-747  | Next Generation Networks               |
| TCET-760  | Network Planning and Design            |

#### Wireless Communications Option

| COURSE                                    |                                 |
|---|---------------------------------|
| <i>All courses required for 9 credits</i> |                                 |
| TCET-750                                  | Wireless Systems Regulation     |
| TCET-752                                  | Advanced Wireless Communication |
| TCET-753                                  | Wireless Networks               |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in engineering technology, engineering, or a related area.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.



- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Construction Management, MS

[www.rit.edu/study/construction-management-ms](http://www.rit.edu/study/construction-management-ms)

**Maureen Valentine, Professor**

**585-475-7398, [msvite@rit.edu](mailto:msvite@rit.edu)**

### Program overview

The master of science degree in construction management is specifically designed for experienced construction management professionals interested in advancing into leadership positions within the field. The program may also accommodate recent graduates of undergraduate programs in construction management or related disciplines. The program is offered entirely online.

The goal of the construction management master's degree is to provide students with the requisite strategic skills to lead and advance the construction industry. Graduates will develop competencies in leadership, construction cost analysis and control, construction operations management and productivity, construction business development, sustainable design and construction, and construction client relationship building. As part of the multidisciplinary nature of the program, a wide range of electives from different disciplines provides graduates with flexibility to take relevant courses across RIT. Core construction management courses in the program are taught by faculty with both field and research experience in the discipline.

### Plan of study

The program is hosted completely online and designed with the working professional in mind. You will have the convenience and flexibility to plan your course work around your work or personal commitments. The program can be completed in as little as one and a half years of full-time study, or approximately two-to-three to years of part-time study. The curriculum consists of core courses, professional electives, and a choice of a graduate thesis, project, or a comprehensive exam.

### Curriculum

#### Construction Management (comprehensive exam completion path), MS degree, typical course sequence

| COURSE                             |  | SEMESTER CREDIT HOURS |
|------------------------------------|--|-----------------------|
| <b>First Year</b>                  |  |                       |
| CONM-650                           | Principles of Construction Leadership and Management | 3                     |
| CONM-690                           | Sustainable Building Construction and Design         | 3                     |
| CONM-718                           | Construction Operations and Productivity             | 3                     |
| CONM-720                           | Construction Cost Analysis and Management            | 3                     |
| GRCS-701                           | Research Methods                                     | 3                     |
|                                    | Professional Electives                               | 6                     |
| <b>Second Year</b>                 |  |                       |
| CONM-760                           | Construction Client Development                      | 3                     |
| CONM-795                           | Comprehensive Exam                                   | 0                     |
|                                    | Professional Electives                               | 6                     |
| <b>Total Semester Credit Hours</b> |  | <b>30</b>             |

#### Construction Management (graduate capstone project completion path), MS degree, typical course sequence

| COURSE            |  | SEMESTER CREDIT HOURS |
|-------------------|--|-----------------------|
| <b>First Year</b> |  |                       |
| CONM-650          | Principles of Construction Leadership and Management | 3                     |
| CONM-690          | Sustainable Building Construction and Design         | 3                     |
| CONM-718          | Construction Operations and Productivity             | 3                     |
| CONM-720          | Construction Cost Analysis and Management            | 3                     |
| GRCS-701          | Research Methods                                     | 3                     |
|                   | Professional Electives                               | 6                     |

| COURSE                                   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>Second Year</b>                       |                       |
| CONM-760 Construction Client Development | 3                     |
| CONM-797 Graduate Project                | 3                     |
| Professional Elective                    | 3                     |
| <b>Total Semester Credit Hours</b>       | <b>30</b>             |

### Construction Management (thesis completion path), MS degree, typical course sequence

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>   |                       |
| CONM-650 Principles of Construction Leadership and Management | 3                     |
| CONM-690 Sustainable Building Construction and Design         | 3                     |
| CONM-718 Construction Operations and Productivity             | 3                     |
| CONM-720 Construction Cost Analysis and Management            | 3                     |
| CONM-788 Thesis Planning                                      | 3                     |
| GRCS-701 Research Methods                                     | 3                     |
| Professional Elective   | 3                     |
| <b>Second Year</b>  |                       |
| CONM-760 Construction Client Development                      | 3                     |
| CONM-790 Thesis   | 3                     |
| Professional Elective   | 3                     |
| <b>Total Semester Credit Hours</b>                            | <b>30</b>             |

### Admission requirements

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

- Submit a graduate application.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Hold a bachelor's degree with a minimum undergraduate GPA of 3.0 in construction management, civil engineering, civil engineering technology, or related program that includes at least 15 semester hours of college level math and science. Applicants holding other bachelor degrees with appropriate, related work experience will be considered for admission on an individual basis.
- Have course work or equivalent documented professional experience in cost estimating, planning & scheduling and project management.
- Business/management courses and a statistics course are strongly recommended.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Have at least one-year relevant construction management experience. Those who lack appropriate work experience may be required to complete one or more semesters of related graduate cooperative work experience;
- If academic and/or work preparation is needed before being admitted and beginning graduate studies, applicants are encouraged to develop a plan with the program chair. Preparatory course(s) may be completed at RIT or (with pre-approval) may be completed at other universities. Each course must be completed with a grade of B or higher.
- International applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). A minimum score of 570 on the written exam, 230 on the electronic version of the exam, or 88 on the internet version of the exam is required.

## Environmental, Health and Safety Management, MS

[www.rit.edu/study/environmental-health-and-safety-management-ms](http://www.rit.edu/study/environmental-health-and-safety-management-ms)

**Joseph Rosenbeck, Professor**

5854756469, [jmrcem@rit.edu](mailto:jmrcem@rit.edu)

### Program overview

Management of environmental, health and safety issues has changed significantly in recent years. The emergence of voluntary standards and codes of conduct, including international standards, coupled with the need to manage costs and limited resources, has resulted in a trend to move beyond regulatory compliance. Now, companies work toward sustainability through the use of integrated environmental and management systems, which are woven into key business processes. The environmental management masters provides students with a solid foundation in the managerial aspects of developing and implementing environmental, health and safety management systems that can move organizations toward a more sustainable and socially responsible future.

Although they are distinct disciplines, environmental management, occupational health, and workplace safety share many technical, regulatory, and organizational characteristics. Today's professionals need to be educated in all three areas. Graduates of the program are employed by Fortune 100 companies, environmental health and safety consultancies, universities, and government agencies such as the Environmental Protection Agency, Occupational Safety and Health Administration, and the New York State Department of Environmental Conservation.

### Environmental Health and Safety Courses

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

The program may be completed entirely through online learning, or via a combination of online and traditional on-campus courses. The curriculum includes core courses, professional electives, and a choice of a thesis, capstone project, or comprehensive exam.

Professional electives can include courses in topics as diverse as fire protection, occupational health, solid and hazardous waste management, industrial wastewater management, air emissions management, occupational safety, mechanical and electrical controls and standards, environmental health and safety law, accounting and finance, project management, and organizational behavior and leadership. Additional professional electives are available in topics such as business management, quality, sustainability, and other areas.

### Cooperative Education

Cooperative education, or co-op for short, is full-time, paid work experience in your field of study. And it sets RIT graduates apart from their competitors. It's exposure—early and often—to a variety of professional work environments, career paths, and industries. RIT co-op is designed for your success.

Full-time students are eligible to participate in RIT's cooperative education program. After completing two semesters (a minimum of 18 credit hours), students may request approval to complete up to one year of cooperative education employment related to their field of study.

## Curriculum

### Environmental, Health and Safety Management (thesis option), MS degree, typical course sequence

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                    |                       |
| ESHS-720 Environmental, Health and Safety Management | 3                     |
| ESHS-740 EHS Management System Design                | 3                     |
| ESHS-755 Corporate Social Responsibility             | 3                     |
| ESHS-760 Integrating EHS Management                  | 3                     |
| GRCS-701 Research Methods                            | 3                     |
| Professional Electives                               | 6                     |
| <b>Second Year</b>                                   |                       |
| ESHS-780 EHS Internal Auditing                       | 3                     |
| ESHS-788 Thesis Planning                             | 3                     |
| ESHS-790 Thesis                                      | 3                     |
| <b>Total Semester Credit Hours</b>                   | <b>30</b>             |

### Environmental, Health and Safety Management (capstone project option), MS degree, typical course sequence

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                    |                       |
| ESHS-720 Environmental, Health and Safety Management | 3                     |
| ESHS-740 EHS Management System Design                | 3                     |
| ESHS-755 Corporate Social Responsibility             | 3                     |
| ESHS-760 Integrating EHS Management                  | 3                     |
| GRCS-701 Research Methods                            | 3                     |
| Professional Electives                               | 6                     |
| <b>Second Year</b>                                   |                       |
| ESHS-780 EHS Internal Auditing                       | 3                     |
| ESHS-797 Graduate Project                            | 3                     |
| Professional Elective                                | 3                     |
| <b>Total Semester Credit Hours</b>                   | <b>30</b>             |

### Environmental, Health and Safety Management (comprehensive exam option), MS degree, typical course sequence

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                    |                       |
| ESHS-720 Environmental, Health and Safety Management | 3                     |
| ESHS-740 EHS Management System Design                | 3                     |
| ESHS-755 Corporate Social Responsibility             | 3                     |
| ESHS-760 Integrating EHS Management                  | 3                     |
| GRCS-701 Research Methods                            | 3                     |
| Professional Electives                               | 6                     |
| <b>Second Year</b>                                   |                       |
| ESHS-780 EHS Internal Auditing                       | 3                     |
| ESHS-795 Comprehensive Exam                          | 0                     |
| Professional Electives                               | 6                     |
| <b>Total Semester Credit Hours</b>                   | <b>30</b>             |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.

- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit two writing samples to demonstrate written communication skills. Writing samples may include, but are not limited to reports, memos, investigations, procedures, position papers, essays and term papers
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Applicants with acceptable professional certification(s) and/or work experience may have prerequisite science course work waived.
- Applicants without formal academic training or documented experience in air emissions, waste water, solid and hazardous waste, occupational health, or occupational safety may be required to take professional electives in these areas.
- 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.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### Transfer Credit

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

### International Students

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

## Manufacturing and Mechanical Systems Integration, MS

[www.rit.edu/study/manufacturing-and-mechanical-systems-integration-ms](http://www.rit.edu/study/manufacturing-and-mechanical-systems-integration-ms)

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### Program overview

The MS in manufacturing and mechanical systems integration is a manufacturing engineering degree designed for individuals who wish to achieve a high level of aptitude, competence, and skill in mechanical or manufacturing engineering, or advanced mechanical systems. The program combines engineering, business, and management to effectively guide and lead in a range of manufacturing enterprises.

The program is offered by the department of manufacturing and mechanical engineering technology in collaboration with Saunders College of Business and the Kate Gleason College of Engineering.

### Manufacturing Engineering Courses

The manufacturing engineering degree includes core courses that cover manufacturing and mechanical systems fundamentals, project management, advanced mechanical systems, integrated mechanical systems, manufacturing process improvements and efficiencies, and the business and financial aspects of manufacturing. You'll also complete a three-course option, elective courses, and a capstone project, thesis, or comprehensive exam.

Options are available in advanced mechanics, electronics packaging, polymer engineering and technology, product design, quality, and robotics and advanced manufacturing systems. Students may be required to take additional prerequisite courses depending on their background and the option selected. The graduate director may approve the waiver of courses in the prerequisite group from graduation requirements, depending on a student's academic and employment background.

- **Advanced Mechanics:** The advanced mechanics option analyzes classical and contemporary theoretical models of material structures. Practical methods and approaches, experimental results, and optimization of material properties and structure performance are put to use for capstones and thesis projects. Students who plan on careers in advanced mechanical modeling and design should consider this option.
- **Electronics Packaging:** Students in this option receive a detailed education in printed circuit board assembly design, manufacturing, materials, failure modes, and root causes. They'll also gain a broad understanding of best practices and learn the scope of the industry. Anyone who plans on designing or manufacturing products that contain circuit board assemblies, in either rigid or flexible formats, would benefit from this option. Topics of study include electronics miniaturization, defect analysis, solder reliability, and process optimization.
- **Polymer Engineering and Technology:** The purpose of this option is to equip future engineers with the unique skills necessary to enter the plastics industry, one of the largest manufacturing related industries in the United States. Successfully developing new plastics materials and products requires specialized knowledge of these complex manufacturing systems. A critical component of this option is the completion of a research project in the area of plastics and polymer technology. Some projects have focused on polymer composites, shape memory/self-healing materials, 3D printing, and biodegradable polymers.
- **Product Design:** Product design in the 21st century requires a skill set that has grown to be much more than just designing parts that fit together in a product. Parts and products must now be designed with consideration for the best choices of features, the ability to function

ideally under varying conditions and environments, and ease in manufacturing and assembly. These skills are all required by today's engineers and product designers and are equally important for engineering managers to understand.

- **Quality:** The quality option enables students to lead a problem-solving project within a quality management team. Students will learn to reduce unacceptable variability in materials, production, and manufacturing systems resulting in high quality finished products. Students will use skills in robust design, linear regression, and modeling to show that variability can be reduced and that a solution is sustainable. Students who select this option may be interested in pursuing a leadership role as a manufacturing engineer, senior quality engineer, continuous process improvement engineer, or process engineer.
- **Robotics and Advanced Manufacturing Systems:** Robotics is more than software. In addition to programming, students who choose this option will study how robotic systems are designed to complement a manufacturing system or aid in human assistance products with a focus on limitations and design improvements. Capstone and thesis projects involve optimization and improvement of designs to achieve a specific robotic behavior or task. Robotic integrators as well as robotic designers will benefit by learning robotic mechanical and electrical limitations and development.

### Electives

The number of electives needed to complete the program is based on whether the student chooses to complete a thesis, capstone project, or comprehensive exam. The thesis option requires one elective, the capstone project requires two electives, and the comprehensive exam option requires three electives. Elective courses can be any course from a different concentration from the one chosen, a graduate-level course from another program (if approved by the graduate director and faculty member teaching the course), or an independent study course (if approved by the student's graduate program director).

### Cooperative Education

Full-time students are eligible to participate in RIT's cooperative education program. After completing two semesters (a minimum of 18 credit hours), students may request approval to complete up to one year of cooperative education employment related to their field of study.

### Curriculum

#### Manufacturing and Mechanical Systems Integration (thesis option), MS degree, typical course sequence

| COURSE                              | SEMESTER  | CREDIT HOURS |
|-------------------------------------|---|--------------|
| <b>First Year</b>                   |   |              |
| <i>Choose one of the following:</i> |   |              |
| ACCT-603                            | Accounting for Decision Makers                    | 3            |
| ACCT-706                            | Cost Management                                   |              |
| MFET-600                            | MMSI Graduate Seminar                             | 0            |
| MFET-650                            | Manufacturing and Mechanical Systems Fundamentals | 3            |
| MFET-730                            | Six Sigma for Design and Manufacturing            | 3            |
| MFET-788                            | MMSI Thesis Planning                              | 3            |
| STAT-670                            | Design of Experiments                             | 3            |
|                                     | MMSI Option Courses                               | 6            |
| <b>Second Year</b>                  |   |              |
| DECS-744                            | Project Management                                | 3            |
| MFET-790                            | MMSI Thesis                                       | 3            |
|                                     | Elective*   | 3            |
|                                     | MMSI Option Course                                | 3            |
| <b>Total Semester Credit Hours</b>  |   | <b>33</b>    |

**Manufacturing and Mechanical Systems Integration (capstone project option), MS degree, typical course sequence**

| COURSE                              |   | SEMESTER CREDIT HOURS |
|-------------------------------------|---|-----------------------|
| <b>First Year</b>                   |   |                       |
| <i>Choose one of the following:</i> |   | 3                     |
| ACCT-603                            | Accounting for Decision Makers                    |                       |
| ACCT-706                            | Cost Management                                   |                       |
| MFET-600                            | MMSI Graduate Seminar                             | 0                     |
| MFET-650                            | Manufacturing and Mechanical Systems Fundamentals | 3                     |
| MFET-730                            | Six Sigma for Design and Manufacturing            | 3                     |
| STAT-670                            | Design of Experiments                             | 3                     |
|                                     | MMSI Option Courses                               | 6                     |
|                                     | Elective*   | 3                     |
| <b>Second Year</b>                  |   |                       |
| DECS-744                            | Project Management                                | 3                     |
| MFET-797                            | MMSI Capstone Project                             | 3                     |
|                                     | MMSI Option Course                                | 3                     |
|                                     | Elective*   | 3                     |
| <b>Total Semester Credit Hours</b>  |   | <b>33</b>             |

**Manufacturing and Mechanical Systems Integration (comprehensive exam option), MS degree, typical course sequence**

| COURSE                              |   | SEMESTER CREDIT HOURS |
|-------------------------------------|---|-----------------------|
| <b>First Year</b>                   |   |                       |
| <i>Choose one of the following:</i> |   | 3                     |
| ACCT-603                            | Accounting for Decision Makers                    |                       |
| ACCT-706                            | Cost Management                                   |                       |
| MFET-600                            | MMSI Graduate Seminar                             | 0                     |
| MFET-650                            | Manufacturing and Mechanical Systems Fundamentals | 3                     |
| MFET-730                            | Six Sigma for Design and Manufacturing            | 3                     |
| STAT-670                            | Design of Experiments                             | 3                     |
|                                     | MMSI Option Courses                               | 6                     |
|                                     | Elective*   | 3                     |
| <b>Second Year</b>                  |   |                       |
| MFET-795                            | MMSI Comprehensive Exam                           | 0                     |
| DECS-744                            | Project Management                                | 3                     |
|                                     | MMSI Option Course                                | 3                     |
|                                     | Electives*  | 6                     |
| <b>Total Semester Credit Hours</b>  |   | <b>33</b>             |

\* Elective courses must be chosen from the list of option courses, but must be outside of the option the student has chosen as part of their program of study.

**Options**

| COURSE   |   | SEMESTER CREDIT HOURS |
|--|---|-----------------------|
| <b>Robotics and Advanced Manufacturing Systems</b> |   |                       |
| ISEE-610   | Systems Simulation                                    | 3                     |
| MFET-670   | Manufacturing Automation Control                      | 3                     |
| MFET-685   | Robots & CNC in Integrated Manufacturing              | 3                     |
| TCET-620   | Applied Machine Learning                              | 3                     |
| <b>Electronics Packaging</b>                       |   |                       |
| MFET-655   | Surface Mount Electronics Manufacturing               | 3                     |
| MFET-656   | Advanced Concepts in Semiconductor Packaging          | 3                     |
| MTSE-601   | Materials Science                                     | 3                     |
| TCET-740   | Fiber Optic Communications                            | 2                     |
| TCET-741   | Fiber Optic Communications Lab                        | 1                     |
| <b>Product Design</b>                              |   |                       |
| MCET-620   | Robust Design & Production Systems                    | 3                     |
| MCET-670   | Concept Design & Critical Parameter Management        | 3                     |
| MCET-683   | Plastics Product Design                               | 3                     |
| MCET-720   | Product & Production System Development & Integration | 3                     |
| <b>Quality</b>                                     |   |                       |
| MCET-620   | Robust Design & Production Systems                    | 3                     |
| STAT-621   | Statistical Quality Control                           | 3                     |
| STAT-641   | Applied Linear Models - Regression                    | 3                     |
| <b>Polymer Engineering &amp; Technology</b>        |   |                       |
| MCET-730   | Polymer Engineering Research (REQUIRED)               | 3                     |
| MCET-674   | Plastics and Composites Materials                     | 2                     |
| MCET-675   | Plastics and Composites Materials Laboratory          | 1                     |
| MCET-680   | Plastics Manufacturing Technology                     | 3                     |
| MCET-683   | Plastics Product Design                               | 3                     |
| MTSE-602   | Polymer Science                                       | 3                     |
| <b>Advanced Mechanics</b>                          |   |                       |
| MCET-621   | Advanced Strength of Materials                        | 3                     |
| MCET-683   | Plastics Product Design                               | 3                     |
| MCET-695   | Applied Finite Element Analysis                       | 3                     |

**Admission requirements**

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in the field of engineering, engineering technology, or computing. Students with degrees in other disciplines will be considered on an individual basis.
- Recommended minimum cumulative GPA of 3.0 (or equivalent). Applicants with a lower GPA will be evaluated on a case-by-case basis and may be admitted on a probationary basis. These students will have to secure a B or better average in the first three graduate courses to be considered for full admission.
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in computer programming and probability and statistics.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.



## Packaging Science, MS

[www.rit.edu/study/packaging-science-ms](http://www.rit.edu/study/packaging-science-ms)

**Erin Aaron,**

**585-475-2278, [eeaast@rit.edu](mailto:eeaast@rit.edu)**

### Program overview

Designed for packaging professionals to become experts in the packaging development process, the master's in packaging science focuses on selecting raw materials, developing environmentally friendly packaging solutions, and creating functional packaging that withstands environmental, chemical, and physical stresses during distribution and transportation. The program will also help you to keep these functional aspects in mind as you develop attractive packaging designs that are aesthetically pleasing as they pique consumer interest. This master's in packaging science combines theoretical and hands-on learning experiences that enable you to gain comprehensive knowledge related to packaging design, package testing, product marketing, project management, and quality control.

### What is Packaging Science?

Packaging science is a dynamic field that integrates engineering, design, and business to develop and design product packaging for a range of consumer goods. Packaging engineers and packaging designers focus on understanding the packaging needs of a product and what it must accomplish. These needs can range from maintaining food freshness and safety, keeping products safe from damage during transportation, appealing to consumers at the point of purchase, communicating product information, sustaining transportation efficiency, complying with sustainable practices for post-use recycling and reuse, and more. It's the role of packaging engineers and packaging designers to responsibility weigh these factors into the conceptualization, design, and development of product packaging.

### Packaging Engineering Courses

The master's in packaging science consists of core courses, elective courses, and either a comprehensive exam, capstone project, or thesis. The total number of elective courses depends on the student's choice of the exam, project, or thesis option. Faculty advisors assist in selecting an option that best meets a student's career aspirations.

Core courses cover topics such as packaging dynamics, packaging and the environment, product packaging for end use, and distribution systems including supply chain management. Elective courses are approved by the student's advisor and must meet degree requirements. In certain circumstances, with pre-approval by the graduate advisor and where individual need indicates appropriateness, a limited number of upper-level undergraduate courses may be used to fulfill elective credit. Students, with advisor permission, may include independent study as part of their elective credits. However, independent study may not be used toward the required packaging core course work. Courses selected for elective credit may be combined to create special areas of focus with program chair approval.

### Green Belt – Lean Six Sigma

Students may elect to pursue Green Belt certificate in Lean Six Sigma with the completion of the thesis or capstone project. Certification requires students to complete the Lean Six Sigma Yellow Belt Certification training program as one of their electives. Upon completion, students must implement the fundamentals of Lean Six Sigma within their thesis or capstone project.

## Cooperative Education

Cooperative education, or co-op for short, is full-time, paid work experience in your field of study. And it sets RIT graduates apart from their competitors. It's exposure—early and often—to a variety of professional work environments, career paths, and industries. RIT co-op is designed for your success.

Full-time students may choose to complete cooperative education (co-op). After completing two semesters of study (a minimum of 18 credit hours), students may request approval to complete up to one year of cooperative education related to packaging.

## Curriculum

### Packaging Science (thesis option), MS degree, typical course sequence

| COURSE                             | SEMESTER                      | CREDIT HOURS |
|------------------------------------|-------------------------------|--------------|
| <b>First Year</b>                  |                               |              |
| GRCS-701                           | Research Methods              | 3            |
| PACK-730                           | Packaging and the Environment | 3            |
| PACK-742                           | Distribution Systems          | 3            |
| PACK-763                           | Packaging for End Use         | 3            |
|                                    | Packaging Electives           | 12           |
| <b>Second Year</b>                 |                               |              |
| PACK-783                           | Advanced Packaging Dynamics   | 3            |
| PACK-790                           | Research Thesis               | 6            |
|                                    | Packaging Elective            | 3            |
| <b>Total Semester Credit Hours</b> |                               | <b>36</b>    |

### Packaging Science (capstone project option), MS degree, typical course sequence

| COURSE                             | SEMESTER                      | CREDIT HOURS |
|------------------------------------|-------------------------------|--------------|
| <b>First Year</b>                  |                               |              |
| 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           |
| <b>Second Year</b>                 |                               |              |
| PACK-783                           | Advanced Packaging Dynamics   | 3            |
| PACK-797                           | Graduate Project              | 3            |
|                                    | Packaging Electives           | 6            |
| <b>Total Semester Credit Hours</b> |                               | <b>36</b>    |

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

| COURSE                             | SEMESTER                      | CREDIT HOURS |
|------------------------------------|-------------------------------|--------------|
| <b>First Year</b>                  |                               |              |
| 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           |
| <b>Second Year</b>                 |                               |              |
| PACK-783                           | Advanced Packaging Dynamics   | 3            |
| PACK-795                           | Comprehensive Examination     | 0            |
|                                    | Packaging Electives           | 9            |
| <b>Total Semester Credit Hours</b> |                               | <b>36</b>    |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.

- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent) in the final two years of undergraduate course work.
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Applicants 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.
- Have completed at least one semester of physics (mechanics focus), one semester of calculus, one year of chemistry (including organic chemistry), statistics, and basic computer literacy.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Print and Graphic Media Science, MS

[www.rit.edu/study/print-and-graphic-media-science-ms](http://www.rit.edu/study/print-and-graphic-media-science-ms)

**Bruce Myers, Associate Professor**  
**585-475-5224, blmppr@rit.edu**

### Program overview

The MS program in print and graphic media science offers students an opportunity to explore new areas of research in the graphic communications field. The program's faculty and curriculum focus on establishing quality and efficiencies pertaining to business, technology, and processes in graphic communications. Recent student research includes 3D printing quality analysis, consumer preferences for printed textiles, user experience in digital publishing, and implementation of lean techniques in printing. Our faculty are experts in many different areas, including print, business, color management, web and IT, digital publishing, imaging, and typography. Students have the opportunity to get hands-on experience by working with faculty as graduate assistants either in the classroom or assisting with faculty research. Graduates are employed as industry leaders in advertising, publishing, business operations, communication processes, and product developments.

### Print and Graphic Media Science Courses

The print and graphic media science degree includes core courses, electives, and a thesis. The thesis provides an opportunity for students to explore in-depth research and present their findings.

**Electives:** The program encourages cross-disciplinary and interdepartmental collaboration. Students may choose elective courses from a variety of courses offered in the department of graphic media science and technology or with other graduate departments and programs at RIT with approval of the graduate director.

**Capstone/Research/Thesis Options:** As part of the program, students must complete a capstone project, a research option, or a thesis. This choice of option provides flexibility for students to choose the path that best aligns with their career goals.

- **Capstone Option:** Students interested in developing an individual interest in an aspect of print media and/or the graphic communication industry may complete a unique capstone project. This option includes one additional elective course.
- **Research Applications and Problem-Solving Option:** Students interested in focusing on the application of their knowledge in a team-based environment may choose to complete a research course. This option includes one additional elective course.
- **Thesis Option:** Students are required to complete a research thesis that demonstrates original thinking and creativity in the search for new knowledge in the graphic communication industry. Students work with expert faculty and focus on a particular topic of thesis research in areas including content management, publishing workflows, typography and layout, business trends, color management, media processes, materials, and applications of printing.

## Curriculum

### Print and Graphic Media Science, MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS                                |
|------------------------------------|--|
| <b>First Year</b>                  |  |
| GRCS-701                           | Research Methods 3                                   |
| PPRT-600                           | Graduate Seminar 0                                   |
| PPRT-602                           | Tone and Color Analysis 3                            |
| PPRT-641                           | Digital Printing and Publishing 3                    |
| PPRT-703                           | Cross Media Workflow 3                               |
| PPRT-705                           | Graphic Standards and Specifications 3               |
| PPRT-751                           | Advanced Materials in Graphic Communication 3        |
|                                    | Technical Electives 6                                |
| <b>Second Year</b>                 |  |
|                                    | Choose one of the following:                         |
| PPRT-790                           | Thesis 6   |
| PPRT-796                           | Capstone Research Applications and Problem Solving 3 |
|                                    | Technical Elective 3                                 |
| PPRT-797                           | Capstone 3   |
|                                    | Technical Elective 3                                 |
| <b>Total Semester Credit Hours</b> | <b>30</b>  |

### Admission requirements

To be considered for admission to the MS program in print and graphic media science, candidates must fulfill the following requirements:

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent). Applicants with a GPA below 3.0 may be considered, but are required to submit standard GRE scores.
- Submit a personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

## Workplace Learning and Instruction, Adv. Cert.

[www.rit.edu/study/workplace-learning-and-instruction-adv-cert](http://www.rit.edu/study/workplace-learning-and-instruction-adv-cert)

**Linda Tolan, Professor**

**585-475-5078, latcad@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 candidates, and retain the most qualified employees.

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

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

## Curriculum

### Workplace Learning and Instruction, advanced certificate, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS                |
|------------------------------------|--------------------------------------|
| <b>First Year</b>                  |                                      |
| EDLI-730                           | Theories of Learning 3               |
| Choose one of the following:       |                                      |
| EDLI-733                           | Instructional Design 3               |
|                                    | Approved Graduate Elective           |
| EDLI-755                           | Learning Assessment and Evaluation 3 |
| EDLI-756                           | Learning Design and Technology 3     |
| <b>Total Semester Credit Hours</b> | <b>12</b>                            |

### Approved Graduate Electives

|          |  |
|----------|--|
| EDLI-723 | Group Dynamics and Facilitation Skills                     |
| EDLI-750 | Strategic Career Development                               |
| EDLI-751 | Career Counseling Techniques                               |
| EDLI-752 | Assessments and Measurements in Human Resource Development |
| EDLI-753 | The Student Experience in Higher Education                 |
| EDLI-754 | Critical Systems in Higher Education                       |
| EDLI-757 | Organization and Leadership in Higher Education            |
| EDLI-758 | Design for On-Line   |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate coursework, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).

- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Faculty

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

**Linda A. Tolan**, BS, State University College at Geneseo; MS, Rochester Institute of Technology; Ph.D., Andrews University; NCC—Senior Associate Dean for Curriculum Innovation, Human Resources and Engagement; Professor

**Michael Eastman**, BS, MS, Rochester Institute of Technology, Ph.D., University at Buffalo—Associate Dean for Academic Programs and Continuous Improvement; Professor

**Rebecca L. Sumner**, AB, Franklin and Marshall College; MA, Ph.D., University of Rochester—Assistant Dean for Research Development

**Melissa Aponte**, BA, Ithaca College; MA, Teachers College, Columbia University; Ed.D., St. John Fisher College—Assistant Dean for Students

## School of Engineering Technology

### Civil Engineering Technology

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

**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 Emeritus

**Gretchen L. Wainwright**, BS, MS, Rensselaer Polytechnic Institute; PE—Principle Lecturer

**Scott B. Wolcott**, PE, BS, MS, State University of New York at Buffalo—CET Faculty Associate for Study Abroad Initiatives; Professor

**Teresa Wolcott**, BS, State University of New York at Buffalo; MS, Rochester Institute of Technology—Principle 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; Ph.D., State University of New York College of Environmental Science and Forestry—Assistant Professor

**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—Eugene H. Fram Chair in Applied Critical Thinking; 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)—Associate 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 Emeritus

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

**James H. Lee**, PE, BS, California Polytechnic State University; MS, Ph.D., Texas A&M University—Acting Department Chair; Program Director for Graduate Studies and Research; Associate Professor

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



***Manufacturing and Mechanical Engineering Technology/Packaging Science***

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

**Martin Anselm**, BS, State University College at Geneseo; MS, Clarkson University; Ph.D., Binghamton University—Associate Professor

**Beth A. Carle**, BSE, University of Pittsburgh; MS, Ph.D., University of Illinois; EIT Professional Certification—Program Director for Undergraduate Studies; Professor

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

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

**Martin Gordon**, PE, BSME, MSME, MBA, State University of New York at Buffalo—Professor

**Seung H. Kim**, BS, Hanyang University (South Korea); MS, Ph.D., University of Illinois—Associate Professor

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

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

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

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

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

**Michael J. Slifka**, BS, MS, Rochester Institute of Technology—Senior Lecturer

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

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

***Packaging Science***

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

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

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

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

**Daniel P. Johnson**, BS, ME, Rochester Institute of Technology, M.Ed., University of Buffalo—Department Chair; Professor

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

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

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

# College of Health Sciences and Technology

Yong Tai Wang, Dean  
rit.edu/healthsciences

## Programs of Study

|                                      |     |
|--------------------------------------|-----|
| Health and Well-being Management, MS | 116 |
| ⊕ Health Care Finance, Adv. Cert.    | 117 |
| ⊕ Health Systems Management, MS      | 118 |
| Medical Illustration, MFA            | 120 |
| ⊕ 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.

Please visit the college's website—[www.rit.edu/healthsciences](http://www.rit.edu/healthsciences)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

## 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.

## Health and Well-being Management, MS

[www.rit.edu/study/health-and-well-being-management-ms](http://www.rit.edu/study/health-and-well-being-management-ms)

**Barbara Lohse, Professor**

585-475-4208, [balihst@rit.edu](mailto:balihst@rit.edu)

### Program overview

Individual and community health, disease prevention, and engaging in healthful habits to promote well-being are at the fore-front of public interest. Health and wellness is a mosaic of nutrition, physical activity, stress management, and environmental features that are critical for a productive, efficient, and healthy society. Corporations, small businesses, government agencies, and institutions are employing health and well-being professionals to help people lead healthier lives and contribute to corporate, agency, and business productivity.

The MS in health and well-being management is a health and wellness degree that prepares you for a career in health and well-being program design, administration, and research. It is the perfect choice for those interested in going to medical or dental school or pursuing doctoral studies in nutrition, health promotion, exercise science, or public health.

To provide high-quality, population-based health care, the future health care workforce needs a skill set that includes the ability to:

- apply systems thinking,
- design interventions,
- practice dissemination and implementation science,
- engage with communities, and
- understand and utilize team dynamics, negotiation, and advocacy skills.

RIT's health and wellness degree offers evidence-informed guidance to develop and apply these skills.

### Two Options

The MS in health and well-being management offers two emphasis options, both of which prepare you for a career in health and well-being as well as offer research experiences for those interested in pursuing further doctoral and post-graduate studies.

Content development, implementation, and evaluation focuses on helping students learn how to design and execute health and well-being programs, focusing on development of content and expertise in a particular area of health or wellness, such as exercise, behavior, and nutrition.

relates to leading an organization's health and wellness program or an employee assistance program within corporate setting or in self-employment venues.

### Educational Outcomes

1. Demonstrate skills in the design, delivery, and evaluation of individual and group interventions/programs that are consistent with evidence based social and behavioral theories. You will learn health education and program evaluation concepts, examine evidence and research-based content and apply learning behavior theory constructs to health and well-being activities.
2. Demonstrate the ability to assist with health, physical, nutrition, behavioral screenings or policy analysis to plan and manage a safe and effective health promotion program for both healthy and health-impaired individuals. You will acquire a knowledge base in nutrition, physical activity, and health law including screening and assessment and utilize this knowledge in health and well-being dissemination or implementation science activities.
3. Develop skills and experience necessary to promote program services to appropriate community recipients including the ability to categorize subsets of the worksite/organization population and identify appropriate intervention strategies for each subset. You will be able to describe and conduct needs assessments and apply findings appropriately. Also,

you will demonstrate the acquisition of marketing concepts to a health and well-being problem.

4. Apply the requisite skills to plan and conduct inquiries into problems and outcomes used to develop and manage health and well-being activities, programs and campaigns. You will apply behavior change theory concepts and research and evaluation criteria to examine, critique, and assess health and well-being programs and activities.
5. Collaborate with multiple disciplines to promote and administer health related research, activities, and policy at the organizational, community, state, and federal level. You will develop verbal and written communication strategies and skills and apply them to tasks involving collaboration, interpretation, and critical thinking for health and well-being activities. Also, be well versed in health and well-being policy development and strategic application at multiple levels of governments and organizations.
6. Design and execute a comprehensive project or research-based inquiry relevant to the health promotion industry. You will integrate your learning in a research, inquiry, or review project on a topic pertinent to designing, planning, implementing, evaluating, managing, or marketing health and well-being.

### Careers in Health and Wellness

The health and well-being management program prepares graduates for careers that provide services to enhance employee health and consequent workforce productivity, including:

- Administrator or manager of a health and well-being program/initiative for government, industry, or organizational entities.
- Health and well-being educator/communicator, instructional program designer, developer, or implementer.
- Preparation for future medical and dental education, doctoral training in fields related to nutrition, health promotion, exercise science, and public health.

### Program Brochure

Download our program brochure for more information.

### Curriculum

#### Health and Well-being Management, MS degree, typical course sequence

| COURSE                              | SEMESTER CREDIT HOURS   |
|-------------------------------------|---|
| <b>First Year</b>                   |   |
| WSHN-700                            | Research Methods in Health and Well-being 3                                       |
| WSHN-701                            | Health and Nutrition Education and Evaluation 3                                   |
| WSHN-702                            | Dissemination and Implementation Science for Health and Well-being 3              |
|                                     | Statistics Elective* 3  |
|                                     | Professional Electives 12   |
| <b>Choose one of the following:</b> | <b>3</b>  |
| WSHN-710                            | Health Risk Identification and Management (Emphasis Plan 1)                       |
| HLTH-710                            | Health Care Economics and Policy (Emphasis Plan 2)                                |
| <b>Choose one of the following:</b> | <b>6</b>  |
| WSHN-790                            | Health & Well-being Management Thesis   |
| WSHN-797                            | Health & Well-being Management Project, plus one additional Professional Elective |
| <b>Total Semester Credit Hours</b>  | <b>33</b>   |

\* Choose from PSYC-640 Graduate Statistics or MATH-655 Biostatistics

#### Emphasis Plan 1- Content Development, Implementation & Evaluation Recommended Electives

|          |                                   |
|----------|-----------------------------------|
| EXSC-650 | Exercise Physiology               |
| EXSC-690 | Exercise Science Research         |
| HRDE-726 | Technology and the Future of Work |
| NUTR-610 | Integrative Approaches to Health  |
| NUTR-650 | Community Nutrition               |
| NUTR-654 | Life Cycle Nutrition              |
| PSYC-713 | Graduate Developmental Psychology |

|          |  |
|----------|--|
| PSYC-716 | Graduate Social Psychology                   |
| SERQ-723 | Service Analytics                            |
| SERQ-747 | Design Thinking and Creativity               |
| STAT-672 | Survey Design and Analysis                   |
| WSHN-600 | Principles and Practices of Health Education |
| WSHN-799 | Independent Study                            |

### Emphasis Plan 2- Health & Well-being Program Management Recommended Electives

|          |   |
|----------|---|
| BUSI-710 | Project Management  |
| EDLI-733 | Instructional Design                                      |
| HLTH-706 | Leading Health Systems I                                  |
| HLTH-718 | Evidence-based Management in Healthcare                   |
| HLTH-725 | Healthcare Strategic Marketing & Communications           |
| HLTH-730 | Health Care Financial Management I: Principles & Practice |
| HLTH-733 | Health Systems Quality and Organizational Learning        |
| HLTH-746 | Leading Health Systems II                                 |
| HRDE-726 | Technology and the Future of Work                         |
| HRDE-735 | Leading Human Resources                                   |
| HRDE-742 | Leading Change  |
| HRDE-765 | Diversity in Global Workplace                             |
| MKTG-761 | Marketing Concepts and Commercialization                  |
| MKTG-772 | Internet Marketing: Strategy & Tactics                    |
| SERQ-720 | Foresight for Innovation                                  |
| SERQ-722 | Customer Centricity                                       |
| SERQ-723 | Service Analytics   |
| SERQ-740 | Leading Innovation  |
| SERQ-747 | Design Thinking and Creativity                            |
| STAT-672 | Survey Design and Analysis                                |
| WSHN-799 | Independent Study   |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Three letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Health Care Finance, Adv. Cert.

[www.rit.edu/study/health-care-finance-adv-cert](http://www.rit.edu/study/health-care-finance-adv-cert)

**Carla Stebbins, Senior Lecturer**  
585-475-4761, [casihst@rit.edu](mailto:casihst@rit.edu)

### Program overview

The advanced certificate in health care finance is an ideal way for health care professionals to deepen their understanding of health care financial management. The four-course, 12 credit hour curriculum supports student understanding how the US health care system is financed, the impact of efforts to reform the system, as well as the development of financial management skills within for-profit and not-for-profit health care organizations. To meet the needs of working professionals, courses in this advanced certificate are available online.

The advanced certificate may serve as a stand-alone credential, or, at a later date be applied to the MS program in health systems management.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Health Care Finance, advanced certificate, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS  |
|------------------------------------|--|
| <b>First Year</b>                  |  |
| HLTH-710                           | Health Care Economics and Policy 3                           |
| HLTH-730                           | Health Care Financial Management I: Principles & Practice 3  |
| HLTH-731                           | Health Care Financial Management II: Concepts/Applications 3 |
| HLTH-732                           | Health Insurance and Reimbursement 3                         |
| <b>Total Semester Credit Hours</b> | <b>12</b>  |

### Admission requirements

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

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent).
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit two letters of recommendation from individuals who have the opportunity to observe the applicant's work output.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

Please note: Certain countries are subject to comprehensive embargoes under US Export Controls, which prohibit virtually ALL exports, imports, and other transactions without a license or other US Government

authorization. Learners from Syria, Sudan, North Korea, the Crimea region of the Ukraine, Iran, and Cuba may not register for RIT online courses. Nor may individuals on the United States Treasury Department's list of Specially Designated Nationals or the United States Commerce Department's table of Deny Orders. By registering for RIT online courses, you represent and warrant that you are not located in, under the control of, or a national or resident of any such country or on any such list.

## Health Systems Management, MS

[www.rit.edu/study/health-systems-management-ms](http://www.rit.edu/study/health-systems-management-ms)

**Carla Stebbins, Senior Lecturer**  
**585-475-4761, [casihst@rit.edu](mailto:casihst@rit.edu)**

### Program overview

A health administration master's degree driven by today's health care imperatives.

Critical success factors driving health care systems today are often referred to as the Quadruple Aim:

7. Improve the health of populations
8. Enhance the quality of care for individuals
9. Reduce the per capita cost of health care
10. Improve the work life of care providers

Successfully managing strategy, finance, patient experience, and operations in the highly regulated and unique health care sector requires specialized competencies and expertise beyond a traditional MBA. The master of science in health systems management is the currency needed to advance and perform in health care systems today.

### Plan of study

This health administration master's degree is an applied, competency-based, and industry-focused online degree. Students are provided the flexibility to pursue the degree full- or part-time, with 12-month and 24-month degree plans available, to accommodate professional schedules.

Unique to this degree, you will have the opportunity to attend two on-campus leadership immersions and a faculty-led travel experience to study another health care system. The faculty strive to blend the flexibility of online learning with the value of face-to-face networking, interaction, and travel. All courses use a case-based, dynamic, and interactive focus on key health care topics including economics and policy, health IT and decision support, ethics, systems quality, and organizational learning.

Business and leadership courses prepare you to tackle issues involving financial management, quality improvement, operations, and strategy formulation—all within the context of real-world health care trends and challenges. You'll be well prepared to develop, direct, and implement strategy and tactics that will shape the health care organizations of the future.

#### On-campus leadership immersion

To best proffer highly developed leadership skills, you will have the valuable opportunity to attend two on-campus, hands-on, application-based learning and networking experiences. You will work closely with your classmates and faculty on case analysis, problem-solving, critical thinking, teamwork, and leadership skills during these four-day sessions. This face-to-face training delivers skills and competencies which will continue to be developed in a virtual environment within the online courses to maximize your return on investment in skill development and practice.

#### Travel course

One of the most distinguishing and attractive benefits of this health administration degree is the culminating travel course. During the final summer term, you will have the opportunity for a faculty-led travel experience in which you will conduct an intensive study of the locale's health system in comparison to your native system. As your final project, you will use that experience to innovate a product or service. For those unable to travel, an alternative study option will be provided.



## Competencies

The MS in health systems administration program was built to support a set of professional competencies identified by the program's advisory board, faculty and alumni. These 19 competencies fall under five domains and support students for success in the field of management and leadership in health care:

- Knowledge of health care systems in the U.S.
- Communications and interpersonal effectiveness
- Critical thinking, analysis, and problem-solving skills
- Management and leadership skills
- Professionalism and ethics theory and practice

## Faculty

The program is led by a team of faculty who are practice-based scholars with extensive experience in the field. Faculty members are accessible, offer constructive feedback on course projects and assignments, and are at the forefront of providing an educational experience in which students can learn and directly apply classroom theories and concepts to the real-world practice of health care management.

An advisory board of health administrators from around the country guides the development of the degree program to ensure the curriculum addresses today's most pressing challenges for health care leaders.

## Industry outlook

Health care is the largest industry in the U.S. and the second largest employer, representing 20 percent of the Gross National Product, and employing more than 11 million people. Employment opportunities for health systems managers and administrators will increase by 20 percent over the next 10 years, according to the Bureau of Labor Statistics.

## Flexible degree built around your schedule

This online degree offers five start dates per year and an accelerated course format which will allow you to complete your degree in half the time of a traditional, semester-based program. A full-time student can complete this degree in one year; a part-time student can complete the degree in 24 months.

## Stackable credentials

You may earn a graduate-level credential and advance your career while you work toward your MS. The advanced certificate in health care finance stands alone, and may also be applied to your MS degree.

## Curriculum

### Health Systems Management, MS degree, typical course sequence

| COURSE                             | SEMESTER   | CREDIT HOURS |
|------------------------------------|--|--------------|
| <b>First Year</b>                  |  |              |
| HLTH-608                           | Integrated Health Systems & Population Health              | 3            |
| HLTH-706                           | Leading Health Systems I                                   | 3            |
| HLTH-710                           | Health Care Economics and Policy                           | 3            |
| HLTH-718                           | Evidence-Based Management in Health Care                   | 3            |
| HLTH-730                           | Health Care Financial Management I: Principles & Practice  | 3            |
| HLTH-731                           | Health Care Financial Management II: Concepts/Applications | 3            |
| HLTH-746                           | Leading Health Systems II                                  | 3            |
| <b>Second Year</b>                 |  |              |
| HLTH-725                           | Healthcare Strategic Marketing & Communications            | 3            |
| HLTH-733                           | Health Systems Quality & Organizational Learning           | 3            |
| HLTH-736                           | Health Care Operations: Building High Reliability Systems  | 3            |
| HLTH-760                           | Health IT and Decision Support                             | 3            |
| HLTH-796                           | Healthcare Strategy: Analysis & Formulation                | 3            |
| HLTH-798                           | Health Systems Analysis & Innovation                       | 3            |
| <b>Total Semester Credit Hours</b> |  | <b>39</b>    |

## Accreditation

The master of science in health systems management was approved for Candidacy Status with the Commission on Accreditation of Healthcare Management Education (CAHME) in May 2020. Candidate status is an indication that a program in health care management has voluntarily committed to participate in a plan of self-improvement and is actively progressing toward the status of accreditation. Candidate status is not accredited status and does not guarantee eventual accredited status.

## Admission requirements

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

- Complete a graduate application.
- Hold a baccalaureate degree (or equivalent) from an accredited university or college.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a cumulative GPA of 3.0 (or equivalent). Applicants with GPAs below a 3.0 are encouraged to apply.
- Submit two letters of recommendation from individuals who have the opportunity to observe the applicant's work.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 88 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

For Online Scholars Only: International students are permitted to participate in the US-based courses of this program only if they have and maintain a valid immigration status which permits part-time study (examples: J-2, H-4). This program does not qualify for F-1 visa status. B-1/B-2 (or the Visa Waiver Program equivalent statuses) should not be used to engage in these courses, as taking credit-bearing courses towards a degree would violate the terms of the visitor visa status.

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

## Medical Illustration, MFA

[www.rit.edu/study/medical-illustration-mfa](http://www.rit.edu/study/medical-illustration-mfa)

**James Perkins, Professor**

**585-475-2443, [japfaa@rit.edu](mailto:japfaa@rit.edu)**

### Program overview

A medical illustrator is a professional artist with advanced education in the biomedical sciences, cutting edge digital media, and the principles of visual communication. RIT's medical illustration degree is one of only five such programs in North America and the only program in the northeast. It combines training in human anatomy (with illustration students observing complete cadaver dissection in RIT's Cadaver Lab), immunology, histology (the cellular structure of organs), and pathophysiology (the study of disease) with extensive training in 2D and 3D digital graphics, interactive media, and animation.

### What is a Medical Illustrator?

Collaborating with scientists, physicians, and other health care professionals, medical illustrators translate complex scientific information into visual images that support medical education, science research, patient care, advertising, and litigation. Illustration projects are designed for use in print, projection, broadcast media, and distribution via the web and mobile devices.

### RIT's Medical Illustration Degree

This is a two-year, graduate-level medical illustration degree where you'll earn a master of fine arts (MFA). The program emphasizes visual problem solving to determine the best approach to communicate a difficult concept. Students also gain real world experience by collaborating with medical researchers and observing live surgery in operating rooms. The program culminates with the production of a thesis project, which requires extensive background research and an original body of artwork on a complex medical topic.

### Becoming a Medical Illustrator

Successful medical illustrators must possess exceptional illustration skills and artistic ability while also having in depth knowledge of the biological sciences in order to fully understand and effectively communicate complex medical information. In the MFA in medical illustration degree, you'll accomplish the following outcomes:

Demonstrate an advanced level of knowledge in the biomedical sciences

- Demonstrate advanced knowledge of human anatomy, molecular biology, physiology, and related biomedical sciences

Visualize scientific structures, processes, and concepts

- Visualize and accurately render anatomic, tissue, cellular, and molecular structures
- Illustrate physiological processes and abstract scientific concepts through visual storytelling

List instructional objectives to communicate biomedical content to a variety of target learners

- Identify the target learners (audience) for each set of instructional illustrations
- Describe the level of scientific literacy of each group of target learners
- Create a set of instructional objectives for each instructional illustration

Solve complex communication problems with appropriate application of verbal and visual content, realism, symbolism, graphic conventions, and motion or interactive media.

- Select the most appropriate medium for delivery of content to target learners

- Select appropriate level of realism, symbolism, and graphic conventions for optimal delivery of instructional objectives to target learners
- Utilize a variety of media and production techniques in appropriate applications and understand production processes sufficiently to communicate with pre-press companies, art directors, etc.

- Create artwork in a variety of media
- Select the appropriate dimensions, color space, resolution, file format, and other criteria for delivery to client
- Use industry standard terminology when discussing production and output processes

Communicate effectively with clients, subject matter experts, co-workers, supervisors, and vendors in oral and written form

- Use correct anatomic and medical terminology when discussing scientific content

Demonstrate knowledge of professional and ethical conduct

- Describe HIPAA regulations regarding the use of patient information
- Follow operating room protocols at affiliated hospitals
- Describe US and international copyright laws and how they apply to the use of reference materials
- Describe copyright infringement and the criteria for determining Fair Use

Demonstrate awareness of established business and management practices

- Describe standard employment practices in the profession
- Describe business models and taxation of independent illustrator
- Describe pricing strategies and calculate prices for illustration projects
- Create a personal identity package and marketing materials
- Generate sample contracts, licensing agreements, and invoices

Demonstrate competency in the academic research process through a graduate research project or thesis

- Conduct background research on a proposed biomedical topic
- Develop a set of instructional objectives to deliver the topic to a specific group of target learners
- Create a body of artwork to meet the instructional objectives
- Exhibit the body of work during one of the thesis shows or at a screening of digital media productions
- Complete a written thesis paper summarizing the project

### Medical Illustrator Jobs

Graduates of RIT's medical illustration degree find employment with hospitals, medical schools, research centers, museums, medical publishers, advertising agencies, web design firms, animation studios, law firms, and a variety of other creative agencies. Since the MFA is considered the terminal degree in the arts, graduates may also teach in academic institutions or in a wide range of computer graphics, scientific illustration, or art programs. Organizations that employ our graduates include:

- Science magazine (American Association for the Advancement of Science)
- Department of Neurobiology and Anatomy, University of Rochester Medical Center
- New England Journal of Medicine
- Roswell Park Cancer Center, Buffalo, NY
- MIT Center for Biomedical Innovation
- Cell Press (publishers of Cell and other scientific journals)
- Nucleus Global (medical communications)
- Custom Learning Designs (pharmaceutical advertising)
- The Presentation Group (courtroom graphics)
- Bryan Christie Design (pharmaceutical advertising)
- Emmi Solutions (web and interactive media)
- Cleveland Institute of Art (scientific illustration program)
- Illustrated Verdict (courtroom graphics)

- National Capital Area Medical Simulation Lab, Uniformed Services University of the Health Sciences (developing virtual surgical simulators)
- Visible Body/Argosy Medical Publishing (medical publishing and interactive media)
- Department of Imaging Sciences, University of Rochester Medical Center
- Smithsonian National Museum of Natural History
- Springer Healthcare Communications (medical publishing)
- Legal Art Works (courtroom graphics)

## Curriculum

### Medical Illustration, MFA degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS                           |
|------------------------------------|---|
| <b>First Year</b>                  |   |
| ILLM-601                           | Human Gross Anatomy 6                           |
| ILLM-602                           | Anatomic Studies 3                              |
| ILLM-603                           | 3D Modeling of Biomedical Forms 3               |
| ILLM-606                           | 3D Animation of Biomedical Forms 3              |
| ILLM-607                           | Computer Applications in Medical Illustration 3 |
| ILLM-608                           | Scientific Visualization 3                      |
| ILLM-890                           | Thesis 1  |
| MEDS-615                           | Medical Pathophysiology 3                       |
| MEDS-630                           | Human Immunology 3                              |
|                                    | Studio Elective 3                               |
| <b>Second Year</b>                 |   |
| ILLM-612                           | Surgical Illustration 3                         |
| ILLM-615                           | Interactive Media I 3                           |
| ILLM-616                           | Interactive Media II 3                          |
| ILLM-617                           | Portfolio and Business Practices 3              |
| ILLM-890                           | Thesis 9  |
| MEDS-620                           | Histology and Histopathology 4                  |
|                                    | Studio Elective 3                               |
| <b>Total Semester Credit Hours</b> |   |
| <b>59</b>                          |   |

### Studio Electives

| COURSE  |   |
|---|---|
| HCIN-610  | Foundations of Human-Computer Interaction           |
| HCIN-620  | Information and Interaction Design                  |
| HCIN-660  | Fundamentals of Instructional Technology            |
| ILLM-618  | Eye Ear and Nose Prosthetics                        |
| ILLM-627  | Advanced Digital Technology for Medical Instruction |
| ILLM-628  | Medical and Scientific Animation                    |
| ILLM-689  | Special Topics                                      |
| ILLM-799  | Independent Study                                   |
| Any graduate studio course offered in the College of Art and Design |   |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in a field of the arts, sciences, or education. The undergraduate degree should include 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.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.

- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Students in medical illustration come from a variety of backgrounds including biology, chemistry, anthropology, fine arts, illustration, photography, and graphic design. Students who have no prior experience in illustration, fine art, drawing, or medical illustration must demonstrate outstanding drawing skills and a strong aptitude for the life sciences.

## Faculty

### Dean's Office

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**Yong "Tai" Wang**, BS, MS, Wuhan Sports University; MA, Ball State University at Muncie; Ph.D., University of Illinois at Urbana-Champaign—Dean; Professor

**Richard L. Doolittle**, BA, University of Bridgeport; MS, Ph.D., University of Rochester—Senior Associate Dean; Professor

### Health Systems Management

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**Carla Stebbins**, BA, University of Northern Iowa; MHA, Des Moines University; Ph.D., Iowa State University—Program Director; Senior Lecturer

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

### Medical Illustration

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**James Perkins**, BA, Cornell University; MFA, Rochester Institute of Technology; ABD, University of Rochester—Graduate Program Director; Distinguished Professor

**Craig Foster**, BFA, University of Michigan; MS, Medical College of Georgia—Assistant Professor

**Glen Hintz**, BA, Lafayette College; MS, The Medical College of Georgia—Associate Professor

### Wegmans School of Health and Nutrition

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**Barbara A. Lohse**, BS, University of Wisconsin-Eau Claire; MS, RD, University of Wisconsin-Stout; Ph.D., University of Wisconsin-Madison—Head, Wegmans School of Health and Nutrition; Professor

**Brenda Ariba Zarhari Abu**, BSc, University for Development Studies (Ghana); MPhil, University of Ghana (Ghana); Ph.D., University of the Free State (South Africa); RD, Iowa State University—Assistant Professor

**Zachary W. Bevilacqua**, BS, State University College at Brockport; MS, University at Buffalo; Ph.D., Indiana University Bloomington—Visiting Assistant Professor

**William S. Brewer**, BS, State University College at Cortland; MS, Empire State College—Program Director; Senior Lecturer

**Elizabeth A. Kmiecinski**, BS, The Ohio State University; RD, Charleston Area Medical Center; MS, University of Kentucky—Associate Professor

**Elizabeth H. Ruder**, BS, Cornell University; RD, Cleveland Clinic Foundation; Ph.D., Pennsylvania State University; MPH, Johns Hopkins Bloomberg School of Public Health—Program Director, Associate Professor

# School of Individualized Study

James C. Hall, Executive Director  
rit.edu/sois

## Programs of Study

|                                     |     |
|-------------------------------------|-----|
| ⊕ Professional Studies, MS          | 124 |
| ⊕ Project Management, Adv. Cert.    | 125 |
| ⊕ Online learning option available. |     |

The School of Individualized Study is about the individual students’ ideas, interests and goals. Through the school, students can combine multiple disciplines to create a singular master’s degree program, the MS in professional studies. The school also offers an advanced certificate in project management.

Please visit the college’s website—[www.rit.edu/sois](http://www.rit.edu/sois)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

### 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.



## Professional Studies, MS

[www.rit.edu/study/professional-studies-ms](http://www.rit.edu/study/professional-studies-ms)

**Peter Boyd, Lecturer**

**585-475-6320, [plbcms@rit.edu](mailto:plbcms@rit.edu)**

### Program overview

The professional studies masters program enables students to create an individualized plan of study tailored to their personal and professional goals. The degree offers students the opportunity to draw on more than 50 of RIT's graduate programs to gain the advanced knowledge and skills necessary to respond successfully to new and emerging career opportunities.

For example, students interested in integrating sustainability into their career as a facilities manager might combine courses from the sustainability and facility management programs. Educators may be interested in combining courses from the school psychology and secondary education of students who are deaf or hard of hearing programs to improve their knowledge of special learning populations and the social issues students face in today's educational environments. There are a wide range of concentrations that can be created based on each student's professional career aspirations.

The degree also includes a capstone project. This applied, hands-on project is directly related to the student's individualized plan of study.

The professional studies degree can be completed on campus or online.

### Concentration Areas

Students create two or three concentrations with courses selected from a wide range of graduate programs at RIT. Some common concentration areas include:

|   |
|---|
| Applied and Computational Mathematics                           |
| Applied Statistics/Quality                                      |
| Bioinformatics  |
| Business (Marketing, Management, etc.)                          |
| Chemistry   |
| Color Science   |
| Communication and Media Technology                              |
| Computer Engineering  |
| Computer Science  |
| Construction Management   |
| Criminal Justice  |
| Education Learning Instruction                                  |
| Electrical Engineering  |
| Environmental, Health and Safety Management                     |
| Health Systems Administration                                   |
| Human Resource Development                                      |
| Imaging Science   |
| Industrial and Systems Engineering                              |
| 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 Engineering  |
| Sustainability  |

### Plan of Study

Students begin their studies with Contexts and Trends (PROF-705), the program's foundation course. Throughout this course students explore their personal career objectives and research RIT's portfolio of graduate programs to identify courses that best match their professional and personal goals.

Students create two or three concentrations that make up their required course work for the degree program. Each concentration is a

selection of courses drawn from existing RIT graduate programs and can range from 9 to 15 credit hours. Graduate credits earned in other programs may be used in completing a concentration, upon approval.

Credit hours not required to fulfill a concentration area may be used as electives. All elective and transferred graduate courses need to be integrated into the proposed plan of study. With certain concentrations, the degree may be completed entirely through online learning.

The program can be completed through full- or part-time study.

### Curriculum

#### Professional Studies, MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS              |
|------------------------------------|------------------------------------|
| <b>First Year</b>                  |                                    |
| PROF-705                           | Context and Trends                 |
|                                    | Concentration A courses            |
|                                    | Concentration B courses            |
| <b>Second Year</b>                 |                                    |
| PROF-770                           | Proposal Seminar                   |
| PROF-775                           | Capstone Project                   |
|                                    | Concentration A or elective course |
|                                    | Concentration B course             |
|                                    | Concentration B or elective course |
| <b>Total Semester Credit Hours</b> |                                    |
| <b>33</b>                          |                                    |

### Admission requirements

To be considered for the MS program in professional studies, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent), or superior endorsements.
- Submit a current resume or curriculum vitae.
- Two letters of recommendations are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.
- Before submitting an application, all applicants are encouraged to discuss their educational goals with a graduate advisor from the professional studies program.

## Project Management, Adv. Cert.

[www.rit.edu/study/project-management-adv-cert](http://www.rit.edu/study/project-management-adv-cert)

**School of Individualized Study**

**585-475-2234, [sois@rit.edu](mailto:sois@rit.edu)**

### Program overview

In today's business-oriented society, project-based organizations and project management have become much more than just a way of conducting business. New growth within these organizations has changed the shape of project management to reveal what is becoming an exciting new career path for many individuals. The goal of a project manager is to successfully plan, organize, and accomplish a specific project or one-time effort. Project managers have quickly become a necessary asset for many businesses.

Encountering the challenges of cultural and social differences, along with an assortment of industrial focuses, the project manager must be aware of a project's goals on a daily and, sometimes, hourly basis. The advanced certificate in project management teaches students how to plan, develop, and implement successful business projects from initiation to completion. The program consists of three core courses and one elective. The certificate can be completed entirely online, on campus, or through a combination of both options.

RIT's School of Individualized Study is a Project Management Institute (PMI) Authorized Training Partner.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Project Management, advanced certificate, typical course sequence

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                                   |                       |
| PROF-710 Project Management                         | 3                     |
| PROF-714 Agile Project Management                   | 3                     |
| <b>Second Year</b>                                  |                       |
| Graduate Elective                                   | 3                     |
| <i>Choose one of the following:</i>                 | 3                     |
| PROF-711 Advanced Project Management                |                       |
| PROF-712 International Project Management           |                       |
| PROF-715 Agile Leadership and Self Organizing Teams |                       |
| PROF-716 Agile and Design Thinking                  |                       |
| <b>Total Semester Credit Hours</b>                  | <b>12</b>             |

### Graduate Electives

| COURSE    |  |
|-----------|--|
| PROF-711* | Advanced Project Management                            |
| PROF-712* | International Project Management                       |
| PROF-713  | Program Management for Product and Service Development |
| PROF-715* | Agile Leadership and Self Organizing Teams             |
| PROF-716* | Agile and Design Thinking                              |
| PROF-720  | Individual Leadership Development                      |
| PROF-721  | Leading and Developing Teams                           |
| HRDE-720  | Theories of Organizational Development                 |
| HRDE-721  | Organizational Learning and Knowledge Management       |
| HRDE-722  | Talent Development                                     |
| HRDE-731  | Team Process and Facilitation Skills                   |
| MGIS-715  | Information Technology and Globalization               |
| MGMT-740  | Leading Teams in Organizations                         |
| MGMT-741  | Managing Organizational Change                         |
| MGMT-755  | Negotiations   |
| SERQ-710  | Service Design Fundamentals                            |
| ISSE-682  | Lean Six Sigma Fundamentals                            |

\* if not used for 3rd required course of certificate

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendations are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

**Faculty**

**Peter Boyd**, BA, Nazareth College;  
MA, Columbia University—  
Graduate Program Coordinator;  
Senior Lecturer

**James Hall**, BA, Wilfrid Laurier  
University (Canada); MTS, Waterloo  
Lutheran Seminary (Canada);  
MA, Ph.D., University of Iowa—  
Executive Director; Professor

**Stephen Aldersley**, BS, University  
of Surrey (United Kingdom); MS,  
University of Lancaster (United  
Kingdom); Graduate Education  
Certificate, St. Martin's College  
(United Kingdom); MS, College  
of St. Rose; Ed.D., University of  
Rochester—Professor

**Leonie Fernandes**, BS, University  
of Michigan; MS, Rochester Institute  
of Technology; PMI—Project  
Management Coordinator

**Clarence Sheffield**, BS, University  
of Utah; MA, University of Colorado  
at Boulder; Ph.D., Bryn Mawr  
College—Professor

**David P. Wick**, BS, MS, Ph.D.,  
Clarkson University—Associate  
Professor

# College of Liberal Arts

Anna Westerstahl Stenport, Dean  
rit.edu/liberalarts

## Programs of Study

|   |     |
|---|-----|
| Communication, MS                         | 128 |
| Criminal Justice, MS                      | 129 |
| Engineering Psychology, Adv. Cert.        | 130 |
| Experimental Psychology, MS               | 131 |
| School Psychology, Adv. Cert.             | 133 |
| School Psychology, MS                     | 134 |
| Science, Technology and Public Policy, MS | 135 |

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.

Please visit the college's website—[www.rit.edu/liberalarts](http://www.rit.edu/liberalarts)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

**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.

## Communication, MS

[www.rit.edu/study/communication-ms](http://www.rit.edu/study/communication-ms)

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### Program overview

Communication in all its forms is at the center of our personal lives and professional careers. Whether it's interpersonal or mediated communication, professional communicators need to know how to develop creative and impactful messaging to successfully engage their audiences.

Technology has changed everything about the field of communication. Social media platforms like Twitter, Instagram, and Facebook are the first places people go to get breaking news. Retargeting ads, geofencing, and native advertising are influencing how to reach and connect with audiences. Add in the proliferation of big data and marketing coordinators, brand managers, and marketing executives now have access to information that impacts real-time decision-making around creative messaging, audience tracking, and the impact of an organization's marketing investment.

The best communication master's programs know how to prepare you to leverage the latest in tech in the dynamic and ever-changing field of communication.

RIT's communication master's degree hosts innovative curriculum that is grounded in today's social sciences and humanities concepts and applications. You'll engage with our diverse and dynamic faculty of accomplished communication researchers and practitioners, who will teach you how to research a communication challenge, create compelling messages, and analyze media content and audience engagement.

### RIT's Communication Master's Program

With communication courses spanning artificial intelligence, digital storytelling, digital advertising, social media analytics, and strategic communication, RIT's communication master's degree prepares you to excel in the ever-changing fields of communication, public relations, marketing, and branding. You'll learn how to leverage technology to reach and engage audiences, craft compelling messages that stand out, analyze media content, and understand how analytics and big data drive smart decision-making. You'll become an effective content, brand, or marketing manager; social media strategist; or PR/communication officer who can deliver the results an organization is looking for. If pursuing a doctoral degree is a future career aspiration, RIT's program will help you grow into an accomplished researcher as you develop an in depth understanding of the communication field.

### Why Get Your Communication Master's Degree from RIT?

RIT is known for creativity and innovation. In fact, U.S. News & World Report ranked RIT 50th on the list of "Most Innovative Schools" for 2021. What does this mean for you as a communication professional?

It means unprecedented access to vast resources in technology and innovation that can only be found at RIT. Diverse and dynamic faculty, comprised of accomplished communication researchers and practitioners, adds depth and real-world insight to your courses. Access to classes from across the university allow you to differentiate yourself by pairing your communication master's degree with elective courses in marketing, analytics, information technology, new media, management, design thinking, data analytics, and more. Smart classrooms, makerspaces, and an entrepreneurial ecosystem are designed for you to connect, share, and develop your ideas. All of this is designed for you to have an outstanding academic experience through hands-on learning and real-world ap-

plication of knowledge. You'll graduate with a degree and the experience needed to stand out in a competitive job market.

### Jobs in Communication

According to the U.S. Bureau of Labor Statistics, jobs in communication fields are expected to grow by seven percent over the next ten years. Communications professionals with graduate degrees earn an average salary of \$86,433.

Types of jobs in communication vary depending on what kind of work interests you most. Graduates of RIT's communication master's degree hold positions as:

- Marketing Specialist
- Communication Coordinator
- Account Coordinator
- Communication Assistant
- Digital Marketing and Communication Analyst
- Social Media Manager
- Digital Marketing Specialist
- Customer Sales Director
- Marketing Analyst
- Technical Writer

### Relevant, Future-Focused Research

The communication master's degree offers research opportunities in timely, urgent areas affecting today's communication and marketing professionals, including the use of artificial intelligence in journalism, social media, visual communication, health communication, and civic engagement.

### Scholarships and Research Assistantships

Scholarships of up to 30 percent of tuition are awarded to qualified applicants. The program also offers several research assistantships each year.

## Curriculum

### Communication, MS degree, typical course sequence

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>   |                       |
| COMM-702 Communication Theories                           | 3                     |
| COMM-703 Research Methods in Communication                | 3                     |
| COMM-714 Strategic Communication                          | 3                     |
| COMM-720 Thesis Preparation Seminar                       | 0                     |
| Communication Electives                                   | 6                     |
| Professional Core   | 9                     |
| <i>Choose one of the following:</i>                       | 6                     |
| COMM-800 Communication Thesis/Project                     |                       |
| COMM-801 Comprehensive Exam, plus two additional courses* |                       |
| <b>Total Semester Credit Hours</b>                        | <b>30</b>             |

\* Courses may be professional core courses, communication electives, or a combination of both. Professional Core courses are chosen by students based on their professional interests. In consultation with their academic advisor, students will choose from graduate courses offered across the university to round out their coursework.

### Communication electives

|          |   |
|----------|---|
| COMM-605 | Social Media Analytics and Research       |
| COMM-606 | Digital Storytelling                      |
| COMM-709 | Digital Advertising                       |
| COMM-710 | Visual Communication                      |
| COMM-715 | Communication Design Principles           |
| COMM-716 | Communication and Identity                |
| COMM-717 | Artificial Intelligence and Communication |

## Admission requirements

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



- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- 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.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Scholarships of up to 30 percent of tuition are awarded to qualified applicants. The program also offers several research assistantships each year as well.

## Criminal Justice, MS

[www.rit.edu/study/criminal-justice-ms](http://www.rit.edu/study/criminal-justice-ms)

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### Program overview

RIT's criminal justice master's degree fosters the creation of new knowledge through active research in agencies and the community. You will learn and apply problem-solving skills rooted in areas of individual interest with an emphasis on applied research. The degree enables graduates to enter successful careers in criminal justice agencies, policy analysis, or pursue further education in a criminal justice doctoral program.

The MS degree in criminal justice emphasizes a multidisciplinary approach to urban studies with a focus on public safety. The program stresses training in policy analysis and practice, particularly as it is relevant to community and urban issues.

The program builds on a foundation of locally relevant policy research by providing you 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 you with a strong foundation in criminological, criminal justice theory, and social scientific research skills, enabling you to have a successful career in the policy analysis arena or to be prepared to pursue advanced study beyond the master's degree.

Recent graduates have entered careers in prosecutorial investigation, criminal justice program evaluation, and crime analysis. Many have also pursued doctoral degrees.

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 equivalent skills for completion of the degree.

### Curriculum

#### Criminal Justice (thesis option), MS degree, typical course sequence

| COURSE                             |  | SEMESTER CREDIT HOURS |
|------------------------------------|--|-----------------------|
| <b>First Year</b>                  |  |                       |
| CRIM-700                           | Pro-Seminar In Criminal Justice Theory       | 3                     |
| CRIM-701                           | Statistics                                   | 3                     |
| CRIM-702                           | Pro-Seminar in Research Methods              | 3                     |
| CRIM-703                           | Advanced Criminology                         | 3                     |
| CRIM-704                           | Crime, Justice and Community                 | 3                     |
| CRIM-705                           | Interventions and Change in Criminal Justice | 3                     |
|                                    | Electives                                    | 6                     |
| <b>Second Year</b>                 |  |                       |
| CRIM-800                           | Thesis in Criminal Justice                   | 6                     |
| <b>Total Semester Credit Hours</b> |  | <b>30</b>             |

#### Criminal Justice (project option), MS degree, typical course sequence

| COURSE            |  | SEMESTER CREDIT HOURS |
|-------------------|--|-----------------------|
| <b>First Year</b> |  |                       |
| CRIM-700          | Pro-Seminar In Criminal Justice Theory       | 3                     |
| CRIM-701          | Statistics                                   | 3                     |
| CRIM-702          | Pro-Seminar in Research Methods              | 3                     |
| CRIM-703          | Advanced Criminology                         | 3                     |
| CRIM-704          | Crime, Justice, and Community                | 3                     |
| CRIM-705          | Interventions and Change in Criminal Justice | 3                     |
|                   | Electives                                    | 6                     |

| COURSE                             | SEMESTER CREDIT HOURS |
|------------------------------------|-----------------------|
| <b>Second Year</b>                 |                       |
| CRIM-775 Criminal Justice Capstone | 3                     |
| Elective                           | 3                     |
| <b>Total Semester Credit Hours</b> | <b>30</b>             |

### Criminal Justice Graduate Electives

|          |  |
|----------|--|
| CRIM-660 | Project Based Learning in Criminal Justice |
| CRIM-706 | Current Issues in CJ                       |
| CRIM-711 | Directed Readings in Criminal Justice      |
| CRIM-712 | Crime And Media                            |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed a statistics course (students may be required to take a data analysis or a statistics course if not taken previously).
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Engineering Psychology, Adv. Cert.

[www.rit.edu/study/engineering-psychology-adv-cert](http://www.rit.edu/study/engineering-psychology-adv-cert)

**Esa Rantanen, Associate Professor**  
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### Program overview

The advanced certificate in engineering psychology focuses on exploring and understanding the relationship between humans and machines. It's the science of human behavior and our interactions with the technologies that go into the design and operation of machines, equipment, and more. Students expand their knowledge of engineering psychology by exploring course work in cognition, perception, ergonomics, industrial design, and more.

The advanced certificate in engineering psychology provides students with core knowledge in the key areas of engineering psychology, as well as an opportunity to study particular topics in greater depth through electives. The advanced certificate provides students with formal recognition of their knowledge in engineering psychology and establishes a credential for seeking a career in the human factors/ergonomics field.

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.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Engineering Psychology, advanced certificate, typical course sequence

| COURSE                                   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                        |                       |
| PSYC-712 Graduate Cognition              | 3                     |
| PSYC-714 Graduate Engineering Psychology | 3                     |
| PSYC-715 Graduate Perception             | 3                     |
| PSYC Elective or Open Elective*          | 6                     |
| <b>Total Semester Credit Hours</b>       | <b>15</b>             |

\* Any graduate level course except PSYC-640, PSYC-642.

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.

- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed at least 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.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### Prerequisite Courses

Students may meet the prerequisite requirements by taking the designated prerequisite courses at RIT, having sufficient background from their undergraduate education, or if prerequisite requirements are explicitly waived by the course instructor.

## Experimental Psychology, MS

[www.rit.edu/study/experimental-psychology-ms](http://www.rit.edu/study/experimental-psychology-ms)

**Tina Sutton, Associate Professor**

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### Program overview

In the experimental psychology master's degree, students are trained to apply scientific methods to basic psychological processes in perception, brain and behavior relationships, thinking, memory, learning, social interactions, human development and related areas. It is a broad and flexible program that provides a solid stepping-stone into careers or further study in psychology. A choice of tracks—in experimental psychology or engineering psychology—allows students to specialize their degree toward their career goals and aspirations.

The MS program in experimental psychology builds on the strengths of faculty research and student interests in experimental psychology broadly defined. The program as a whole provides a foundation for further advanced academic study in human factors and/or experimental psychology.

### Plan of Study

The program includes 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 publicly present their findings and defend their research before a thesis committee.

### Cooperative Education

Cooperative education, or co-op for short, is full-time, paid work experience in your field of study. And it sets RIT graduates apart from their competitors. It's exposure—early and often—to a variety of professional work environments, career paths, and industries. RIT co-op is designed for your success.

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.

## Curriculum

### Experimental Psychology, MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS  |
|------------------------------------|--|
| <b>First Year</b>                  |  |
| PSYC-640                           | Graduate Statistics 3  |
| PSYC-751                           | Graduate Research Seminar 0                                    |
| Choose one of the following:       | 3  |
| PSYC-752                           | Thesis Proposal (Thesis Option)                                |
|                                    | Specialized PSYC Elective (Non-Thesis Option)                  |
|                                    | PSYC Elective 3  |
|                                    | Institute Electives 6  |
| Choose one of the following:       | 3  |
| PSYC-641                           | Applied Psychology Methods                                     |
| PSYC-642                           | Graduate Research Methods                                      |
| Choose one of the following:       | 3  |
| PSYC-714                           | Graduate Engineering Psychology (Engineering Psychology track) |
|                                    | PSYC Elective (Experimental track)                             |
| <b>Second Year</b>                 |  |
| Choose one of the following:       | 3  |
| PSYC-753                           | Thesis (Thesis Option)   |
| PSYC-754                           | Graduate Psychology Capstone (Non-Thesis Option)               |
|                                    | PSYC Elective 3  |
| Choose one of the following:       | 3  |
|                                    | PSYC Elective  |
|                                    | Institute Elective   |
| <b>Total Semester Credit Hours</b> | <b>30</b>  |

### PSYC Electives

| COURSE   |   |
|----------|---|
| PSYC-711 | Graduate Biopsychology                    |
| PSYC-712 | Graduate Cognition                        |
| PSYC-713 | Graduate Development Psychology           |
| PSYC-715 | Graduate Perception                       |
| PSYC-716 | Graduate Social Psychology                |
| PSYC-717 | Advanced Graduate Statistics              |
| PSYC-718 | Clinical and Experimental Neuropsychology |
| PSYC-798 | Advanced Research in Psychology           |

### Institute Electives

| COURSE   |   |
|----------|---|
| BIOL-673 | Marine Biology  |
| BIOL-675 | Advanced Conservation Biology   |
| HCIN-600 | Research Methods  |
| HCIN-610 | Foundations of Human-Computer Interaction                                 |
| HCIN-620 | Information and Interaction Design  |
| HCIN-630 | Usability Testing   |
| HCIN-661 | Interactive Courseware  |
| HCIN-700 | Current Topics in HCI   |
| HCIN-705 | Topics in HCI for Biomedical Informatics                                  |
| HCIN-715 | Agent-based and Cognitive Modeling  |
| HCIN-720 | Prototyping Wearable and Internet of Things Devices                       |
| HCIN-722 | Human-Computer Interaction with Mobile, Wearable, and Ubiquitous Devices  |
| HCIN-730 | User-Centered Design Methods  |
| HCIN-735 | Collaboration, Technology, and the Human Experience                       |
| HRDE-711 | Program Evaluation and Design   |
| ISEE-730 | BioMechanics of Human Movement  |
| ISEE-731 | Advanced Topics in Human Factors and Ergonomics                           |
| ISEE-732 | Systems Safety Engineering  |
| MATH-655 | Biostatistics   |
| MKTG-761 | Marketing Concepts and Commercialization                                  |
| MSSE-704 | Teaching Deaf and Hard of Hearing Learners with Special Educational Needs |
| PSYC-631 | Cognitive Assessment  |
| PSYC-632 | Social-Emotional Assessment   |
| PSYC-650 | Applied Behavior Analysis   |
| PSYC-720 | Advanced Consultation   |
| PSYC-721 | Academic Intervention   |
| PSYC-723 | Systems and Organizational Interventions                                  |
| STAT-611 | Statistical Software  |

| COURSE   |  |
|----------|--|
| STAT-641 | Applied Linear Models - Regression     |
| STAT-701 | Foundations of Experimental Design     |
| STAT-756 | Multivariate Analysis                  |
| STAT-775 | Design and Analysis of Clinical Trials |
| STSO-621 | Graduate Biodiversity and Society      |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed at least 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.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## School Psychology, Adv. Cert.

[www.rit.edu/study/school-psychology-adv-cert](http://www.rit.edu/study/school-psychology-adv-cert)  
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### 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. This school psychology certificate may be completed as a stand-alone program, or courses may be applied later for students who wish to complete RIT's MS degree in school psychology. Students who complete the MS program in school psychology automatically earn this certificate.

#### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### School Psychology, advanced certificate, typical course sequence

| COURSE                             |  | SEMESTER CREDIT HOURS |
|------------------------------------|--|-----------------------|
| <b>First Year</b>                  |  |                       |
| PSYC-620                           | Interpersonal Intervention Skills        | 3                     |
| PSYC-630                           | Academic Assessment                      | 3                     |
| PSYC-641                           | Applied Psychology Methods               | 3                     |
| PSYC-650                           | Applied Behavior Analysis                | 3                     |
| <b>Second Year</b>                 |  |                       |
| PSYC-640                           | Graduate Statistics                      | 3                     |
| PSYC-720                           | Advanced Consultation                    | 3                     |
| PSYC-723                           | Systems and Organizational Interventions | 3                     |
| <b>Total Semester Credit Hours</b> |  | <b>21</b>             |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendations are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed at least 18 semester hours of course work in behavioral sciences with a grade of B (3.0) or better.

- Have completed prerequisite undergraduate courses in general psychology, elementary statistics, child or developmental psychology, and abnormal psychology.
- Participate in an individual interview.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.



## School Psychology, MS

[www.rit.edu/study/school-psychology-ms](http://www.rit.edu/study/school-psychology-ms)

**Vincent Pandolfi, Associate Professor**

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### Program overview

A school psychologist works with young children; elementary, junior high, and high school students; teachers and administrators; parents; and various educational professionals to offer services to prevent or improve existing student difficulties and enhance the educational success of all children. Through diagnostic testing, counseling, consultation, and intervention, school psychologist programs help students deal with learning and behavioral difficulties and help improve students' adjustment to school and their community. The school psychology masters prepares students for provisional New York state certification as school psychologists. Designed to provide students with a strong background in psychological foundations, the program develops professional skills and competencies in assessment, counseling, consultation, and program evaluation.

Designed to provide students with a strong background in psychological foundations, our school psychology master's degree develops professional skills and competencies in assessment, counseling, consultation, and program evaluation. The program prepares students for provisional New York state certification as school psychologists. The MS degree in school psychology is approved by the National Association of School Psychologists, and is awarded after students have completed all course work, an internship, and have passed a portfolio review.

### Curriculum

#### School Psychology, MS degree, typical course sequence

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| PSYC-600                           | Field Experience I: Professional School Psychology Foundations  | 3                     |
| PSYC-601                           | Field Experience II: Professional School Psychology Foundations | 3                     |
| PSYC-620                           | Interpersonal Intervention Skills                               | 3                     |
| PSYC-630                           | Academic Assessment   | 3                     |
| PSYC-631                           | Cognitive Assessment  | 3                     |
| PSYC-632                           | Social-Emotional Assessment                                     | 3                     |
| PSYC-640                           | Graduate Statistics   | 3                     |
| PSYC-650                           | Applied Behavior Analysis                                       | 3                     |
| PSYC-713                           | Graduate Developmental Psychology                               | 3                     |
| PSYC-721                           | Academic Intervention   | 3                     |
| <b>Second Year</b>                 |   |                       |
| PSYC-603                           | Ethical and Legal Issues  | 3                     |
| PSYC-641                           | Applied Psychology Methods                                      | 3                     |
| PSYC-701                           | Advanced Practicum I: Issues in Diversity                       | 3                     |
| PSYC-702                           | Advanced Practicum II: Issues in Diversity                      | 3                     |
| PSYC-710                           | Developmental Psychopathology                                   | 3                     |
| Choose one of the following:       |   | 3                     |
| PSYC-711                           | Graduate Biopsychology  |                       |
| PSYC-718                           | Clinical and Experimental Neuropsychology                       |                       |
| PSYC-720                           | Advanced Consultation   | 3                     |
| PSYC-722                           | Advanced Counseling   | 3                     |
| PSYC-723                           | Systems and Organizational Interventions                        | 3                     |
| PSYC-730                           | Comprehensive Assessment Integration                            | 3                     |
| <b>Third Year</b>                  |   |                       |
| PSYC-750                           | Internship  | 6                     |
| <b>Total Semester Credit Hours</b> |   | <b>66</b>             |

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendations are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed at least 18 semester hours of course work in behavioral sciences with a grade of B (3.0) or better.
- Have completed prerequisite undergraduate courses in general psychology, elementary statistics, child or developmental psychology, and abnormal psychology.
- Participate in an individual interview.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Science, Technology and Public Policy, MS

www.rit.edu/study/science-technology-and-public-policy-ms  
Franz Foltz, Associate Professor  
585-475-5368, fafgsh@rit.edu

Program overview

The MS degree in science, technology, and public policy enables students to work at the intersection of engineering, science, technology, and public policy. The program builds on RIT’s strengths as a technological university, enabling students to interact with faculty and researchers who are working on scientific developments and technological innovations that drive new public policy considerations. This public policy masters is interdisciplinary and draws significantly from disciplines and courses throughout RIT. It is geared toward producing graduates who will make significant contributions in the private, public, and not-for-profit sectors.

All students in the program complete a set of policy core courses that emphasize analysis, problem solving, and interdisciplinary approaches. Students work with an advisor to choose electives that focus their policy studies in a particular area, such as environmental policy, climate change policy, health care policy, STEM education policy, telecommunications policy, or energy policy. Typical students include those with science or engineering backgrounds seeking to broaden their career opportunities in government or business settings, as well as those with undergraduate degrees in the liberal arts (e.g., economics) who are interested in science, technology, and policy issues. Full-time students can typically finish the program in one to two years. The program prides itself on working one-on-one with students to ensure that their educational needs and academic goals are attained.

Plan of Study

The program consists of required core courses, elective courses, and the completion of a thesis or comprehensive exam. The thesis option allows students to work with a faculty advisor on an independent research project in their area of interest.

Electives

Students choose elective courses based on their interests and career goals. Courses may be offered in various colleges throughout the university, including the colleges of Business, Engineering, Engineering Technology, and Science. Course selection is completed jointly with a faculty advisor and typically aims to develop a specialized area of interest for the student (e.g., biotechnology policy, environmental policy, energy policy, communications policy, etc.).

Curriculum

Science, Technology and Public Policy, MS degree, typical course sequence

| COURSE                       |  | SEMESTER CREDIT HOURS |
|------------------------------|--|-----------------------|
| First Year                   |  |                       |
| PUBL-700                     | Readings in Public Policy                      | 3                     |
| PUBL-701                     | Graduate Policy Analysis                       | 3                     |
| PUBL-702                     | Graduate Decision Analysis                     | 3                     |
| PUBL-703                     | Evaluation and Research Design                 | 3                     |
| STSO-710                     | Graduate Science and Technology Policy Seminar | 3                     |
|                              | Graduate Electives*                            | 9                     |
| Second Year                  |  |                       |
| Choose one of the following: |  | 6                     |
| PUBL-785                     | Capstone Experience                            |                       |
| PUBL-790                     | Public Policy Thesis                           |                       |
| PUBL-798                     | Comprehensive Exam plus 2 Graduate Electives*  |                       |
| Total Semester Credit Hours  |  | 30                    |

\* Graduate Electives are chosen by students based on their professional interests. In consultation with their academic advisor, students will choose from graduate courses offered across the university to round out their coursework.

Admission requirements

- To be considered for admission to the MS program in science, technology and public policy, candidates must fulfill the following requirements:
- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
  - Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
  - Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
  - Recommended minimum cumulative GPA of 3.0 (or equivalent).
  - Submit a current resume or curriculum vitae.
  - Two letters of recommendations are required. Refer to Application Instructions and Requirements for additional information.
  - Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
  - Submit two writing samples, one of which should be a statement of interest.
  - Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
  - Have completed course work in calculus and statistics. Students may be required to take a course in data analysis or statistics course and an introductory calculus course, if not taken previously.
  - International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility

## Faculty

### Dean's Office

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**Anna Westerstahl Stenport**, BA, MA, Uppsala University (Sweden); Ph.D., University of California-Berkeley—Dean; Professor

**Michael Laver**, BA, Purdue University; MA, Ph.D., University of Pennsylvania—Associate Dean; Professor

### School of Communication

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**Kelly Norris Martin**, BA, John Carroll University; MS, Ph.D., North Carolina State University—Director; Associate Professor

**Bruce A. Austin**, BA, Rider College; MS, Illinois State University; Ph.D., Temple University—Professor

**Grant C. Cos**, BA, University of Massachusetts at Amherst; MA, Emerson College; Ph.D., Kent State University—Professor

**Keith B. Jenkins**, BA, University of Arkansas; MA, Ph.D., Florida State University—Vice President and Associate Provost for Diversity and Inclusion; Professor

**Ammina Kothari**, BA, North Central College; MA, University of Oregon; Ph.D., Indiana University—Director of Graduate Program, Associate Professor

**Hinda Mandell**, BA, Brandeis University; MA, Harvard University; Ph.D., Syracuse University—Associate Professor

**David R. Neumann**, BA, Ithaca College; MA, Ph.D., Bowling Green State University—Professor

**Rudy Pugliese**, BA, State University College at Oneonta; MA, State University College at Brockport; Ph.D., Temple University—Professor

**Jonathan E. Schroeder**, BA, University of Michigan; MA, Ph.D., University of California at Berkeley—William A. Kern Professor in Communications

**Xiao Wang**, BA, Beijing University of Aeronautics and Astronautics (China); MA, Marquette University; Ph.D., Florida State University—Professor

**Tracy R. Worrell**, BA, Otterbein College; MA, University of Cincinnati; Ph.D., Michigan State University—Professor

### Criminal Justice

---

**Christopher Schreck**, BA, University of Florida; MA, University of Arizona; Ph.D., Pennsylvania State University—Department Chair; Professor

**Irshad Altheimer**, BA, Alabama State University; MA, Ph.D., Washington State University—Associate Professor

**John McCluskey**, BA, 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—Undergraduate Director; Professor

**O. Nicholas Robertson**, BA, State University College at Geneseo; MA, State University College at Brockport; Ph.D., State University of New York at Buffalo—Assistant Professor

**Jason Scott**, BS, Roberts Wesleyan College; MA, Ph.D., State University of New York at Albany—Graduate Director; Associate Professor

**Tony Smith**, BA, MA, Ph.D., State University of New York at Albany—Associate Professor

**Joe Williams**, BS, Rochester Institute of Technology; MA, State University College at Brockport—Lecturer; Field Experience Coordinator

### Humanities

---

**Timothy H. Engström**, BA, MA, Ph.D., University of Edinburgh (United Kingdom)—Professor, Philosophy

**Jessica Lieberman**, BA, University of Pennsylvania; Ph.D., University of Michigan—Associate Professor, Visual Culture

**Cecilia Ovesdotter Alm**, BA, Universitat Wien (Austria); MA, Ph.D., University of Illinois—Associate Professor, English

**Katie Terezakis**, BA, Central Connecticut State University; MA, Ph.D., New School for Social Research—Professor

## Psychology

**Joseph Baschnagel**, BA, MA, Ph.D., State University of New York at Buffalo—Department Chair; Associate Professor

**Suzanne Bamonto**, AA, Finger Lakes Community College; BA, State University College at Geneseo; Ph.D., University of Oregon—Associate Professor

**Kirsten Condry**, BA, Swarthmore College; Ph.D., University of Minnesota—Associate Professor

**Caroline DeLong**, BA, New College of Florida; MA, Ph.D., University of Hawaii—Undergraduate Program Director; Professor

**John E. Edlund**, BS, MA, Ph.D., Northern Illinois University—Professor

**Allison Fitch**, BA, University of Connecticut; Ph.D., University of Massachusetts Boston—Assistant Professor

**Stephanie A. Godleski**, BA, Hamilton College; MS, Ph.D., University of Buffalo—Associate Professor

**Andrew M. Herbert**, B.Sc., McGill University (Canada); MA, Ph.D., University of Western Ontario (Canada)—Professor

**Rebecca Houston**, BS, University of Arkansas at Little Rock; MA, Ph.D., University of New Orleans, Louisiana—Associate Professor

**Scott P. Merydith**, BA, M.Ed., Ph.D., Kent State University—Professor

**Vincent Pandolfi**, BA, Lafayette College; MA, Ph.D., Hofstra University—Graduate Program Director, School Psychology; Associate Professor

**Esa Rantenen**, BS, MS, Embry-Riddle Aeronautical University; MS, Ph.D., Pennsylvania State University—Associate Professor

**Lindsay Schenkel**, BA, St. John Fisher College; MA, Ph.D., University of Nebraska at Lincoln—Associate Professor

**Alan Smerbek**, BA, University of Rochester; Ph.D., State University of New York at Buffalo—Associate Professor

**Tina Sutton**, BS, Union College; MA; Ph.D., State University of New York at Albany—Graduate Director; Experimental Psychology; Associate Professor

## Public Policy

**Sandra Rothenberg**, BS, Syracuse University; MS, Ph.D., Massachusetts Institute of Technology—Department Chair, Professor

**Franz A. Foltz**, BS, MS, Pennsylvania State University; Ph.D., Rensselaer Polytechnic Institute—Public Policy Graduate Program Director; Associate Professor

**Eric Hittinger**, BS, MS, Case Western Reserve University; Ph.D., Carnegie Mellon University—Associate Professor

**Nathan Lee**, BS, University of Pennsylvania; MS, Massachusetts Institute of Technology; Ph.D., Stanford University—Assistant Professor

**Qing Miao**, BA, Nanjing University (China); MS, University of Michigan; Ph.D., Syracuse University—Assistant Professor

## Science, Technology and Society

**Christine Keiner**, BA, Western Maryland College; Ph.D., Johns Hopkins University—Department Chair; Professor

**Deborah Blizzard**, BA, Smith College; MS, Ph.D., Rensselaer Polytechnic Institute—Department Chair; Professor

**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

**Kaitlin Stack Whitney**, BS, Cornell University; Ph.D., University of Wisconsin-Madison—Assistant Professor

**Kristoffer J. Whitney**, BS, Rochester Institute of Technology; Ph.D., University of Pennsylvania—Assistant Professor

# National Technical Institute for the Deaf

Gerard Buckley, President, NTID; Vice President and Dean, RIT  
rit.edu/ntid

## Programs of Study

|   |   |     |
|---|---|-----|
| ⊕ | Health Care Interpretation, MS                                      | 139 |
|   | Secondary Education of Students Who Are Deaf or Hard of Hearing, MS | 140 |
| ⊕ | Online learning option available.                                   |     |

The National Technical Institute for the Deaf (NTID) is the world’s largest technological college for deaf and hard-of-hearing students. Among RIT’s more than 19,000 full- and part-time students are more than 1,100 undergraduate and graduate deaf and hard-of-hearing students from across the United States and the world.

NTID offers a master of science degree in secondary education of students who are deaf or hard of hearing. All full-time students in the MS program are eligible for graduate assistantships. NTID offers a master of science degree in health care interpretation as well. Students also can pursue graduate and doctoral degrees through RIT’s other mainstream colleges and degree-granting units.

Please visit the college’s website for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

### Admission requirements

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



## Health Care Interpretation, MS

[www.rit.edu/study/health-care-interpretation-ms](http://www.rit.edu/study/health-care-interpretation-ms)

**Jeni Rodrigues, Lecturer**

**585-975-9353, [Jeni.Rodrigues@rit.edu](mailto:Jeni.Rodrigues@rit.edu)**

### Program overview

The MS in health care interpretation is designed to meet the demands of nationally certified sign language interpreters desiring a master's degree specific to working in health care environments. The National Technical Institute for the Deaf's Department of American Sign Language and Interpreting Education administers the program with some course work contributed by RIT's College of Health Sciences and Technology. This unique program:

- Meets the growing demand for specialized sign language health care interpreters as more deaf and hard-of-hearing professionals enter medical/health care fields.
- Increases the number of specialized sign language interpreters working in patient health care settings.
- Prepares interpreters to work in leadership roles in the health care interpreting field.

The program is offered exclusively online. It is estimated that each course will require 9-12 hours per week for class assignments. Course materials will be delivered online asynchronously. In your final semester, you will complete a capstone project consisting of either a research paper or project.

The program curriculum employs an online pedagogical approach, including accelerated courses as its primary delivery system.

The program may be completed on a full- or part-time basis: one academic year (with two summers) for full-time students or two academic years (with two summers) for part-time students.

### Curriculum

#### Health Care Interpretation (full-time), MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS   |
|------------------------------------|---|
| <b>First Year</b>                  |   |
| HCIA-610                           | Interpreting Research Setting (summer) 3                            |
| HCIA-705                           | Professional Seminar (summer) 3                                     |
| HCIA-719                           | Theories of Translation and Interpretation (summer) 3               |
| HCIA-715                           | Human Body Systems/Diseases I* 3                                    |
| HCIA-720                           | Health Care Practical Interpreting I* 3                             |
| HCIA-730                           | Human Body Systems/Diseases II** 3                                  |
| HCIA-740                           | Health Care Practical Interpreting II** 3                           |
| HCIA-760                           | Research Methods in Interpreting 3                                  |
|                                    | HLTH Elective 3   |
| <b>Second Year</b>                 |   |
| HCIA-750                           | Health Care Interpreting Within a Diverse Deaf Community (summer) 3 |
| HCIA-770                           | Capstone Prof Proj/Rsrch Paper (summer) 3                           |
| <b>Total Semester Credit Hours</b> |   |
|                                    | <b>33</b>   |

\* HCIA-715 and HCIA-720 are taken in session 1 (first 7 weeks) of the semester.

\*\* HCIA-730 and HCIA-740 are taken in session 2 (last 7 weeks) of the semester.

#### Health Care Interpretation (part-time), MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS   |
|------------------------------------|---|
| <b>First Year</b>                  |   |
| HCIA-705                           | Professional Seminar (summer) 3                                     |
| HCIA-719                           | Theories of Translation and Interpretation (summer) 3               |
| HCIA-715                           | Human Body Systems/Diseases I* 3                                    |
| HCIA-720                           | Health Care Practical Interpreting I* 3                             |
| HCIA-730                           | Human Body Systems/Diseases II** 3                                  |
| HCIA-740                           | Health Care Practical Interpreting II** 3                           |
| <b>Second Year</b>                 |   |
| HCIA-610                           | Interpreting Research Setting (summer) 3                            |
| HCIA-750                           | Health Care Interpreting Within a Diverse Deaf Community (summer) 3 |
| HCIA-760                           | Research Methods in Interpreting 3                                  |
| HCIA-770                           | Capstone Prof Proj/Rsrch Paper 3                                    |
|                                    | HLTH Elective 3   |
| <b>Total Semester Credit Hours</b> |   |
|                                    | <b>33</b>   |

\* HCIA-715 and HCIA-720 are taken in session 1 (first 7 weeks) of the semester.

\*\* HCIA-730 and HCIA-740 are taken in session 2 (last 7 weeks) of the semester.

### Admission requirements

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

- Complete a graduate application.
- Submit a current resume or curriculum vitae.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Enrollment in the program is open to students residing in the United States and other countries. Current ASL/English certification, Board for Evaluation of Interpreters (BEI), or state licensure is required. Applicants must email a copy of their credentials to [ntidadmissions@rit.edu](mailto:ntidadmissions@rit.edu).
- Have a cumulative GPA of 3.0 or above (or superior endorsement) from an accredited college or university.
- Submit two letters of reference from interpreter colleagues, mentors, or Deaf community members who have had the opportunity to observe the applicant's interpreting work.
- Submit a personal statement describing the applicant's educational objectives. (This may include reasons for applying to the program, how the program will relate to long-range career objectives, any personal or non-academic qualities that might contribute to success in the program, any prior experience, or any reasons why the applicant wants to attend RIT.)
- Submit an ASL interpretation sample.
- Deaf and hard-of-hearing applicants must submit an audiogram.

Applicants accepted into the program are required to complete a self-paced online course in medical terminology called Language of Medicine prior to the beginning of the summer term, which starts each June.

## Secondary Education of Students Who Are Deaf or Hard of Hearing, MS

[www.rit.edu/study/secondary-education-students-who-are-deaf-or-hard-hearing-ms](http://www.rit.edu/study/secondary-education-students-who-are-deaf-or-hard-hearing-ms)

**Patrick Graham, Associate Professor**

**585-475-6480, [pjgnmp@rit.edu](mailto:pjgnmp@rit.edu)**

### Program overview

The master of science (MS) degree in secondary education of students who are deaf or hard of hearing is designed for deaf, hard-of-hearing, and hearing students with a passion for teaching. As an teacher-candidate in the program, you'll earn dual certification to teach a secondary school content area for students who are hearing or deaf as well as in deaf education for grades K-12. The curriculum is taught by renowned faculty at RIT, one of the most innovative campuses in the world. The program prepares teachers to be effective and ethical practitioners and also to be scholars and leaders in the profession.

As a graduate student in the program you will enjoy small class sizes, one-to-one discussions, and advisement with world renowned faculty in small classes that allow you to build your strengths and develop your skills.

RIT and the National Technical Institute for the Deaf (NTID) have created a unique educational community with a diverse communication environment. All community members share responsibility for effective communication and are expected to respect the language preferences of students, faculty, and staff. The rich inclusive communication environment at RIT/NTID prepares you for the broad array of communication styles you will encounter in the classroom as a teacher of the deaf.

Faculty members are international leaders in research and are highly skilled in the education of deaf people. A carefully designed system of faculty advisement is a prominent feature of the program. On-campus facilities, state-of-the-art technology, and a well-established system of educational access services combine to make this a vital program for both deaf and hearing students who desire careers as professional educators of deaf students.

### Plan of Study

Course work requires a minimum of five semesters. A cumulative grade point average of at least 3.0 must be maintained. Before graduation, students are expected to have at least intermediate-level signing skills as determined by a Sign Language Proficiency Interview.

### Degree and Certification

When you successfully complete the program, you will have earned:

- A master of science degree
- Initial Certification from New York State to teach in an academic subject area at the secondary school level (grades 7-12). Subject areas include biology, chemistry, earth science, English, math, physics, social studies, or American Sign Language
- Initial certification from New York State in education of students who are deaf or hard of hearing, grades K-12
- Initial certification from Council on Education of the Deaf Note: To be eligible for initial certification, you are required to take and pass the New York State Teacher Certification Examinations (NYSTCE). There are four tests: Educating All Students (EAS) Content Specialty Test (CST), Deaf and Hard of Hearing Content Specialty Test (CST), in the academic subject area for which you wish to become certified to teach. edTPA (Teacher Performance Assessment)

### Is the RIT/NTID's MS in secondary education right for you?

How do you know if the MS degree in secondary education is the right program for you? Use the follow questions to assess your interest in the education field and in teaching students who are deaf and hard of hearing:

- Do you want to teach deaf and hard-of-hearing students?
- Do you want to teach math, science, social studies or English and respond to the need for more high school teachers?
- Do you want to teach in a variety of K-12 mainstream and residential/center school settings?
- Are you fascinated by the cognitive, cultural and language characteristics of deaf and hard-of-hearing students?
- Are you looking for personal attention and advisement from faculty and staff who are leaders in the field?
- Would you like to learn, live and work on a campus designed for collaboration between deaf and hearing students?
- Do you want training in evidence-based instructional approaches?

### Why choose RIT/NTID's MS in secondary education

With the pressing need for more secondary education teachers, especially in science and mathematics, the strong foundation RIT provides in these areas creates an exceptional environment for deaf, hard-of-hearing, and hearing students to pursue a teaching degree. The program offers the following advantages:

- Personal attention from program faculty members.
- Dual certification in a secondary school content area in grades 7-12 for students who are hearing or deaf as well as in deaf education for grades K-12.
- Strong faculty with expertise in pedagogy, language development, teaching and curriculum, speech development, research, educational technology, youth and adolescent development, student advisement and placement, and educational issues.
- Variety of student-teaching placement options.
- Access to a wide array of research materials.
- Extensive library resources on education of students who are deaf or hard of hearing, Deaf culture, sign language, and curriculum materials.
- Thorough and thoughtful personal advising.
- Close proximity to schools for deaf students and mainstream programs.
- A vibrant Deaf community in Rochester, N.Y.
- Numerous seminars and workshops focused on contemporary educational and cultural topics.
- Immersion in American Sign Language.
- Collaborative projects with faculty, staff members and students.

### The RIT 4+2 Teacher Education Program

Be part of an exciting new program that creates a bridge between a four-year RIT bachelor's degree and RIT's two-year master of science degree program in secondary education. The RIT 4+2 Teacher Education Program is an exceptional value and an outstanding choice designed to give you the skills you need for a successful teaching career. In the 4+2 program you will:

- Receive dual certification in education of students who are deaf or hard-of-hearing as well as in an academic subject such as science or math.
- Enjoy small class sizes and one-to-one discussions with faculty who are international leaders in research and the art of teaching.
- Have the opportunity to gain valuable real-world teaching experience before you graduate.
- Enjoy a top-quality education at a substantially reduced tuition rate.

### How the program works

- You must be accepted to an RIT bachelor's degree program in one of the following areas: Any major in the College of ScienceAny major in the College of Engineering that requires 30 credits in math or scienceAny major in the College of Liberal Arts that requires 30 credits in English or history/social studiesAn applied arts and sciences program requiring 30 credits in either math, science, or English, history/social studies
- Once you are enrolled in one of the bachelor's degree programs for at least two years, you can complete the application for graduate study to the MS degree in secondary education (during your 4th year of study). You must interview with the department chairperson prior to your admission to qualify for the program.
- Upon completion of your bachelor's degree program, you must have: A cumulative GPA of 3.25 or higher, Graduate Record Exam (GRE) is not needed.A cumulative GPA of 2.8-3.24, GRE scores must be submitted (combined score of at least 280 and analytic writing score of 3.0 or better).Completed 30 credits and earned a 3.0 GPA in your academic subject area (ex. math, science, history/social studies, or English)Successfully taken and passed at least ASL I and ASL II through RIT's College of Liberal Arts, or earned credit by exam.

For more information on the RIT 4+2 Teacher Education Program, contact the NTID Office of Admissions.

## Curriculum

### Secondary Education of Students who are Deaf or Hard of Hearing, MS degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS   |
|------------------------------------|---|
| <b>First Year</b>                  |   |
| MSSE-700                           | History of Deaf Educational Thought and Practice 3                          |
| MSSE-701                           | Psychology and Human Development 3  |
| MSSE-703                           | Special Education in the Social Context 3                                   |
| MSSE-704                           | Teaching Deaf and Hard of Hearing Learners with Special Educational Needs 3 |
| MSSE-710                           | General Instructional Methods 3   |
| MSSE-712                           | Practicum 2   |
| MSSE-713                           | Assessment Principles and Practices 3                                       |
| MSSE-725                           | Structures of American Sign Language and English 3                          |
| MSSE-726                           | Language Acquisition and Learning 3   |
| MSSE-727                           | American Sign Language in Instructional Delivery 3                          |
| MSSE-785                           | Foundations of Educational Research 3                                       |
| <b>Second Year</b>                 |   |
| MSSE-702                           | Educational and Cultural Diversity 3  |
| MSSE-714                           | Curriculum Content and Methods of Instruction 3                             |
| MSSE-715                           | Issues in Mainstreamed Education 3  |
| MSSE-722                           | Educational Audiology and Spoken Language Development 3                     |
| MSSE-728                           | Literacy and the Deaf Adolescent 3  |
| MSSE-760                           | Student Teaching I 6  |
| MSSE-761                           | Student Teaching II 6   |
| MSSE-790                           | Professional Portfolio 3  |
| MSSE-794                           | Inquiry in Teaching (optional elective) (3)                                 |
| <b>Total Semester Credit Hours</b> |   |
| <b>62</b>                          |   |

## Admission requirements

To be considered for admission to the MS program in secondary education of students who are deaf or hard of hearing, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.

- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendations are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a writing sample, of which you are the sole author, which should be a report or paper from previous academic or professional work that reflects your critical thinking and writing abilities.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Participate in an individual interview.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.
- Complete the Content Area/Certification Questionnaire.
- Complete a Sign Language Assessment. Applicants must demonstrate at least basic skills in sign language as measured by a departmental skill assessment or be willing to take the ASL I course (or its equivalent) at RIT/NTID or another college prior to the beginning of the program.

Additionally, 30 semester credit hours in a content area are required by the New York State Education Department for initial certification to teach a secondary content area (grades 7-12). Students who do not have the required number of hours must complete the additional credits before applying for New York State certification. Secondary academic subjects include American Sign Language, English, mathematics, social studies, or science. Please note: The social studies content area includes economics and government, and requires at least 21 semester hours in the history and geography of the United States and the world.

### Financial Aid

NTID graduate tuition rates are less than one-half of RIT's tuition for U.S. citizens. Students who are interested in applying for financial assistance need to complete the Free Application for Federal Student Aid (FAFSA). International applicants should contact the NTID Admissions Office for additional information. Questions related to program, including scholarship opportunities, should be directed to the NTID Office of Admissions.

## Faculty

### Dean's Office

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**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

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**Jodie M. Ackerman**, BS, Rochester Institute of Technology; MS, Gallaudet University; Ed.D., Lamar University—Lecturer

**Robyn K. Dean**, BA, Maryville College; MA, Colgate Rochester Crozer Divinity School; Ph.D., Heriot-Watt University (United Kingdom)—Assistant Professor, Health Care Interpretation

**Kim B. Kurz**, BS, MS, Rochester Institute of Technology; Ph.D., University of Kansas—Associate Professor, Health Care Interpreting Within a Diverse Deaf Community

**Jason Listman**, BS, MS, Rochester Institute of Technology; Ed.D., St. John Fisher College—Associate Professor, Healthcare Professional Seminar

**Daniel V. Maffia**, BS, Rochester Institute of Technology; MA, Western Oregon University—Senior Lecturer, Theories of Translation and Interpretation

### Secondary Education of Students Who are Deaf and Hard of Hearing

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**Patrick J. Graham**, BS, MS, Rochester Institute of Technology; Ph.D., University of Georgia—Associate Professor; Director, Curriculum and Teaching

**Christopher A. N. Kurz**, BS, Rochester Institute of Technology; MS, Ph.D., University of Kansas—Professor, Special Education: Education of Deaf Students

**Amanda L. Picioli**, BS, State University College at Geneseo; MED, Smith College; MS, Syracuse University; AuD., University of Florida—Audiologist, Audiology

**Thomastine Sarchet**, BS, MS, Rochester Institute of Technology—Research Associate Professor, Assessment

**Sara Schley**, BA, Reed College; MA, Northeastern University; Ed.D., Harvard University—Professor, Human Development and Language Acquisition

**Michael Skyer**, BFA, MS, Rochester Institute of Technology—Senior Lecturer, English

**Jessica W. Trussell**, BS, University of Georgia; M.Ed., Ph.D., Georgia State University—Associate Professor, Deaf Education

# College of Science

**Sophia Maggelakis, Dean**

[rit.edu/science](http://rit.edu/science)

## Programs of Study

|   |     |
|---|-----|
| Applied and Computational Mathematics, MS     | 160 |
| ⊕ Applied Statistics, Adv. Cert.              | 163 |
| ⊕ Applied Statistics, MS                      | 162 |
| Astrophysical Sciences and Technology, MS     | 166 |
| Astrophysical Sciences and Technology, Ph.D.  | 167 |
| Bioinformatics, MS                            | 157 |
| Chemistry, MS                                 | 144 |
| Color Science, MS                             | 149 |
| Color Science, Ph.D.                          | 150 |
| Environmental Science, MS                     | 159 |
| ⊕ Imaging Science, MS                         | 153 |
| Imaging Science, Ph.D.                        | 155 |
| Materials Science and Engineering, Adv. Cert. | 148 |
| Materials Science and Engineering, MS         | 146 |
| Mathematical Modeling, Ph.D.                  | 164 |
| Physics, MS                                   | 169 |

⊕ Online learning option available.

The College of Science offers a unique complement of graduate programs featuring curricula designed with sufficient flexibility to prepare students for direct entry into a variety of careers or further study toward a more advanced graduate degree in a chosen discipline. The college also houses four doctorate programs featuring internationally-recognized, cutting-edge research activities.

Whether the focus is on the foundations of matter, the origins of the universe, the modeling of mathematics, the role of chemists in our daily lives, the encoding of life within DNA, the specialized properties of advanced materials, our impact on the environment, or the science and technology of advanced imaging systems, the college's graduate faculty provide a valuable and integrated understanding of today's most important fundamental problems, applied research issues, and industrial applications.

Please visit the college's website—[www.rit.edu/science](http://www.rit.edu/science)—for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

## 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

### Chemistry, MS

[www.rit.edu/study/chemistry-ms](http://www.rit.edu/study/chemistry-ms)

**Nathan Eddingsaas, Associate Professor**  
585-475-4605, [ncesch@rit.edu](mailto:ncesch@rit.edu)

#### Program overview

With a chemistry master's degree, you'll be able to solve scientific problems with agility and accuracy. Conduct research specific to your field of interest as you develop skills that translate to infinite career opportunities. With an emphasis on leadership, many graduates excel in leadership positions in dynamic fields such as sustainability, public policy, lobbying, sales, government, imaging science, space exploration, medicine, and much more.

The MS degree in chemistry is offered on a full- or part-time basis. The program is designed to fill the needs of the traditional student or the practicing chemist who is employed full time and wishes to pursue a graduate degree on a part-time basis.

The School of Chemistry and Materials Science has research- and teaching-oriented faculty, as well as excellent equipment and facilities that enable full-time graduate students to carry on a program of independent study and develop the ability to attack scientific problems at the fundamental level. The research can result in either a thesis or a project report.

Through course work and research activities, the program strives to increase the breadth and depth of the student's background in chemistry. Students develop the ability to attack scientific problems with minimal supervision.

#### Plan of Study

The program offers two options: a thesis or a project. Concentrations are available in organic chemistry, analytical chemistry, inorganic chemistry, physical chemistry, polymer chemistry, materials science, and biochemistry. Customized concentrations are available to accommodate specific student interests and needs relating to graduate study in chemistry.

Each student, together with an advisor, chooses courses to create a customized curriculum that best meets their interests, needs, and career aspirations. Each student's curriculum is subject to the approval of the director of the graduate program.

A deliberate effort is made to strengthen any areas of weakness indicated by the student's undergraduate records and the placement examinations. The MS degree consists of the following requirements:

##### 1. A minimum of 30 semester credit hours beyond the bachelor's degree.

Courses in chemistry consist of core and focus area courses. Core courses are designed to increase a student's breadth of chemical knowledge, while focus area courses increase depth. Core courses include four semester credit hours in Graduate Chemistry Seminar and one credit hour in Chemistry Writing (CHEM-670). Focus area courses are chosen to address the student's career goals and any undergraduate deficiencies in chemistry. Focus area courses must be at the graduate level and are chosen in consultation between the student and graduate advisor. Focus area courses outside of chemistry are acceptable provided they are approved by the student's graduate advisor.

##### 2. Research

Ten semester credit hours of research are required with the thesis option. For students who opt for the project option, four semester hours of project research are required.

##### 3. Capstone

Students enrolled in the thesis option are expected to complete an independent research thesis and pass an oral defense. Typically, all requirements are met within two years. Students enrolled in the project option have numerous ways of satisfying the capstone requirement for their project. These include but are not limited to conference presentations, papers, journal articles, patents, and seminars.

#### 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).

#### 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.

#### National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

#### Cooperative Education

Cooperative education, or co-op for short, is full-time, paid work experience in your field of study. And it sets RIT graduates apart from their competitors. It's exposure—early and often—to a variety of professional work environments, career paths, and industries. RIT co-op is designed for your success.

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.

#### Curriculum

##### Chemistry (thesis option), MS degree, typical course sequence

| COURSE                             |                                  | SEMESTER CREDIT HOURS |
|------------------------------------|----------------------------------|-----------------------|
| <b>First Year</b>                  |                                  |                       |
| CHEM-670                           | Graduate Chemistry Writing       | 1                     |
| CHEM-771                           | Graduate Chemistry Seminar I     | 1                     |
| CHEM-772                           | Graduate Chemistry Seminar II    | 1                     |
| CHEM-790                           | Research & Thesis                | 5                     |
|                                    | Graduate Chemistry Focus Courses | 12                    |
| <b>Second Year</b>                 |                                  |                       |
| CHEM-773                           | Graduate Chemistry Seminar III   | 1                     |
| CHEM-774                           | Graduate Chemistry Seminar IV    | 1                     |
| CHEM-790                           | Research & Thesis                | 5                     |
|                                    | Graduate Chemistry Focus Course  | 3                     |
| <b>Total Semester Credit Hours</b> |                                  | <b>30</b>             |

**Chemistry (project option), MS degree, typical course sequence**

| COURSE                             |                                  | SEMESTER CREDIT HOURS |
|------------------------------------|----------------------------------|-----------------------|
| <b>First Year</b>                  |                                  |                       |
| CHEM-771                           | Graduate Chemistry Seminar I     | 1                     |
| CHEM-772                           | Graduate Chemistry Seminar II    | 1                     |
| CHEM-670                           | Graduate Chemistry Writing       | 1                     |
|                                    | Graduate Chemistry Focus Courses | 12                    |
| <b>Second Year</b>                 |                                  |                       |
| CHEM-773                           | Graduate Chemistry Seminar III   | 1                     |
| CHEM-774                           | Graduate Chemistry Seminar IV    | 1                     |
| CHEM-780                           | Chemistry Project                | 1-4*                  |
|                                    | Graduate Chemistry Focus Courses | 9-12*                 |
| <b>Total Semester Credit Hours</b> |                                  | <b>30</b>             |

\* Students must complete at least 1 semester credit hour (sch) of CHEM-780, but may elect to take up to 4 sch of CHEM-780 in place of one (1) Chemistry Focus Course.

*Chemistry Focus Courses*

| COURSE   |   | SEMESTER CREDIT HOURS |
|----------|---|-----------------------|
| CHMA-621 | Advanced Instrumental Analysis Lab                          | 3                     |
| CHMA-650 | Separations and Mass Spectroscopy in Biological Chemistry   | 3                     |
| CHMA-670 | Advanced Concepts of Environmental Chemistry                | 3                     |
| CHMA-711 | Advanced Instrumental Analysis                              | 3                     |
| CHMA-725 | The Magnetic Resonance Family                               | 3                     |
| CHMA-740 | Practical NMR   | 3                     |
| CHMA-750 | NMR Spectrometer Maintenance                                | 3                     |
| CHMB-610 | Advanced Protein Biochemistry: Structure and Function       | 3                     |
| CHMB-702 | Protein Conformation and Dynamics                           | 3                     |
| CHMB-704 | Advanced Nucleic Acids Biochemistry: Structure and Function | 3                     |
| CHMI-664 | Modern Inorganic Chemistry                                  | 3                     |
| CHMO-636 | Spectrometric Identification of Organic Compounds           | 3                     |
| CHMO-637 | Advanced Organic Chemistry                                  | 3                     |
| CHMO-640 | Mechanisms of Drug Interactions                             | 3                     |
| CHMO-710 | Literature Exploration of Organic Synthesis                 | 1                     |
| CHMO-739 | Advanced Physical Organic Chemistry                         | 3                     |
| CHMP-747 | Principles of Magnetic Resonance                            | 3                     |
| CHMP-751 | Colloid & Interface Science                                 | 3                     |
| CHMP-752 | Molecular Photophysics and Photochemistry                   | 3                     |
| CHMP-753 | Computational Chemistry                                     | 3                     |
| CHPO-706 | Polymer Synthesis   | 3                     |
| CHPO-707 | Polymer Chemistry II  | 3                     |
| CHPO-708 | Polymer Synthesis & Characterization Lab                    | 3                     |
| IMGS-730 | Magnetic Resonance Imaging                                  | 3                     |
| MTSE-602 | Polymer Science   | 3                     |

**Admission requirements**

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in chemistry. Applicants with an undergraduate degree in another scientific discipline and the equivalent of a full year of work in analytical chemistry, organic chemistry, physical chemistry, physics, and calculus will also be considered for admission.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.

- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

**Visit RIT**

As a supplement to the normal application process, it is strongly recommended that students visit RIT.

**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.

## Materials Science and Engineering, MS

[www.rit.edu/study/materials-science-and-engineering-ms](http://www.rit.edu/study/materials-science-and-engineering-ms)

**Scott Williams, Professor**

**585-475-3033, sawppr@rit.edu**

### Program overview

The materials science master's degree is designed to satisfy individual and industry needs in the rapidly growing field of materials. The materials science degree offers a serious interdisciplinary learning experience in materials studies, crossing over the traditional boundaries of such classical disciplines like chemistry, physics, and engineering.

The MS degree in materials science and engineering offered jointly by the College of Science and the Kate Gleason College of Engineering, is designed with a variety of options to satisfy individual and industry needs in the rapidly growing field of materials.

The objectives of the program are threefold:

- With the advent of new classes of materials and instruments, the traditional practice of empiricism in the search for and selection of materials is rapidly becoming obsolete. Therefore, the program offers a serious interdisciplinary learning experience in materials studies, crossing over the traditional boundaries of such classical disciplines like chemistry, physics, and electrical, mechanical, and microelectronic engineering.
- The program provides extensive experimental courses in diverse areas of materials-related studies.
- The program explores avenues for introducing greater harmony between industrial expansion and academic training.

### Plan of Study

The program 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.

There also is an emphasis on experimental techniques, with one required experimental course as part of the curriculum. Additional experimental courses are available for students who wish to pursue course work in this area. These courses are organized into appropriate units covering many aspects of the analysis of materials. This aspect of the program enhances a student's confidence when dealing with materials-related problems.

#### Electives

Elective courses may be selected from advanced courses offered by the School of Chemistry and Materials Science or, upon approval, from courses offered by other RIT graduate programs. Elective courses are scheduled on a periodic basis. Transfer credit may be awarded based on academic background beyond the bachelor's degree or by examination, based on experience.

#### Thesis/Project

Students may choose to complete a thesis or a project as the conclusion to their program. Students who pursue the thesis option take four graduate electives, complete nine credit hours of research, and produce a thesis paper. The project option includes six graduate electives and a 3 credit hour project.

### Part-Time Study

The materials science degree offers courses in the late afternoon and evenings to encourage practicing scientists and engineers to pursue the program without interrupting their employment. (This may not apply to courses offered off campus at selected industrial sites.) Students employed full time are normally limited to a maximum of two courses, or 6 credit hours, each semester. A student who wishes to register for more than 6 credit hours must obtain the permission of his or her advisor.

### National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

### Curriculum

#### Materials Science and Engineering (thesis option), MS degree, typical course sequence

| COURSE                             | SEMESTER   | CREDIT HOURS |
|------------------------------------|--|--------------|
| <b>First Year</b>                  |  |              |
| MTSE-601                           | Materials Science  | 3            |
| MTSE-704                           | Theoretical Methods in Materials Science and Engineering | 3            |
| MTSE-705                           | Experimental Techniques                                  | 3            |
| MTSE-790                           | Research & Thesis  | 6            |
|                                    | Graduate Electives                                       | 12           |
| <b>Second Year</b>                 |  |              |
| MTSE-790                           | Research & Thesis  | 3            |
| <b>Total Semester Credit Hours</b> |  | <b>30</b>    |

#### Materials Science and Engineering (project option), MS degree, typical course sequence

| COURSE                             | SEMESTER   | CREDIT HOURS |
|------------------------------------|--|--------------|
| <b>First Year</b>                  |  |              |
| MTSE-601                           | Materials Science  | 3            |
| MTSE-704                           | Theoretical Methods in Materials Science and Engineering | 3            |
| MTSE-705                           | Experimental Techniques                                  | 3            |
| MTSE-777                           | Graduate Project   | 3            |
|                                    | Graduate Electives                                       | 15           |
| <b>Second Year</b>                 |  |              |
|                                    | Graduate Elective  | 3            |
| <b>Total Semester Credit Hours</b> |  | <b>30</b>    |

### Electives

| COURSE   |   |
|----------|---|
| CHMA-621 | Advanced Instrumental Analysis Lab                    |
| CHMA-711 | Advanced Instrumental Analysis                        |
| CHMB-610 | Advanced Protein Biochemistry: Structure and Function |
| CHMB-702 | Protein Conformation and Dynamics                     |
| CHMI-664 | Modern Inorganic Chemistry                            |
| CHMO-636 | Spectrometric Identification of Organic Compounds     |
| CHMO-739 | Advanced Physical Organic Chemistry                   |
| CHMP-753 | Computational Chemistry                               |
| CHPO-706 | Polymer Synthesis                                     |
| CHPO-707 | Polymer Chemistry II                                  |
| CHPO-708 | Polymer Synthesis & Characterization Lab              |
| EEEE-605 | Modern Optics for Engineers                           |
| EEEE-689 | Fundamentals of MEMS                                  |
| EEEE-713 | Solid State Physics                                   |
| EEEE-730 | Advanced Analog IC Design                             |
| EEEE-787 | MEMS Evaluation                                       |
| IMGS-616 | Fourier Methods for Imaging                           |
| IMGS-724 | Introduction to Electron Microscopy                   |
| IMGS-737 | Physical Optics                                       |

| COURSE  |   |
|---|---|
| ISEE-682  | Lean Six Sigma Fundamentals                                   |
| ISEE-741  | 3D Printing   |
| ISEE-771  | Engineering of Systems I                                      |
| ISEE-785  | Fundamentals of Sustainable Engineering                       |
| ISEE-786  | Lifecycle Assessment  |
| ISEE-787  | Design for the Environment                                    |
| ISUS-718  | Sustainable Energy Systems                                    |
| ISUS-810  | Thermodynamics for Sustainability                             |
| ISUS-821  | Applied Life Cycle Assessment                                 |
| ISUS-822  | Materials Cycling   |
| MCEE-601  | Microelectronic Fabrication                                   |
| MCEE-603  | Thin Films  |
| MCEE-605  | Lithography Materials and Processes                           |
| MCEE-620  | Photovoltaic Science and Engineering                          |
| MCEE-704  | Physical Modeling of Semiconductor Devices                    |
| MCEE-706  | SiGe and SOI Devices and Technologies                         |
| MCEE-714  | Micro/Nano Characterization                                   |
| MCEE-730  | Metrology for Failure Analysis and Yield of ICs               |
| MCEE-770  | Microelectromechanical Systems                                |
| MCSE-610  | Applied Biofluid Mechanics and Microcirculation               |
| MCSE-712  | Nonlinear Optics  |
| MCSE-713  | Lasers  |
| MCSE-731  | Integrated Optical Devices & Systems                          |
| MCSE-771  | Optoelectronics   |
| MECE-644  | Introduction To Composite Materials                           |
| MECE-657  | Applied Biomaterials  |
| MECE-739  | Alternative Fuels and Energy Efficiency                       |
| MECE-746  | Engineering Properties of Materials                           |
| MECE-752  | Tribology Fundamentals  |
| MECE-754  | Fundamentals of Fatigue and Fracture                          |
| MECE-785  | Mechanics of Solids   |
| MECE-789  | Graduate Special Topics                                       |
| MFET-655  | Surface Mount Electronics Manufacturing                       |
| MFET-656  | Advanced Concepts in Semiconductor Packaging                  |
| MTSE-602  | Polymer Science   |
| MTSE-617  | Material Degradation  |
| MTSE-632  | Solid State Science   |
| MTSE-704  | Theoretical Methods in Materials Science and Engineering      |
| MTSE-780  | Theory of Microsensors and Actuators                          |
| MTSE-799  | Independent Study   |
| PHYS-611  | Classical Electrodynamics I                                   |
| PHYS-612  | Classical Electrodynamics II                                  |
| STAT-621  | Statistical Quality Control                                   |
| STAT-641  | Applied Linear Models - Regression                            |
| STAT-642  | Applied Linear Models - ANOVA                                 |
| STAT-670  | Design of Experiments   |
| TCET-740  | Fiber Optic Communications                                    |
| TCOM-621  | Proposal Writing  |
| For the courses below: Thesis option can include up to two (2); Project option can include up to four (4) |   |
| ACCT-603  | Accounting for Decision Makers                                |
| ACCT-706  | Cost Management   |
| BLEG-745  | Legal and Ethical Issues in Technology-intensive Environments |
| BUSI-710  | Project Management  |
| BUSI-711  | Advanced Project Management                                   |
| BUSI-712  | International Project Management                              |
| DECS-744  | Project Management  |
| INTB-730  | Cross-Cultural Management                                     |
| ISEE-750  | Systems and Project Management                                |
| MGMT-740  | Leading Teams in Organizations                                |
| MGMT-742  | Technology Management   |
| MGMT-761  | Managing Research and Innovation                              |
| MGMT-762  | Managing New Process and Product Development                  |
| SERQ-712  | Breakthrough Thinking, Creativity, and Innovation             |

\* Additional approved electives comprise graduate courses offered by programs in the College of Science, Kate Gleason College of Engineering, College of Engineering Technology, Golisano Institute for Sustainability, School of Individualized Studies, and the Saunders College of Business. Prerequisites for all approved electives include Graduate Standing and may require permission of instructor.

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.

- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in chemistry, physics, chemical engineering, electrical engineering, mechanical engineering, or a related field.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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.

## Materials Science and Engineering, Adv. Cert.

[www.rit.edu/study/materials-science-and-engineering-adv-cert](http://www.rit.edu/study/materials-science-and-engineering-adv-cert)

**Scott Williams, Professor**

**585-475-3033, sawppr@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.

The advanced certificate may be completed on a full- or part-time basis. Part-time students are normally limited to a maximum of two courses, or 6 credit hours, each semester.

Students who are interested in further study may apply the credits earned in their advanced certificate to the MS degree in materials science and engineering.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Materials Science and Engineering, advanced certificate, typical course sequence

| COURSE                             |  | SEMESTER CREDIT HOURS |
|------------------------------------|--|-----------------------|
| <b>First Year</b>                  |  |                       |
| MTSE-601                           | Materials Science  | 3                     |
| MTSE-617                           | Material Degradation                                     | 3                     |
| MTSE-632                           | Solid State Science                                      | 3                     |
| MTSE-602                           | Polymer Science  | 3                     |
| MTSE-704                           | Theoretical Methods in Materials Science and Engineering | 3                     |
|                                    | Elective   | 3                     |
| <b>Total Semester Credit Hours</b> |  | <b>18</b>             |

### Electives

| COURSE   |  |
|----------|--|
| CHMA-621 | Advanced Instrumental Analysis Lab         |
| CHMI-664 | Modern Inorganic Chemistry                 |
| CHPO-706 | Polymer Synthesis                          |
| CHPO-707 | Polymer Chemistry II                       |
| ISEE-682 | Lean Six Sigma Fundamentals                |
| MCEE-601 | Microelectronic Fabrication                |
| MCEE-605 | Lithography Materials and Processes        |
| MCEE-620 | Photovoltaic Science and Engineering       |
| MCEE-704 | Physical Modeling of Semiconductor Devices |
| MCEE-714 | Micro/Nano Characterization                |
| MTSE-780 | Theory of Microsensors and Actuators       |
| MTSE-799 | Independent Study                          |
| STAT-670 | Design of Experiments                      |

\* Additional approved electives comprise graduate courses offered by programs in the College of Science, Kate Gleason College of Engineering, College of Engineering Technology, Golisano Institute for Sustainability, School of Individualized Studies, and the Saunders College of Business. Prerequisites for all approved electives include Graduate Standing and may require permission of instructor.

### Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in chemistry, physics, chemical engineering, electrical engineering, mechanical engineering, or a related field.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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.



Integrated Sciences Academy

Color Science, MS

www.rit.edu/study/color-science-ms  
Mark Fairchild, Professor  
585-475-2784, Mark.Fairchild@rit.edu

Program overview

Color science is a fundamental field of science that is dedicated to understanding the creation of colored stimuli, sources of illumination, and ultimately the human perception of color. RIT's graduate color science degree is designed for students who have a background in physics, chemistry, imaging science, computer science, electrical engineering, experimental psychology, cognitive neuroscience, physiology, or any other discipline that lends itself to the quantitative description of color. At the only university in the nation offering this program of study, you will be exposed to the rich, dynamic field of color science through theory and practical application.

Broadly interdisciplinary, encompassing physics, chemistry, physiology, statistics, computer science, and psychology, the curriculum leads to a master of science degree in color science, educates students using a broad interdisciplinary approach. This is the only graduate program in the country devoted to this discipline and it is designed for students whose undergraduate majors are in physics, chemistry, imaging science, computer science, electrical engineering, experimental psychology, cognitive neuroscience, physiology, or any discipline pertaining to the quantitative description of color.

The color science degree provides a graduate-level study in both scientific theory and practical application. The program gives students a broad exposure to the field of color science and affords them the unique opportunity of specializing in an area appropriate for their background and interest. This objective is accomplished through the program's core courses, selection of electives, and completion of a thesis or graduate project.

Plan of Study

Students must earn 30 semester credit hours as a graduate student to earn a master of science degree. For full-time students, the program requires three to four semesters of study. Part-time students generally require two to four years of study. The curriculum is a combination of required courses in color science, elective courses appropriate for the candidate's background, and either a research thesis or graduate project. Students require the approval of the program director if they wish to complete a graduate project, rather than a research thesis, at the conclusion of their degree.

*Prerequisites: The foundation program*  
The color science program is designed for students with an undergraduate degree in a scientific or another technical discipline. Those with adequate undergraduate work in related sciences start the program as matriculated graduate students.

Students 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.

Color Science Careers

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 our graduates include Apple, Dolby Laboratories, Google, Benjamin Moore, Canon Corp., Hallmark, Hewlett Packard Corp., Microsoft Corp., Pantone, Qualcomm Inc., Ricoh Innovations Inc., LG Electronics, and Samsung.

National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

Curriculum

Color Science, MS degree, typical course sequence

| COURSE                      |                                  | SEMESTER CREDIT HOURS |
|-----------------------------|----------------------------------|-----------------------|
| First Year                  |                                  |                       |
| CLRS-601                    | Principles of Color Science      | 3                     |
| CLRS-602                    | Color Physics and Applications   | 3                     |
| CLRS-720                    | Computational Vision Science     | 3                     |
| CLRS-750                    | Historical Research Perspectives | 1                     |
| CLRS-751                    | Research and Publication Methods | 2                     |
| CLRS-820                    | Modeling Visual Perception       | 3                     |
|                             | Graduate Electives               | 6                     |
| Second Year                 |                                  |                       |
| CLRS-890                    | Research & Thesis                | 6                     |
|                             | Elective                         | 3                     |
| Total Semester Credit Hours |                                  | 30                    |

Admission requirements

- To be considered for admission to the MS program in color science, candidates must fulfill the following requirements:
- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
  - Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
  - Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
  - Recommended minimum cumulative GPA of 3.0 (or equivalent).
  - Submit a current resume or curriculum vitae.
  - Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
  - Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
  - Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
  - International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students

below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### Scholarships and Assistantships

Currently, assistantships are only available for qualified color science applicants to the doctoral program. Students seeking RIT-funded scholarships and assistantships should consider apply to the doctoral program, which is identical to the MS program in the first two years. Partial tuition scholarships are available for the MS program. Applicants seeking financial assistance from RIT should contact the Office of Graduate and Part-time Enrollment for current application materials and deadlines.

## Color Science, Ph.D.

[www.rit.edu/study/color-science-phd](http://www.rit.edu/study/color-science-phd)

**Mark Fairchild, Professor**

**585-475-2784, [Mark.Fairchild@rit.edu](mailto:Mark.Fairchild@rit.edu)**

### Program overview

Color has been an intense topic of interest for thousands of years. Mathematicians, philosophers, physicists, physiologists, poets, and other disciplines have all contributed to our understanding of color. RIT's color science Ph.D. program allows you to contribute to knowledge creation and practical application of color science. You will conduct extensive research that encompasses diverse fields and multiple disciplines of science.

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.

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.

### Plan of Study

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.

#### Core courses

The following core courses are completed during the first year of study: Principles of Color Science (CLRS-601), Computational Vision Science (CLRS-720), Color Physics and Applications (CLRS-602), Modeling Visual Perception (CLRS-820), Historical Research Perspectives (CLRS-750), and Research and Publication Methods (CLRS-751).

#### Electives

Elective courses are selected depending on the student's interests and background. The program director must approve all electives.

#### Second year project

During the second year, students engage in graduate-level research under the supervision of a graduate program faculty member. The topic may or may not be the same as the dissertation topic. One of the purposes of this project is to evaluate the student's research capabilities and suitability for doctorate-level research.

#### Years three and beyond

After completing the required courses, students follow their study plan which consists of research and thesis credits and elective courses.

### *Qualifying examination*

All students must pass a qualifying examination, which determines whether the student has a sufficient depth of knowledge in color science and the ability to perform research at the doctoral level.

The qualifying exam consists of a written test and an evaluation of the second-year research project. The written test is given twice each year and is based on the core curriculum in color science and any material deemed appropriate by the committee. Note that the required readings for these courses include textbooks and current literature. An evaluation of the second-year research project includes depth of research, productivity, quality, analytical skills, and the ability to communicate results. A written document is submitted in the style of a published proceedings paper.

Students must successfully pass the qualifying examination to continue in the program. Those who do not pass the qualifying examination may make a written request to the color science program director to change to the MS program. Requests must be received before the end of the semester in which the second written test is taken. Students with permission to enter the MS program will use their second year research project as an MS research thesis topic. A written thesis is required. Students can then graduate with an MS in color science.

### *Dissertation research advisor and committee*

After students pass the qualifying examination, a dissertation research adviser is selected from the graduate program faculty based on the student's research interests, faculty research interests, and discussions with the color science graduate coordinator. A four-member dissertation committee is appointed for the duration of the student's tenure in the program. The committee includes the dissertation research advisor, one other member of the color science faculty, and an external chair appointed by the dean of graduate education. The external chair must be a tenured member of the RIT faculty who is not a current member of the color science faculty. The fourth member may be an RIT faculty member or a professional affiliated with industry or another institution. The color science graduate program director must approve committee members who are not RIT faculty.

The dissertation committee prepares and administers the examination for admission to candidacy; assists in planning and coordinating research; provides research advice; supervises the writing of the dissertation; and conducts the final examination of the dissertation.

### *Developing a study plan*

During the first semester of study, students work with the color science graduate program director to develop a study plan. This plan may be revised as necessary, subject to approval by the graduate program director. For example, the dissertation research adviser or the dissertation committee might recommend a revised study plan to include specific graduate electives.

### *Admission to candidacy*

When the student thoroughly understands the dissertation research topic, the dissertation committee administers an examination to determine if the student can be admitted to candidacy for the doctoral degree in color science. The purpose of the examination is to ensure the student has the necessary intellectual skills and background knowledge to carry out their specific doctoral-level research project. The dissertation research adviser defines the type of examination and any requirements prior to the examination. Requirements include a dissertation proposal and may additionally include a review of literature, preliminary experiments, and the preparation of an oral presentation. The examination must be administered no later than one year prior to defending the dissertation.

### *Final examination of dissertation*

Once the dissertation has been written, distributed to the dissertation committee, and the committee agrees to administer the final examination, the doctoral candidate can schedule the final examination.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The dissertation committee may also elect to privately question the candidate following the presentation. The dissertation committee immediately notifies the candidate and the color science graduate program director of the result of the examination.

### *Teaching experience*

All candidates for the Ph.D. must serve as a teaching assistant for a minimum of one course before scheduling the final examination of the dissertation. Candidates are encouraged to serve as a teaching assistant for two or more courses.

### *Public presentation experience*

All candidates for the Ph.D. must present research in a public forum before scheduling the final examination of the dissertation. The preferred public forum is a technical conference.

### *Publication requirement*

Prior to scheduling the Ph.D. dissertation defense (final examination), all candidates for the Ph.D. must have at least two refereed journal publications on the dissertation research accepted for publication (or published). The student must be a principal (not always first) author on both papers.

### **Color science MS graduates**

Graduates from the color science master's degree program, 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.

### **Residency**

All students in the program must spend at least two consecutive semesters (summer may be excluded) as resident full-time students to be eligible to receive the Ph.D.

### **Time limitations**

All candidates for the Ph.D. must maintain continuous enrollment during the research phase of the program. The maximum number of research credits that apply to the degree does not limit such enrollment. Normally, full-time students complete the course of study for the doctorate in approximately four years. Requirements for the degree must be completed within seven years of the date students pass the qualifying examination.

### National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

## Curriculum

### Color Science, Ph.D. degree, typical course sequence

| COURSE                             | SEMESTER CREDIT HOURS                   |
|------------------------------------|---|
| <b>First Year</b>                  |   |
| CLRS-601                           | Principles of Color Science 3           |
| CLRS-602                           | Color Physics and Applications 3        |
| CLRS-720                           | Computational Vision Science 3          |
| CLRS-750                           | Historical Research Perspectives 1      |
| CLRS-751                           | Research and Publication Methods 2      |
| CLRS-820                           | Modeling Visual Perception 3            |
|                                    | Graduate Electives 6                    |
| <b>Second Year</b>                 |   |
| CLRS-890                           | Research & Thesis (and/or Electives) 18 |
| <b>Third Year</b>                  |   |
| CLRS-890                           | Research & Thesis (and/or Electives) 12 |
| <b>Fourth Year</b>                 |   |
| CLRS-890                           | Research & Thesis (and/or Electives) 9  |
| <b>Total Semester Credit Hours</b> | <b>60</b>                               |

## Admission requirements

To be considered for admission to the Ph.D. program in color science, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Candidates without adequate undergraduate work in related sciences must take foundation courses prior to matriculation into the graduate program. A written agreement between the candidate and the program director will identify the required foundation courses. Foundation

courses must be completed with an overall B average before a student can matriculate into the graduate program.

The foundation courses, representative of those often required, are as follows: one year of calculus, one year of college physics (with laboratory), one course in computer programming, one course in matrix algebra, one course in statistics, and one course in introductory psychology. Other science courses (with laboratory) might be substituted for physics.

### Assistantships

Students receiving fully funded assistantships tend to have minimum undergraduate cumulative grade point averages of 3.5 and exceptional GRE scores. International applicants who must submit TOEFL scores, must have scores above 100 (internet-based). Students who submit IELTS scores must have a minimum score of 7.0. Applicants seeking financial assistance should contact the Office of Graduate and Part-time Enrollment for current application materials and deadlines.

## Chester F. Carlson Center for Imaging Science

### Imaging Science, MS

[www.rit.edu/study/imaging-science-ms](http://www.rit.edu/study/imaging-science-ms)

**Charles Bachmann, Associate Professor**  
585-475-7238, [cmbpci@rit.edu](mailto:cmbpci@rit.edu)

#### Program overview

The master's in imaging science prepares you for research positions in the imaging industry or in the application of various imaging modalities to problems in engineering and science. This emerging field integrates engineering, math, physics, computer science, and psychology to understand and develop imaging systems and technology. You'll explore the creation and interpretation of image forming systems that are used in a broad range of applications from environmental forecasting and remote sensing to the analysis of the physical properties of radiation-sensitive materials. The masters in imaging science is geared towards advancing and broadening the skills of professionals working in the imaging industry.

Faculty within the Chester F. Carlson Center for Imaging Science supervise thesis research in areas of the physical properties of radiation-sensitive materials and processes, digital image processing, remote sensing, nanoimaging, electro-optical instrumentation, vision, computer vision, color imaging systems, and astronomical imaging. Interdisciplinary efforts are possible with other colleges across the university.

Formal course work includes consideration of the physical properties of radiation-sensitive materials and processes, the applications of physical and geometrical optics to electro-optical systems, the mathematical evaluation of image forming systems, digital image processing, and the statistical characterization of noise and system performance. Technical electives may be selected from courses offered in imaging science, color science, engineering, computer science, science, and mathematics. Both thesis and project options are available. In general, full-time students are required to pursue the thesis option, with the project option targeted to part-time and online students who can demonstrate that they have sufficient practical experience through their professional activities.

#### Course of Study

The curriculum is a combination of required core courses in imaging science, elective courses appropriate for the candidate's background and interests, and either a research thesis or graduate paper/project. Students must enroll in either the research thesis or graduate paper/project option at the beginning of their studies. The program can be completed on a full- or a part-time basis. Some courses are available online, specifically in the areas of color science, remote sensing, computer vision, and digital image processing.

#### Specialty Track Courses

Students choose two courses from a variety of tracks such as: digital image processing, computer vision, electro-optical imaging systems, remote sensing, color imaging, optics, hard copy materials and processes, and nanoimaging. Tracks may be created for students interested in pursuing additional fields of study.

#### Research Thesis Option

The research thesis is based on experimental evidence obtained by the student in an appropriate field, as arranged between the student and their adviser. The minimum number of thesis credits required is four and may be fulfilled by experiments in the university's laboratories. In some cases,

the requirement may be fulfilled by work done in other laboratories or the student's place of employment, under the following conditions:

1. The results must be fully publishable.
2. The student's advisor must be approved by the graduate program coordinator.
3. The thesis must be based on independent, original work, as it would be if the work were done in the university's laboratories.

A student's thesis committee is composed of a minimum of three people: the student's advisor and two additional members who hold at least a master's degree in a field relevant to the student's research. Two committee members must be graduate faculty of the center.

#### Graduate Paper/Project Option

Students with demonstrated practical or research experience, approved by the graduate program coordinator, may choose the graduate project option (3 credit hours). This option takes the form of a systems project course. The graduate paper is normally performed during the final semester of study. Both part- and full-time students may choose this option, with the approval of the graduate program coordinator.

#### Nature of Work

Faculty within the Center for Imaging Science supervise thesis research in areas of the physical properties of radiation-sensitive materials and processes, digital image processing, remote sensing, nanoimaging, electro-optical instrumentation, vision, computer vision, color imaging systems, and astronomical imaging. Interdisciplinary efforts are possible with the Kate Gleason College of Engineering and the College of Science.

The program can be completed on a full- or a part-time basis. Some courses are available online, specifically in the areas of color science, remote sensing, medical imaging, and digital image processing.

#### Select Employers

Students have found employment in some of the world's leading companies and organizations, including Adobe, Amazon, Apple, Aptiva Imaging, Boeing, CACI, General Electric, Google, Harris Corp., Heidelberg, Hewlett-Packard, Hover Inc., Integrity Applications Inc., Lawrence Livermore National Laboratory, Lexmark, Lockheed Martin, Microsoft, MITRE, Motorola Mobility LLC, NASA, National Geospatial Intelligence Agency, Naval Undersea Warfare Center, NVIDIA, EagleView, LLC, Ricoh Print Production, Sandia National Labs, Science Applications International Corp., Sherwin Williams, Technicolor, The Aerospace Corporation, Valspar, Xerox.

#### National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.



## Curriculum

### Imaging Science (thesis option), MS degree, typical course sequence

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>                                |                       |
| IMGS-606 Graduate Seminar I                      | 1                     |
| IMGS-607 Graduate Seminar II                     | 1                     |
| IMGS-616 Fourier Methods for Imaging             | 3                     |
| Choose one of the following:                     | 3                     |
| IMGS-619 Radiometry                              |                       |
| IMGS-620 The Human Visual System                 |                       |
| Choose two of the following:                     | 6                     |
| IMGS-613 Probability, Noise, and System Modeling |                       |
| IMGS-633 Optics for Imaging                      |                       |
| IMGS-682 Image Processing and Computer Vision    |                       |
| IMGS Specialty Track Course                      | 3                     |
| IMGS Elective                                    | 3                     |
| <b>Second Year</b>                               |                       |
| IMGS-790 Research & Thesis                       | 4                     |
| IMGS Specialty Track Course                      | 3                     |
| Choose one of the following:                     | 3                     |
| IMGS-790 Research & Thesis                       |                       |
| IMGS Elective                                    |                       |
| <b>Total Semester Credit Hours</b>               | <b>30</b>             |

### Imaging Science (project option), MS degree, typical course sequence

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                                 |                       |
| IMGS-616 Fourier Methods for Imaging              | 3                     |
| IMGS-633 Optics for Imaging                       | 3                     |
| IMGS-682 Image Processing and Computer Vision     | 3                     |
| Choose one of the following:                      | 3                     |
| IMGS-619 Radiometry                               |                       |
| IMGS-620 The Human Visual System                  |                       |
| IMGS Elective                                     | 3                     |
| IMGS Specialty Track Course                       | 3                     |
| <b>Second Year</b>                                |                       |
| IMGS-740 Imaging Science MS Systems Project Paper | 3                     |
| IMGS Specialty Track Course                       | 3                     |
| IMGS Electives                                    | 6                     |
| <b>Total Semester Credit Hours</b>                | <b>30</b>             |

### Electives

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| ASTP-613 Astronomical Observational Techniques and Instrumentation | 3                     |
| CLRS-601 Principles of Color Science                               | 3                     |
| CLRS-602 Color Physics and Applications                            | 3                     |
| CLRS-720 Computational Vision Science                              | 3                     |
| CLRS-820 Modeling Visual Perception                                | 3                     |
| CSCI-603 Computational Problem Solving                             | 3                     |
| CSCI-630 Foundations of Artificial Intelligence                    | 3                     |
| CSCI-631 Foundations of Computer Vision                            | 3                     |
| CSCI-737 Pattern Recognition                                       | 3                     |
| EEEE-780 Digital Video Processing                                  | 3                     |
| ENVS-650 Hydrologic Applications of Geographic Information Systems | 4                     |
| IMGS-606 Graduate Seminar I  | 1                     |
| IMGS-607 Graduate Seminar II                                       | 1                     |
| IMGS-609 Graduate Laboratory I                                     | 2                     |
| IMGS-613 Probability, Noise, and System Modeling                   | 3                     |
| IMGS-616 Fourier Methods for Imaging                               | 3                     |
| IMGS-619 Radiometry  | 3                     |
| IMGS-620 The Human Visual System                                   | 3                     |
| IMGS-622 Vision Sciences Seminar                                   | 1                     |
| IMGS-624 Interactive Virtual Env                                   | 3                     |
| IMGS-628 Design and Fabrication of Solid State Cameras             | 3                     |
| IMGS-632 Advanced Environmental Applications of Remote Sensing     | 3                     |
| IMGS-633 Optics for Imaging  | 3                     |
| IMGS-635 Optical System Design and Analysis                        | 3                     |
| IMGS-639 Principles of Solid State Imaging Arrays                  | 3                     |
| IMGS-640 Remote Sensing Systems and Image Analysis                 | 3                     |
| IMGS-642 Testing of Focal Plane Arrays                             | 3                     |
| IMGS-682 Image Processing and Computer Vision                      | 3                     |
| IMGS-684 Deep Learning for Vision                                  | 3                     |
| IMGS-699 Imaging Science Graduate Co-op                            | 0                     |
| IMGS-711 Computational Methods for Imaging Science                 | 3                     |
| IMGS-712 Multi-view Imaging  | 3                     |
| IMGS-715 Computational Photography                                 | 3                     |

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| IMGS-719 Radiative Transfer I   | 3                     |
| IMGS-720 Radiative Transfer II  | 3                     |
| IMGS-723 Remote Sensing: Spectral Image Analysis                            | 3                     |
| IMGS-724 Introduction to Electron Microscopy                                | 3                     |
| IMGS-729 Photogrammetry for Airborne and Space Systems                      | 3-4                   |
| IMGS-730 Magnetic Resonance Imaging   | 3                     |
| IMGS-737 Physical Optics  | 3                     |
| IMGS-740 Imaging Science MS Systems Project Paper                           | 3                     |
| IMGS-754 Pattern Recognition  | 3                     |
| IMGS-756 Advanced Digital Image Processing                                  | 3                     |
| IMGS-765 Performance Modeling and Characterization of Remote Sensing System | 3                     |
| IMGS-766 Geometric Optics and Lens Design                                   | 3                     |
| IMGS-789 Graduate Special Topics: Robot Vision                              | 1-3                   |
| IMGS-790 Research & Thesis  | 1-6                   |
| IMGS-797 Principles of Computed Tomographic Imaging                         | 3                     |
| IMGS-799 Imaging Science Independent Study                                  | 1-4                   |
| IMGS-830 Advanced Topics in Remote Sensing                                  | 3                     |
| IMGS-890 Research & Thesis  | 1-6                   |
| MATH-605 Stochastic Processes   | 3                     |
| MATH-645 Graph Theory   | 3                     |
| MATH-711 Advanced Methods in Scientific Computing                           | 3                     |
| MCSE-712 Nonlinear Optics   | 3                     |
| MCSE-713 Lasers   | 3                     |
| MCSE-731 Integrated Optical Devices & Systems                               | 3                     |
| STAT-641 Applied Linear Models - Regression                                 | 3                     |
| STAT-758 Multivariate Statistics for Imaging Science                        | 3                     |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed courses in mathematics (through calculus and including differential equations), and a full year of calculus-based physics (including modern physics). It is assumed that students can write a common computer program.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Applicants seeking financial assistance from the center must have all application documents submitted to the Office of Graduate and Part-time Enrollment Services by January 15 for the next academic year.

### Bridge courses

Applicants who lack adequate preparation may be required to complete bridge courses in mathematics or physics before matriculating with graduate status.

## Imaging Science, Ph.D.

[www.rit.edu/study/imaging-science-phd](http://www.rit.edu/study/imaging-science-phd)

**Charles Bachmann, Associate Professor**

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### Program overview

The Ph.D. in imaging science signifies high achievement in scholarship and independent investigation in the diverse aspects of imaging science. Students contribute their fundamental body of knowledge in science and engineering that is associated with this field of study. As an imaging Ph.D. candidate, you'll acquire the capabilities, skills, and experience to continue to expand the limits of the discipline and meet future scholarly, industrial, and government demands on the field.

Candidates for the doctoral degree must demonstrate proficiency by:

- Successfully completing course work, including a core curriculum, as defined by the student's plan of study;
- Passing a series of examinations; and
- Completing an acceptable dissertation under the supervision of the student's research advisor and dissertation committee.

### Plan of Study

All students must complete a minimum of 60 credit hours of course work and research. The core curriculum spans and integrates a common body of knowledge essential to an understanding of imaging processes and applications. Courses are defined by the student's study plan and must include core course sequences plus a sequence in a topical area such as remote sensing, digital image processing, color imaging, digital graphics, electro-optical imaging systems, and microlithographic imaging technologies.

Students may take a limited number of credit hours in other departments and must complete research credits including two credits of research associated with the research seminar course, Graduate Seminar.

Graduate elective courses offered by the Chester F. Carlson Center for Imaging Science (and other RIT academic departments in fields closely allied with imaging science) allow students to concentrate their studies in a range of imaging science research and imaging application areas, including electro-optical imaging, digital image processing, color science, perception and vision, electrophotography, lithography, remote sensing, medical imaging, electronic printing, and machine vision.

### Advancement to Candidacy

Advancement to candidacy occurs through the following steps:

- Advisor selection
- Submission and approval of a preliminary study plan
- Passing a written qualifying exam
- Study plan revision based on the outcome of qualifying exam and adviser recommendation
- Research committee appointment
- Candidacy exam based on thesis proposal

Following the qualifying exam, faculty decide whether a student continues in the doctoral program or if the pursuit of an MS degree or other program option is more acceptable. For students who continue in the doctoral program, the student's plan of study will be revised, a research committee is appointed, candidacy/proposal exams are scheduled, and, finally, a dissertation defense is presented.

### Research Committee

Prior to the candidacy exam, the student, in consultation with an advisor, must present a request to the graduate program coordinator for the appointment of a research committee. The committee is composed of at least four people: an advisor, at least one faculty member who is tenured (or tenure-track) and whose primary affiliation is the Carlson Center for

Imaging Science (excluding research faculty), a person competent in the field of research who is an RIT faculty member or affiliated with industry or another university and has a doctorate degree, and the external chair. The external chair must be a tenured member of the RIT faculty who is not a faculty member of the center and who is appointed by the dean of graduate education. The committee supervises the student's research, beginning with a review of the research proposal and concluding with the dissertation defense.

### Research Proposal

The student and their research advisor select a research topic for the dissertation. Proposed research must be original and publishable. Although the topic may deal with any aspect of imaging, research is usually concentrated in an area of current interest within the center. The research proposal is presented to the student's research committee during the candidacy exam at least six months prior to the dissertation defense.

### Final Examination of the Dissertation

The research advisor, on behalf of the student and the student's research committee, must notify the graduate program coordinator of the scheduling of the final examination of the dissertation by forwarding to the graduate program coordinator the title and abstract of the dissertation and the scheduled date, time, and location of the examination. The final examination of the dissertation may not be scheduled within six months of the date on which the student passed the candidacy exam (at which the thesis proposal was presented and approved).

Barring exceptional circumstances (requiring permission from the graduate program coordinator), the examination may not be scheduled sooner than four weeks after formal announcement (i.e. center-wide hallway postings and email broadcast) has been made of the dissertation title and abstract and the defense date, time, and location.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The research committee may also elect to privately question the candidate following the presentation. The research committee will immediately notify the candidate and the graduate program coordinator of the examination result.

### 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 advisor 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.

### National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and

development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

## Curriculum

### Imaging Science, Ph.D. degree, typical course sequence

| COURSE                             |  | SEMESTER CREDIT HOURS |
|------------------------------------|--|-----------------------|
| <b>First Year</b>                  |  |                       |
| IMGS-606                           | Graduate Seminar I                       | 1                     |
| IMGS-607                           | Graduate Seminar II                      | 1                     |
| IMGS-609                           | Graduate Laboratory I                    | 2                     |
| IMGS-613                           | Probability, Noise, and Systems Modeling | 3                     |
| IMGS-616                           | Fourier Methods for Imaging              | 3                     |
| IMGS-619                           | Radiometry                               | 3                     |
| IMGS-620                           | The Human Visual System                  | 3                     |
| IMGS-633                           | Optics for Imaging                       | 3                     |
| IMGS-682                           | Image Processing and Computer Vision     | 3                     |
|                                    | IMGS Elective (optional)*                | 3                     |
| <b>Second Year</b>                 |  |                       |
| IMGS-890                           | Research & Thesis                        | 1                     |
|                                    | IMGS Electives                           | 12                    |
| <b>Third Year</b>                  |  |                       |
| IMGS-890                           | Research & Thesis                        | 10                    |
| <b>Fourth Year</b>                 |  |                       |
| IMGS-890                           | Research & Thesis                        | 10                    |
| <b>Fifth Year</b>                  |  |                       |
| IMGS-890                           | Research & Thesis                        | 2 or 5*               |
| <b>Total Semester Credit Hours</b> |  | <b>60</b>             |

\* Students opting to take the optional Elective in the first year would take 2 units of IMGS-PHD in the final year. Students opting not to take the optional elective would take 5 units of IMGS-PHD in the final year.

### Electives

| COURSE   |   | SEMESTER CREDIT HOURS |
|----------|---|-----------------------|
| ASTP-613 | Astronomical Observational Techniques and Instrumentation | 3                     |
| CLRS-601 | Principles of Color Science                               | 3                     |
| CLRS-602 | Color Physics and Applications                            | 3                     |
| CLRS-720 | Computational Vision Science                              | 3                     |
| CLRS-820 | Modeling Visual Perception                                | 3                     |
| CSCI-603 | Computational Problem Solving                             | 3                     |
| CSCI-630 | Foundations of Artificial Intelligence                    | 3                     |
| CSCI-631 | Foundations of Computer Vision                            | 3                     |
| CSCI-737 | Pattern Recognition                                       | 3                     |
| EEEE-780 | Digital Video Processing                                  | 3                     |
| ENVS-650 | Hydrologic Applications of Geographic Information Systems | 4                     |
| IMGS-606 | Graduate Seminar I  | 1                     |
| IMGS-607 | Graduate Seminar II                                       | 1                     |
| IMGS-609 | Graduate Laboratory I                                     | 2                     |
| IMGS-613 | Probability, Noise, and System Modeling                   | 3                     |
| IMGS-616 | Fourier Methods for Imaging                               | 3                     |
| IMGS-619 | Radiometry  | 3                     |
| IMGS-620 | The Human Visual System                                   | 3                     |
| IMGS-622 | Vision Sciences Seminar                                   | 1                     |
| IMGS-624 | Interactive Virtual Env                                   | 3                     |
| IMGS-628 | Design and Fabrication of Solid State Cameras             | 3                     |
| IMGS-632 | Advanced Environmental Applications of Remote Sensing     | 3                     |
| IMGS-633 | Optics for Imaging  | 3                     |
| IMGS-635 | Optical System Design and Analysis                        | 3                     |
| IMGS-639 | Principles of Solid State Imaging Arrays                  | 3                     |
| IMGS-640 | Remote Sensing Systems and Image Analysis                 | 3                     |
| IMGS-642 | Testing of Focal Plane Arrays                             | 3                     |
| IMGS-682 | Image Processing and Computer Vision                      | 3                     |
| IMGS-684 | Deep Learning for Vision                                  | 3                     |
| IMGS-699 | Imaging Science Graduate Co-op                            | 0                     |
| IMGS-711 | Computational Methods for Imaging Science                 | 3                     |
| IMGS-712 | Multi-view Imaging  | 3                     |
| IMGS-715 | Computational Photography                                 | 3                     |
| IMGS-719 | Radiative Transfer I                                      | 3                     |
| IMGS-720 | Radiative Transfer II                                     | 3                     |
| IMGS-723 | Remote Sensing: Spectral Image Analysis                   | 3                     |
| IMGS-724 | Introduction to Electron Microscopy                       | 3                     |
| IMGS-729 | Photogrammetry for Airborne and Space Systems             | 3-4                   |
| IMGS-730 | Magnetic Resonance Imaging                                | 3                     |
| IMGS-737 | Physical Optics   | 3                     |

| COURSE   |  | SEMESTER CREDIT HOURS |
|----------|--|-----------------------|
| IMGS-740 | Imaging Science MS Systems Project Paper                           | 3                     |
| IMGS-754 | Pattern Recognition  | 3                     |
| IMGS-756 | Advanced Digital Image Processing                                  | 3                     |
| IMGS-765 | Performance Modeling and Characterization of Remote Sensing System | 3                     |
| IMGS-766 | Geometric Optics and Lens Design                                   | 3                     |
| IMGS-789 | Graduate Special Topics: Robot Vision                              | 1-3                   |
| IMGS-790 | Research & Thesis  | 1-6                   |
| IMGS-797 | Principles of Computed Tomographic Imaging                         | 3                     |
| IMGS-799 | Imaging Science Independent Study                                  | 1-4                   |
| IMGS-830 | Advanced Topics in Remote Sensing                                  | 3                     |
| IMGS-890 | Research & Thesis  | 1-6                   |
| MATH-605 | Stochastic Processes   | 3                     |
| MATH-645 | Graph Theory   | 3                     |
| MATH-711 | Advanced Methods in Scientific Computing                           | 3                     |
| MCSE-712 | Nonlinear Optics   | 3                     |
| MCSE-713 | Lasers   | 3                     |
| MCSE-731 | Integrated Optical Devices & Systems                               | 3                     |
| STAT-641 | Applied Linear Models - Regression                                 | 3                     |
| STAT-758 | Multivariate Statistics for Imaging Science                        | 3                     |

## Admission requirements

To be considered for admission to the Ph.D. program in imaging science, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in engineering, computer science, applied mathematics, or one of the natural sciences.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed courses in calculus, university physics (one year), modern physics, and a computer language.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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.

### Financial aid, scholarships, and assistantships

Graduate assistantships and tuition remission scholarships are available to qualified students. Applicants seeking financial assistance from the

center should contact the Office of Graduate and Part-time Enrollment for current application materials and deadlines. Students whose native language is not English are advised to obtain as high a TOEFL or IELTS score as possible if they wish to apply for a teaching or research assistantship. These candidates also are encouraged to take the Test of Spoken English in order to be considered for financial assistance.

## Thomas H. Gosnell School of Life Sciences

### Bioinformatics, MS

[www.rit.edu/study/bioinformatics-ms](http://www.rit.edu/study/bioinformatics-ms)

**Feng Cui, Associate Professor**

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#### Program overview

The bioinformatics master's combines biotechnology, computer programming, and computational mathematics to prepare you to utilize and create technologies that will discover, treat, and cure a range of medical illnesses. The MS degree in bioinformatics provides students with a strong foundation in biotechnology, computer programming, computational mathematics, statistics, and database management. Graduates are well-prepared for academia and careers in the biotechnology, bioinformatics, pharmaceutical, and vaccine industries.

In laboratory exercises and assignments, students learn to sequence DNA and use computer programs to analyze DNA sequences and predict molecular models.

Bioinformatics is a field that has been developing over the last thirty years. It is a discipline that represents a marriage between biotechnology and computer technologies and has evolved through the convergence of advances in each of these fields. Today bioinformatics is a field that encompasses all aspects of the application of computer technologies to biological data. Computers are used to organize, link, analyze and visualize complex sets of biological data.

With the advent of high-throughput technologies such as Next Generation Sequencing and proteomics, bioinformatics has become essential to the biological sciences in general. In the past, laboratories were able to manage and analyze their experimental data in spreadsheets. Many research labs now require the expertise of dedicated bioinformatics core centers or their own in-house bioinformaticists.

Graduates of the bioinformatics master's program have entered such laboratories, both in industry and academia, as bioinformaticists. Some have also gone on to leverage their biotechnology experiences as wet lab experimentalists themselves. The diversity of skills our students cultivate has given them access to a wide range of career choices.

Based on consultation with individuals within the industry nationwide, the job market is rich with opportunities for those who obtain a graduate degree in bioinformatics, particularly when coupled with research as thesis work. This research provides exposure to real-world problems—and their solutions—not otherwise attainable in an academic setting.

The program provides you with the capability to enter the bioinformatics workforce and become leaders in the field. The curriculum is designed to fulfill the needs of students with diverse educational and professional backgrounds. Individuals entering the program typically have degrees in biology, biotechnology, chemistry, statistics, computer science, information technology, or a related field. The program accommodates this diversity by providing a comprehensive bridge program for students who need to supplement their education before entering the program. The program offers two tracks, one for students with backgrounds in the life sciences and one for those with backgrounds in the computational sciences. Regardless of the track pursued, students are prepared to become professional bioinformaticists upon graduation.

The program is offered on a full- or part-time basis to fulfill the needs of traditional students and those currently employed in the field.

## Nature of Work

Bioinformatics jobs come with several different areas of focus, which are less strictly hierarchical than bioscience discovery research jobs. The analyst/programmer job provides more focused computational analysis support. Analyst/programmers design and develop software, databases and interfaces used to analyze and manipulate genomic databases. They collaborate with production to develop high-throughput data processing and analysis capability and to design and implement data queries, novel algorithms, and/or visualization techniques. Analyst/programmers also maintain large-scale DNA databases, prepare data for other scientists, monitor new data from integrating sequence-based/ functional knowledge about genes to help scientists analyze and interpret gene-expression data. They also analyze DNA information and identify opportunities for innovative solutions to analyze and manage biological data. In addition, they often assist in developing software and custom scripts to automate data retrieval, manipulation, and analysis; application of statistics; and visualization tools. (Source: Vault Career Guide to Biotech; The Jobs in Lab Research)

## Training/Qualifications

Within the bioinformatics field employers tend to look for the following skills/strengths: fundamental training/knowledge in molecular biology, biochemistry and biotechnology, particularly, genomics, relational database administration and programming skills/e.g. using SQL, PERL, C, C++, etc. on a UNIX operating system, strong analytical abilities using relevant mathematical/statistical tools, a strong interest in utilizing computational skills to leverage the data outcomes of those working in the laboratory, meticulous, independent, patient to do the same task repetitively and multitask. (Source: Bioinformatics Career Guide)

## National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

## Curriculum

### Bioinformatics, MS degree, typical course sequence

| COURSE                             | SEMESTER  | CREDIT HOURS |
|------------------------------------|---|--------------|
| <b>First Year</b>                  |   |              |
| BIOL-625                           | Ethics in Bioinformatics                          | 3            |
| BIOL-630                           | Bioinformatics Algorithms                         | 3            |
| BIOL-635                           | Bioinformatics Seminar                            | 3            |
| BIOL-671                           | Database Management for the Sciences              | 3            |
| BIOL-672                           | Computational Statistics and Data Science Methods | 3            |
| BIOL-694                           | Molecular Modeling and Proteomics                 | 3            |
| BIOL-790                           | Research and Thesis                               | 2            |
|                                    | Graduate Electives*                               | 6            |
| <b>Second Year</b>                 |   |              |
| BIOL-790                           | Research and Thesis                               | 4            |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>    |

\* Any graduate-level course deemed related to the field of Bioinformatics by the Program Director.

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in biology, biotechnology, biochemistry, chemistry, computer science, information technology, statistics, or a related discipline.
- Recommended minimum cumulative GPA of 3.2 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.



Environmental Science, MS

www.rit.edu/study/environmental-science-ms  
Carmody McCalley, Assistant Professor  
585-475-6258, ckmsbi@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 each day. These complex problems pit environmental limits against economic development, diverse cultures, ethics, values, and social stability, and therefore require an understanding of science, policy, society, history, and economics in order to address problems realistically and effectively. Environmental scientists must use integrated and holistic approaches to understand and find sustainable solutions to these problems. Graduates of the environmental science masters are well prepared for a variety of environmentally sustainable careers including consulting, research, policy, and outreach, or further graduate work in a doctoral program.

The program's curriculum provides students with a deep understanding of the science behind our environmental problems, the complex set of circumstances that impact environmental issues, and how environmental decisions and policies must attempt to find a balance between environmental conservation, human well-being, and economic development. Students augment their hands-on classroom work with in-depth experiential learning through an individual thesis or project that provides students with the chance to work on real-world environmental problems under the guidance of skilled environmental scientists.

Plan of Study

The practice of environmental science demands that students be well-rounded specialists. To accomplish this, each student is required to complete a concentration in one of the following areas: environmental microbiology/molecular biology, chemistry, ecology and field biology, economics, geographic information systems, organismal biology and evolution, public policy, remote sensing, or statistics. Students also may develop a self-designed concentration in an area of personal interest, subject to approval from an environmental science review committee.

Nature of Work

Environmental scientists and geoscientists use their knowledge of the physical makeup and history of the earth to protect the environment; locate water, mineral, and energy resources; predict future geologic hazards; and offer environmental site assessments and advice on indoor air quality, hazardous waste site remediation and construction and land-use projects. Most of their time is devoted to office or field work and often includes data analysis and report/proposal writing. (Source: U.S. Bureau of Labor Statistics Occupational Outlook Handbook)

National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

Cooperative Education

Cooperative education, or co-op for short, is full-time, paid work experience in your field of study. And it sets RIT graduates apart from their competitors. It's exposure—early and often—to a variety of professional work environments, career paths, and industries. RIT co-op is designed for your success.

Cooperative education is optional for environmental science majors, however, it offers students a great way to get a head start on their career with paid, professional work experience. Students can participate in cooperative education as soon as the summer after their second year of study. Co-op placements are typically with local, state, or federal government agencies, nonprofit environmental organizations, and a host of environmental consulting firms.

Curriculum

Environmental Science, MS degree, typical course sequence

| COURSE                             |   | SEMESTER CREDIT HOURS |
|------------------------------------|---|-----------------------|
| <b>First Year</b>                  |   |                       |
| ENVS-601                           | Environmental Science Graduate Studies I  | 2                     |
| ENVS-602                           | Environmental Science Graduate Studies II | 1                     |
| ENVS-795                           | Environmental Science Graduate Research   | 3                     |
|                                    | Graduate GIS Elective                     | 3                     |
|                                    | Graduate Statistics Elective              | 3                     |
|                                    | Graduate Public Policy/STS Elective       | 3                     |
|                                    | Graduate Science Core Elective            | 3                     |
|                                    | Professional Electives                    | 6                     |
| <b>Second Year</b>                 |   |                       |
| Choose one of the following:       |   | 6                     |
| ENVS-780                           | Environmental Science Project             |                       |
| ENVS-790                           | Environmental Science Thesis              |                       |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>             |

Electives

| COURSE  |   | SEMESTER CREDIT HOURS |
|---|---|-----------------------|
| <b>Graduate Public Policy/STS Electives</b>                       |   |                       |
| PUBL-610  | Technological Innovation and Public Policy                  | 3                     |
| PUBL-630  | Energy Policy   | 3                     |
| PUBL-700  | Readings in Public Policy                                   | 3                     |
| PUBL-701  | Graduate Policy Analysis                                    | 3                     |
| PUBL-702  | Graduate Decision Analysis                                  | 3                     |
| PUBL-703  | Evaluation and Research Design                              | 3                     |
| PUBL-810  | Technology, Policy and Sustainability                       | 3                     |
| STSO-621  | Graduate Biodiversity and Society                           | 3                     |
| STSO-710  | Graduate Science and Technology Policy Seminar              | 3                     |
| STSO-750  | Graduate Sustainable Communities                            | 3                     |
| <b>Graduate Science Core Electives and Professional Electives</b> |   |                       |
| BIOL-655  | Biogeography  | 3                     |
| BIOL-671  | Database Management for the Sciences                        | 3                     |
| BIOL-672  | Computational Statistics and Data Science Methods           | 3                     |
| BIOL-673  | Marine Biology  | 4                     |
| BIOL-675  | Advanced Conservation Biology                               | 3                     |
| ESHS-613  | Solid and Hazardous Waste Management                        | 3                     |
| ESHS-614  | Industrial Wastewater                                       | 3                     |
| ESHS-615  | Air Emissions Management                                    | 3                     |
| ESHS-755  | Corporate Social Responsibility                             | 3                     |
| ENVS-615  | Aquatic Ecology Seminar                                     | 1                     |
| ENVS-631  | Climate Change: Science Technology & Policy                 | 3                     |
| ENVS-650  | Hydrological Applications of Geographic Information Systems | 4                     |
| ENVS-670  | Advanced Concepts of Environmental Chemistry                | 3                     |
| IMGS-632  | Advanced Environmental Applications of Remote Sensing       | 3                     |
| ISTE-742  | Introduction To Geographic Information Systems              | 3                     |
| ISUS-704  | Industrial Ecology  | 3                     |
| STAT-614  | Applied Statistics  | 3                     |
| STAT-641  | Applied Linear Models - Regression                          | 3                     |

Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in environmental science, biological science, or a related discipline.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Three letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Students are strongly encouraged to contact program faculty before applying to discuss thesis topics and research projects. Students are matched with a potential thesis adviser at the time of admission.

## School of Mathematical Sciences

### Applied and Computational Mathematics, MS

[www.rit.edu/study/applied-and-computational-mathematics-ms](http://www.rit.edu/study/applied-and-computational-mathematics-ms)

**Michael Cromer, Associate Professor**

**585-475-4078, [mec2sma@rit.edu](mailto:mec2sma@rit.edu)**

#### Program overview

Sophisticated mathematical tools are increasingly used to solve problems in management science, engineering, biology, financial portfolio planning, facilities planning, control of dynamic systems, and design of composite materials. The goal is to find computing solutions to real-world problems. The applied and computational mathematics master's degree refines your capabilities in applying mathematical models and methods to study a range of problems, with an emphasis on developing and implementing computing solutions.

The ideas of applied mathematics pervade several applications in a variety of businesses and industries as well as the government. Sophisticated mathematical tools are increasingly used to develop new models, modify existing ones, and analyze system performance. This includes applications of mathematics to problems in management science, biology, portfolio planning, facilities planning, control of dynamic systems, and design of composite materials. The goal of this mathematics master's degree is to find computable solutions to real-world problems arising from these types of situations.

The masters of science degree in applied and computational mathematics provide students with the capability to apply mathematical models and methods to study various problems that arise in industry and business, with an emphasis on developing computable solutions that can be implemented. Electives may be selected from the graduate course offerings in the School of Mathematical Sciences or from other graduate programs, with approval from the graduate program director. Students have the option to complete a thesis, which includes the presentation of original ideas and solutions to a specific mathematical problem. The proposal for the thesis work and the results must be presented and defended before the advisory committee.

#### Nature of Work

Mathematicians use mathematical theory, computational techniques, algorithms, and the latest computer technology to solve economic, scientific, engineering, physics, and business problems. The work of mathematicians falls into two broad classes — theoretical (pure) mathematics and applied mathematics. These classes, however, often overlap. Applied mathematicians start with a practical problem, envision its separate elements, and then reduce the elements to mathematical variables. They often use computers to analyze relationships among the variables, and they solve complex problems by developing models with alternative solutions.

#### Types of Mathematics

Most often the work involving applied mathematics is done by persons whose titles are other than mathematician, including engineer, economist, analyst (e.g. operations research), physicist, cryptanalyst (codes), actuary, teacher, market researcher, and financial advisor.

Many mathematicians work for federal or state agencies. The Department of Defense accounts for about 81 percent of the mathematicians employed by the federal government. In the private sector, mathematicians are employed by scientific research and development services, software publishers, insurance companies, and in aerospace or pharmaceutical manufacturing.

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.

National Labs Career Fair

Hosted by RIT’s Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States’ federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

Cooperative Education

Cooperative education, or co-op for short, is full-time, paid work experience in your field of study. And it sets RIT graduates apart from their competitors. It’s exposure—early and often—to a variety of professional work environments, career paths, and industries. RIT co-op is designed for your success.

Co-op is optional for students in the applied and computational mathematics program. Students may pursue a co-op position after their first semester.

Curriculum

Applied and Computational Mathematics (thesis option), MS degree, typical course sequence

| COURSE                                      | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                           |                       |
| Choose three of the following core courses: | 9                     |
| MATH-601 Methods of Applied Mathematics     |                       |
| MATH-602 Numerical Analysis I               |                       |
| MATH-605 Stochastic Processes               |                       |
| MATH-622 Mathematical Modeling I            |                       |
| MATH-645 Graph Theory                       |                       |
| MATH-722 Mathematical Modeling II           |                       |
| MATH-606 Graduate Seminar I                 | 1                     |
| MATH-607 Graduate Seminar II                | 1                     |
| MATH Graduate Electives                     | 9                     |
| <b>Second Year</b>                          |                       |
| MATH-790 Research & Thesis                  | 7                     |
| MATH Graduate Elective                      | 3                     |
| <b>Total Semester Credit Hours</b>          | <b>30</b>             |

Applied and Computational Mathematics (project option), MS degree, typical course sequence

| COURSE                                      | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                           |                       |
| Choose three of the following core courses: | 9                     |
| MATH-601 Methods of Applied Mathematics     |                       |
| MATH-602 Numerical Analysis I               |                       |
| MATH-605 Stochastic Processes               |                       |
| MATH-622 Mathematical Modeling I            |                       |
| MATH-645 Graph Theory                       |                       |
| MATH-722 Mathematical Modeling II           |                       |
| MATH-606 Graduate Seminar I                 | 1                     |
| MATH-607 Graduate Seminar II                | 1                     |
| MATH Graduate Electives                     | 9                     |
| <b>Second Year</b>                          |                       |
| MATH-790 Research & Thesis                  | 4                     |
| MATH Graduate Electives                     | 6                     |
| <b>Total Semester Credit Hours</b>          | <b>30</b>             |

Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in mathematics or a related field.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in programming language.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

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 advisor. 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.

Nonmatriculated students

A student with a bachelor’s degree from an approved undergraduate institution, and with the background necessary for specific courses, may take graduate courses as a nonmatriculated student with the permission of the graduate program director and the course instructor. Courses taken for credit may be applied toward the master’s degree if the student is formally admitted to the program at a later date. However, the number of credit hours that may be transferred into the program from courses taken at RIT is limited for nonmatriculated students.

## Applied Statistics, MS

[www.rit.edu/study/applied-statistics-ms](http://www.rit.edu/study/applied-statistics-ms)

**Robert Parody, Associate Professor**  
585-475-5288, [rjpeqa@rit.edu](mailto:rjpeqa@rit.edu)

### Program overview

The MS in applied statistics focuses on data mining, design of experiments, health care applications, and the application of statistics to imaging and industrial environments. You'll integrate knowledge learned through engaging courses to solve more complex problems for a wide range of organizations, including industrial, marketing, education, insurance, credit, government, and health care.

This statistics master's degree 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 includes core courses, electives, and a capstone project or thesis.

#### Electives

Elective courses are chosen by the student with the guidance of their advisor. These courses are usually department courses but may include up to 6 credit hours from other departments (or may be transferred from other universities) that are consistent with students' professional objectives.

#### Capstone Thesis/Project

The capstone project is designed to ensure that students can integrate the knowledge from their courses to solve more complex problems. This project is taken near the end of a student's course of study. Students, with advisor approval, may write a thesis as their capstone. A thesis may be 3 or 6 credit hours. If a student writes a 6 credit hour thesis, they would be required to complete four elective courses instead of five.

#### Areas of Concentration

- Clinical Trials
- Data Mining/Machine Learning
- Industrial Statistics
- Informatics

### National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

## Curriculum

### Applied Statistics (project option), MS degree, typical course sequence

| COURSE                                      | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                           |                       |
| STAT-631 Foundations of Statistics          | 3                     |
| STAT-641 Applied Linear Models - Regression | 3                     |
| STAT-642 Applied Linear Models - ANOVA      | 3                     |
| Electives                                   | 9                     |
| <b>Second Year</b>                          |                       |
| Electives                                   | 9                     |
| STAT-790 Capstone Thesis/Project            | 3                     |
| <b>Total Semester Credit Hours</b>          | <b>30</b>             |

### Applied Statistics (thesis option), MS degree, typical course sequence

| COURSE                                      | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>                           |                       |
| STAT-631 Foundations of Statistics          | 3                     |
| STAT-641 Applied Linear Models - Regression | 3                     |
| STAT-642 Applied Linear Models - ANOVA      | 3                     |
| Electives                                   | 9                     |
| <b>Second Year</b>                          |                       |
| Electives                                   | 6                     |
| STAT-790 Capstone Thesis/Project            | 6                     |
| <b>Total Semester Credit Hours</b>          | <b>30</b>             |

## Admission requirements

To be considered for admission to the MS program in applied statistics, candidates should fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in mathematics (two course sequence in calculus) and one course in applied statistics.
- Have college level credit or practical experience in programming language.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Applied Statistics, Adv. Cert.

[www.rit.edu/study/applied-statistics-adv-cert](http://www.rit.edu/study/applied-statistics-adv-cert)  
**Robert Parody, Associate Professor**  
**585-475-5288, [rjpeqa@rit.edu](mailto:rjpeqa@rit.edu)**

### Program overview

The advanced certificate in applied statistics is designed for engineers, scientists, analysts, and other professionals who want a solid education in the statistical methods that are most closely related to their work. Courses are available both on-campus and online to accommodate diverse schedules.

The program requires two core courses and two elective courses.

### What is a graduate certificate?

A graduate certificate, also called an advanced certificate, is a selection of up to five graduate level courses in a particular area of study. It can serve as a stand-alone credential that provides expertise in a specific topic that enhances your professional knowledge base, or it can serve as the entry point to a master's degree. Some students complete an advanced certificate and apply those credit hours later toward a master's degree.

### Curriculum

#### Applied Statistics, advanced certificate, typical course sequence

| COURSE                             |                                    | SEMESTER CREDIT HOURS |
|------------------------------------|------------------------------------|-----------------------|
| <b>First Year</b>                  |                                    |                       |
| STAT-641                           | Applied Linear Models - Regression | 3                     |
| STAT-642                           | Applied Linear Models - ANOVA      | 3                     |
|                                    | Electives                          | 6                     |
| <b>Total Semester Credit Hours</b> |                                    | <b>12</b>             |

### Electives

| COURSE   |  |
|----------|--|
| ISEE-682 | Lean Six Sigma Fundamentals                |
| STAT-621 | Statistical Quality Control                |
| STAT-670 | Design of Experiments                      |
| STAT-745 | Predictive Analytics                       |
| STAT-747 | Principles of Statistical Data Mining      |
| STAT-753 | Nonparametric Statistics and Bootstrapping |
| STAT-756 | Multivariate Analysis                      |
| STAT-773 | Times Series Analysis and Forecasting      |
| STAT-775 | Design and Analysis of Clinical Trials     |
| STAT-784 | Categorical Data Analysis                  |

### Admission requirements

To be considered for admission to the advanced certificate in applied statistics, candidates should fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.

- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have college level credit or practical experience in mathematics and statistics (two courses in probability and statistics).
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.



## Mathematical Modeling, Ph.D.

[www.rit.edu/study/mathematical-modeling-phd](http://www.rit.edu/study/mathematical-modeling-phd)

**Nathan Cahill, Associate Professor**

**585-475-5144, [ndcsma@rit.edu](mailto:ndcsma@rit.edu)**

### Program overview

Mathematical modeling is the process of developing mathematical descriptions, or models, of real-world systems. These models can be linear or nonlinear, discrete or continuous, deterministic or stochastic, and static or dynamic, and they enable investigating, analyzing, and predicting the behavior of systems in a wide variety of fields. Through extensive study and research, graduates of the mathematical modeling Ph.D. will have the expertise not only to use the tools of mathematical modeling in various application settings, but also to contribute in creative and innovative ways to the solution of complex interdisciplinary problems and to communicate effectively with domain experts in various fields.

### Plan of Study

The degree requires at least 60 credit hours of course work and research. The curriculum consists of three required core courses, three required concentration foundation courses, a course in scientific computing and high-performance computing (HPC), three elective courses focused on the student's chosen research concentration, and a doctoral dissertation. Elective courses are available from within the School of Mathematical Sciences as well as from other graduate programs at RIT, which can provide application-specific courses of interest for particular research projects. A minimum of 30 credits hours of course work is required. In addition to courses, at least 30 credit hours of research, including the Graduate Research Seminar, and an interdisciplinary internship outside of RIT are required.

Students develop a plan of study in consultation with an application domain advisory committee. This committee consists of the program director, one of the concentration leads, and an expert from an application domain related to the student's research interest. The committee ensures that all students have a roadmap for completing their degree based on their background and research interests. The plan of study may be revised as needed. Learn more about our mathematical modeling doctoral students and view a selection of mathematical modeling seminars hosted by the department.

### Qualifying Examinations

All students must pass two qualifying examinations to determine whether they have sufficient knowledge of modeling principles, mathematics, and computational methods to conduct doctoral research. Students must pass the examinations in order to continue in the Ph.D. program.

The first exam is based on the Numerical Analysis I (MATH-602) and Mathematical Modeling I, II (MATH-622, 722). The second exam is based on the student's concentration foundation courses and additional material deemed appropriate by the committee and consists of a short research project.

### Dissertation Research Advisor and Committee

A dissertation research advisor is selected from the program faculty based on the student's research interests, faculty research interest, and discussions with the program director. Once a student has chosen a dissertation advisor, the student, in consultation with the advisor, forms a dissertation committee consisting of at least four members, including the dissertation advisor. The committee includes the dissertation advisor, one other member of the mathematical modeling program faculty, and an external chair appointed by the dean of graduate education. The external chair must be a tenured member of the RIT faculty who is not a current

member of the mathematical modeling program faculty. The fourth committee member must not be a member of the RIT faculty and may be a professional affiliated with industry or with another institution; the program director must approve this committee member.

The main duties of the dissertation committee are administering both the candidacy exam and final dissertation defense. In addition, the dissertation committee assists students in planning and conducting their dissertation research and provides guidance during the writing of the dissertation.

### Admission to Candidacy

When a student has developed an in-depth understanding of their dissertation research topic, the dissertation committee administers an examination to determine if the student will be admitted to candidacy for the doctoral degree. The purpose of the examination is to ensure that the student has the necessary background knowledge, command of the problem, and intellectual maturity to carry out the specific doctoral-level research project. The examination may include a review of the literature, preliminary research results, and proposed research directions for the completed dissertation. Requirements for the candidacy exam include both a written dissertation proposal and the presentation of an oral defense of the proposal. This examination must be completed at least one year before the student can graduate.

### Dissertation Defense and Final Examination

The dissertation defense and final examination may be scheduled after the dissertation has been written and distributed to the dissertation committee and the committee has consented to administer the final examination. Copies of the dissertation must be distributed to all members of the dissertation committee at least four weeks prior to the final examination. The dissertation defense consists of an oral presentation of the dissertation research, which is open to the public. This public presentation must be scheduled and publicly advertised at least four weeks prior to the examination. After the presentation, questions will be fielded from the attending audience and the final examination, which consists of a private questioning of the candidate by the dissertation committee, will ensue. After the questioning, the dissertation committee immediately deliberates and thereafter notifies the candidate and the mathematical modeling graduate director of the result of the examination.

### Residency

All students in the program must spend at least two consecutive semesters (summer excluded) as resident full-time students to be eligible to receive the doctoral degree.

### Maximum Time Limitations

University policy requires that doctoral programs be completed within seven years of the date of the student passing the qualifying exam. All candidates must maintain continuous enrollment during the research phase of the program. Such enrollment is not limited by the maximum number of research credits that apply to the degree.

### National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

## Curriculum

### Mathematical Modeling, Ph.D. degree, typical course sequence

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>   |                       |
| MATH-602 Numerical Analysis I   | 3                     |
| MATH-606 Graduate Seminar I   | 1                     |
| MATH-607 Graduate Seminar II  | 1                     |
| MATH-622 Mathematical Modeling I  | 3                     |
| MATH-722 Mathematical Modeling II   | 3                     |
| MATH Concentration Courses  | 6                     |
| MATH Elective   | 3                     |
| <b>Second Year</b>  |                       |
| MATH-789 Special Topics: High-performance Computing For Mathematical Modeling | 3                     |
| MATH-790 Research & Thesis  | 6                     |
| MATH Concentration Course   | 3                     |
| MATH Electives  | 6                     |
| <b>Third Year</b>   |                       |
| MATH-790 Research & Thesis  | 10                    |
| <b>Fourth Year</b>  |                       |
| MATH-790 Research & Thesis  | 6                     |
| <b>Fifth Year</b>   |                       |
| MATH-790 Research & Thesis  | 6                     |
| <b>Total Semester Credit Hours</b>  | <b>60</b>             |

### Concentrations

#### Applied Inverse Problems

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| MATH-625 Applied Inverse Problems                           | 3                     |
| MATH-633 Measure Theory of Elements and Functional Analysis | 3                     |
| MATH-741 Partial Differential Equations I                   | 3                     |

#### Biomedical Mathematics

| COURSE                         | SEMESTER CREDIT HOURS |
|--------------------------------|-----------------------|
| MATH-631 Dynamical Systems     | 3                     |
| MATH-702 Numerical Analysis II | 3                     |
| MATH-761 Mathematical Biology  | 3                     |

#### Discrete Mathematics

| COURSE                             | SEMESTER CREDIT HOURS |
|------------------------------------|-----------------------|
| CSCI-665 Foundations of Algorithms | 3                     |
| MATH-645 Graph Theory              | 3                     |
| MATH-646 Combinatorics             | 3                     |

#### Dynamical Systems and Fluid Dynamics

| COURSE                                    | SEMESTER CREDIT HOURS |
|---|-----------------------|
| MATH-631 Dynamical Systems                | 3                     |
| MATH-741 Partial Differential Equations I | 3                     |
| MATH-831 Mathematical Fluid Dynamics      | 3                     |

#### Geometry, Relativity and Gravitation

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| ASTP-660 Introduction to Relativity and Gravitation | 3                     |
| ASTP-861 Advanced Relativity and Gravitation        | 3                     |
| MATH-702 Numerical Analysis II                      | 3                     |

## Admission requirements

To be considered for admission to the Ph.D. program in mathematical modeling, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.

- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

Mathematical modeling encompasses a wide variety of scientific disciplines, and candidates from diverse backgrounds are encouraged to apply. If applicants have not taken expected foundational course work, the program director may require the student to successfully complete foundational courses prior to matriculating into the Ph.D. program. Typical foundation course work includes calculus through multivariable and vector calculus, differential equations, linear algebra, probability and statistics, one course in computer programming, and at least one course in real analysis, numerical analysis, or upper-level discrete mathematics.

### Financial Aid, Scholarships, and Assistantships

Graduate assistantships and tuition remission scholarships are available to qualified students. Applicants seeking financial assistance must submit all application documents to the Office of Graduate and Part-time Enrollment. Please contact the office for current application materials and deadlines. Students whose native language is not English are advised to obtain as high a TOEFL or IELTS score as possible if they wish to apply for a teaching or research assistantship. These candidates also are encouraged to take the Test of Spoken English in order to be considered for financial assistance.

## School of Physics and Astronomy

### Astrophysical Sciences and Technology, MS

[www.rit.edu/study/astrophysical-sciences-and-technology-ms](http://www.rit.edu/study/astrophysical-sciences-and-technology-ms)

**Andrew Robinson, Professor**

**585-475-2726, [axrps@rit.edu](mailto:axrps@rit.edu)**

#### Program overview

Students may tailor their programs of study to emphasize astrophysics (including observational and theoretical astrophysics), computational and gravitational astrophysics (including numerical relativity, gravitational wave astronomy), and astronomical technology (including detector and instrumentation research and development). Students can pursue research interests in a wide range of topics, including design and development of novel detectors, multiwavelength studies of proto-stars, active galactic nuclei and galaxy clusters, gravitational wave data analysis, and theoretical and computational modeling of astrophysical systems including galaxies and compact objects such as binary black holes. Depending on research interests, students may participate in one of three research centers: the Center for Computational Relativity and Gravitation(Video), the Center for Detectors or the Laboratory for Multi-wavelength Astrophysics.

The astrophysics degree focuses on the underlying physics of phenomena beyond the Earth, and on the development of the technologies, instruments, data analysis, and modeling techniques that will enable the next major strides in the field.

There has never been a more exciting time to study the universe beyond the confines of the Earth. A new generation of advanced ground-based and space-borne telescopes and enormous increases in computing power are enabling a golden age of astrophysics. The MS program in astrophysical sciences and technology focuses on the underlying physics of phenomena beyond the Earth, and on the development of the technologies, instruments, data analysis, and modeling techniques that will enable the next major strides in the field. The program's multidisciplinary emphasis sets it apart from conventional astrophysics graduate programs at traditional research universities.

#### Plan of Study

The program consists of four core courses, two to four elective courses, two semesters of graduate seminar, and a research project culminating in a thesis.

#### Master's Thesis

During the first year, most students begin a research project under the guidance of a faculty research advisor. Focus on the project becomes more significant during the second year after the core courses have been completed. A thesis committee is appointed by the program director and oversees the final defense of the thesis, which consists of a public oral presentation by the student, followed by a closed-door examination by the committee.

#### MS to Ph.D. Transfer

Students in the MS degree program who have excelled in their course work and research project may be permitted, by program approval, to transition into the doctoral degree in astrophysical sciences and technology, with the MS thesis defense serving as the Ph.D. qualifying examination. Such a transition from MS to Ph.D. is contingent on the availability of an advisor and research funding.

#### National Labs Career Fair

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

#### Curriculum

##### Astrophysical Sciences and Technology, MS degree, typical course sequence

| COURSE                             | SEMESTER  | CREDIT HOURS |
|------------------------------------|---|--------------|
| <b>First Year</b>                  |   |              |
| ASTP-601                           | Graduate Seminar I  | 1            |
| ASTP-602                           | Graduate Seminar II                                       | 1            |
| ASTP-608                           | Fundamental Astrophysics I                                | 3            |
| ASTP-609                           | Fundamental Astrophysics II                               | 3            |
| ASTP-610                           | Mathematical and Statistical Methods for Astrophysics     | 3            |
| ASTP-613                           | Astronomical Observational Techniques and Instrumentation | 3            |
| ASTP-790                           | Research & Thesis   | 4            |
| <b>Second Year</b>                 |   |              |
|                                    | Electives   | 6            |
| ASTP-790                           | Research & Thesis   | 6            |
| <b>Total Semester Credit Hours</b> |   | <b>30</b>    |

#### Electives

| COURSE   |   |
|----------|---|
| ASTP-611 | Statistical Methods for Astrophysics          |
| ASTP-660 | Introduction to Relativity and Gravitation    |
| ASTP-720 | Computational Methods for Astrophysics        |
| ASTP-730 | Stellar Atmospheres & Evolution               |
| ASTP-740 | Galactic Astrophysics                         |
| ASTP-750 | Extragalactic Astrophysics                    |
| ASTP-835 | High-Energy Astrophysics                      |
| ASTP-841 | The Interstellar Medium                       |
| ASTP-851 | Cosmology                                     |
| ASTP-861 | Advanced Relativity and Gravitation           |
| IMGS-628 | Design and Fabrication of Solid State Cameras |
| IMGS-639 | Principles of Solid State Imaging Arrays      |
| IMGS-642 | Testing of Focal Plane Arrays                 |
| PHYS-611 | Classical Electrodynamics I                   |
| PHYS-612 | Classical Electrodynamics II                  |

#### Admission requirements

To be considered for admission to the MS program in astrophysical sciences and technology, a candidate must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in the physical sciences, mathematics, computer science, or engineering.
- Recommended minimum cumulative GPA of 3.2 (or equivalent) in course work in mathematical, science, engineering, and computing subject areas.
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.

- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

## Astrophysical Sciences and Technology, Ph.D.

[www.rit.edu/study/astrophysical-sciences-and-technology-phd](http://www.rit.edu/study/astrophysical-sciences-and-technology-phd)

**Andrew Robinson, Professor**

**585-475-2726, [axrsps@rit.edu](mailto:axrsps@rit.edu)**

### Program overview

There has never been a more exciting time to study the universe beyond the confines of the Earth. A new generation of advanced ground-based and space-borne telescopes and enormous increases in computing power are enabling a golden age of astrophysics. The doctoral program in astrophysical sciences and technology focuses on the underlying physics of phenomena beyond the Earth and on the development of the technologies, instruments, data analysis, and modeling techniques that will enable the next major strides in the field. The program's multidisciplinary emphasis sets it apart from conventional astrophysics graduate programs at traditional research universities.

The program offers tracks in astrophysics (including observational and theoretical astrophysics), computational and gravitational astrophysics (including numerical relativity, gravitational wave astronomy), and astronomical technology (including detector and instrumentation research and development). Students can pursue research interests in a wide range of topics, including design and development of novel detectors, multiwavelength studies of proto-stars, active galactic nuclei and galaxy clusters, gravitational wave data analysis, and theoretical and computational modeling of astrophysical systems including galaxies and compact objects such as binary black holes. Depending on research interests, students may participate in one of three research centers: the Center for Computational Relativity and Gravitation (Video), the Center for Detectors, or the Laboratory for Multi-wavelength Astrophysics.

### Plan of Study

In the astrophysics Ph.D., students complete a minimum of 60 credit hours of study, consisting of at least 24 credit hours of course work and at least 24 credit hours of research. Students may choose to follow one of three tracks: astrophysics, astro-informatics and computational astrophysics (with the option of a concentration in general relativity), or astronomical instrumentation. All students must complete four core courses with grades of B or better, as well as two semesters of graduate seminar. Core course grades below B must be remediated by taking and passing a comprehensive exam on the core course subject matter prior to receiving the doctoral degree. The remaining course credits are made up from specialty track courses and electives. Students must pass a qualifying examination, which consists of completing and defending a master's-level research project, prior to embarking on the dissertation research project.

#### *Electives*

Electives include additional courses in astrophysics and a wide selection of courses offered in other RIT graduate programs (e.g., imaging science, computer science, engineering), including detector development, digital image processing, computational techniques, optics, and entrepreneurship, among others.

#### *Ph.D. qualification requirements: Master's-level research project*

During the first year of the program, most doctoral candidates begin a master's-level research project under the guidance of a faculty member. The project gains momentum during the second year, after the core courses have been completed. The master's-level research topic may be different from the eventual doctoral dissertation topic, and the supervising faculty member will not necessarily serve as the dissertation research advisor.



The doctoral qualification requirements consist of a combination of a publication-quality master's-level project report, which may be in the form of a thesis (if the student so chooses), and an oral presentation and defense of the master's-level project. This qualification process, which must be completed by the beginning of the third year of full-time study or its equivalent, is designed to ensure the student has the necessary background knowledge and intellectual skills to carry out doctoral-level research in the subject areas of astrophysical sciences and technology. A director-approved committee consisting of the student's master's-level project research advisor and two additional faculty members will assess the student's project report and defense.

#### *Dissertation research advisor*

After passing the qualifying examination, students are guided by a dissertation research advisor who is approved by the program director. The choice of advisor is based on the student's research interests, faculty research interests, and available research funding.

#### *Research committee*

After passing the qualifying examination, a dissertation committee is appointed for the duration of the student's tenure in the program. The committee chair is appointed by the dean of graduate education and must be a faculty member in a program other than astrophysical sciences and technology. The committee chair acts as the institutional representative in the final dissertation examination. The committee comprises at least four members and in addition to the chair, must also include the student's dissertation research advisor and at least one other member of the program's faculty. The fourth member may be an RIT faculty member, a professional affiliated in industry, or a representative from another institution. The program director must approve committee members who are not RIT faculty.

#### *Ph.D. proposal review (candidacy exam)*

Within six months of the appointment of the dissertation committee, students must prepare a Ph.D. research project proposal and present it to the committee for review. The student provides a written research proposal and gives an oral presentation to the committee, who provides constructive feedback on the project plan. The review must take place at least six months prior to the dissertation defense.

#### *Annual review*

Each fall, students provide an annual report in the form of an oral presentation, which summarizes progress made during the preceding year. The program director also monitors student's progress toward meeting the requirements for either the qualifying examination (during the first two years), or the Ph.D. (after passing the qualifying examination). Students may be interviewed, as necessary, to explore any concerns that emerge during the review and to discuss remedial actions.

#### *Final examination of the dissertation*

Once the dissertation is written, distributed to the dissertation committee, and the committee agrees to administer the final examination, the doctoral candidate may schedule the final examination. The candidate must distribute a copy of the dissertation to the committee and make the dissertation available to interested faculty at least four weeks prior to the dissertation defense.

The final examination of the dissertation is open to the public and is primarily a defense of the dissertation research. The examination consists of an oral presentation by the student, followed by questions from the audience. The dissertation committee privately questions the candidate following the presentation. The dissertation committee caucuses immediately following the examination and thereafter notifies the candidate and the program director of the results.

### **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.

### **National Labs Career Fair**

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

## **Curriculum**

### **Astrophysical Sciences and Technology, Ph.D. degree, typical course sequence**

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| <b>First Year</b>  |                       |
| ASTP-601 Graduate Seminar I  | 1                     |
| ASTP-602 Graduate Seminar II                                       | 1                     |
| ASTP-608 Fundamental Astrophysics I                                | 3                     |
| ASTP-609 Fundamental Astrophysics II                               | 3                     |
| ASTP-610 Mathematical Methods for the Astrophysical Sciences       | 3                     |
| ASTP-613 Astronomical Observational Techniques and Instrumentation | 3                     |
| ASTP-790 Research & Thesis   | 4                     |
| <b>Second Year</b>   |                       |
| Choose from the following:   | 6                     |
| Specialty Track Courses  |                       |
| Electives  |                       |
| Specialty Track Courses  | 6                     |
| ASTP-790 Research & Thesis   | 6                     |
| <b>Third Year</b>  |                       |
| ASTP-890 Research & Thesis   | 8                     |
| <b>Fourth Year</b>   |                       |
| ASTP-890 Research & Thesis   | 8                     |
| <b>Fifth Year</b>  |                       |
| ASTP-890 Research & Thesis   | 8                     |
| <b>Total Semester Credit Hours</b>                                 | <b>60</b>             |

### **Specialty Tracks**

#### *Astrophysics*

| COURSE                                   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| ASTP-730 Stellar Atmospheres & Evolution | 3                     |
| ASTP-740 Galactic Astrophysics           | 3                     |
| ASTP-750 Extragalactic Astrophysics      | 3                     |

#### *Astro-Informatics and Computational Astrophysics*

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| ASTP-611 Statistical Methods for Astrophysics   | 3                     |
| ASTP-720 Computational Methods for Astrophysics | 3                     |



*Astro-informatics and Computational Astrophysics—General Relativity*

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| Choose one of the following:                        | 3                     |
| ASTP-611 Statistical Methods for Astrophysics       |                       |
| ASTP-720 Computational Methods for Astrophysics     |                       |
| ASTP-660 Introduction to Relativity and Gravitation | 3                     |
| ASTP-861 Advanced Relativity and Gravitation        | 3                     |
| PHYS-611 Classical Electrodynamics I                | 3                     |
| PHYS-612 Classical Electrodynamics II               | 3                     |

*Astronomical Instrumentation*

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| IMGS-628 Design and Fabrication of Solid State Cameras | 3                     |
| IMGS-639 Principles of Solid State Imaging Arrays      | 3                     |
| IMGS-642 Testing of Focal Plane Arrays                 | 3                     |

*Electives\**

| COURSE   | SEMESTER CREDIT HOURS |
|--|-----------------------|
| ASTP-611 Statistical Methods for Astrophysics          | 3                     |
| ASTP-660 Introduction to Relativity and Gravitation    | 3                     |
| ASTP-720 Computational Methods for Astrophysics        | 3                     |
| ASTP-730 Stellar Atmospheres & Evolution               | 3                     |
| ASTP-740 Galactic Astrophysics                         | 3                     |
| ASTP-750 Extragalactic Astrophysics                    | 3                     |
| ASTP-835 High-Energy Astrophysics                      | 3                     |
| ASTP-841 The Interstellar Medium                       | 3                     |
| ASTP-851 Cosmology                                     | 3                     |
| ASTP-861 Advanced Relativity and Gravitation           | 3                     |
| IMGS-628 Design and Fabrication of Solid State Cameras | 3                     |
| IMGS-639 Principles of Solid State Imaging Arrays      | 3                     |
| IMGS-642 Testing of Focal Plane Arrays                 | 3                     |
| PHYS-611 Classical Electrodynamics I                   | 3                     |
| PHYS-612 Classical Electrodynamics II                  | 3                     |

\* Students may choose from these elective courses as long as the course is not required by their specialty track.

**Admission requirements**

To be considered for admission to the Ph.D. program in astrophysical sciences and technology, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in the physical sciences, mathematics, computer science, or engineering.
- Recommended minimum cumulative GPA of 3.2 (or equivalent) in course work in mathematical, science, engineering, and computing subject areas.
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

**Physics, MS**

[www.rit.edu/study/physics-ms](http://www.rit.edu/study/physics-ms)

**George Thurston, Professor**

**585-475-4549, [gmtsp@rit.edu](mailto:gmtsp@rit.edu)**

**Program overview**

RIT's physics master's degree offers both a research and professional option, and provides advanced knowledge in core areas of physics, including electrodynamics, quantum, and classical mechanics, and statistical physics, as well as one or more sub-areas of physics that correspond to your individual interests and career aspirations. You'll work with program faculty to develop a tailored individual academic plan that supports your individual career aspirations.

The MS program in physics is designed to provide flexible options that can be tailored to the specific career goals and disciplinary interests of students seeking graduate training in fundamental and/or applied areas of physics. The program is suitable as either a means to further career development or as preparation for further graduate study. Nationally, graduates of the program are in demand across all economic sectors, spanning a wide variety of exciting opportunities within the private sector (especially in engineering and computer/information technology), in government labs and agencies, and in university level and secondary education.

**Plan of Study**

The program focuses on providing advanced knowledge in core areas of physics. This includes electrodynamics, quantum and classical mechanics, and statistical physics, as well as one or more sub-areas of physics that correspond to each students' individual interests and career aspirations. Students work with the program director to develop a tailored individual academic plan that includes course work that supports these goals. Sub-areas may include modern and quantum optics; lasers; computational physics; solid-state, materials, and device physics; soft matter and biological physics; radiation scattering spectroscopy; relativity and gravitation; and nanoscale physics. The program also includes professional skills in organization and leadership, managing research teams, promoting innovation or sustainable technologies, entrepreneurship and intellectual property, finance and accounting, data science, scientific visualization, electronics, STEM pedagogy and education research, public policy, and communication skills.

**Options**

The program offers options in research or professional physics. The research option is research-focused and is intended to leverage each student's acquired physics knowledge in support of furthering the student's research training. Students will conduct research and produce a thesis as part of their studies. The professional option is designed to supplement advanced physics knowledge with a portfolio of electives in professional skills that can be tailored to each student's career goals. Students complete a graduate project.

**National Labs Career Fair**

Hosted by RIT's Office of Career Services and Cooperative Education, the National Labs Career Fair is an annual event that brings representatives to campus from the United States' federally funded research and development labs. These national labs focus on scientific discovery, clean energy development, national security, technology advancements, and more. Students are invited to attend the career fair to network with lab professionals, learn about opportunities, and interview for co-ops, internships, research positions, and full-time employment.

## Curriculum

### Physics (research option), MS degree, typical course sequence

| COURSE                              | SEMESTER CREDIT HOURS                  |
|-------------------------------------|--|
| <b>First Year</b>                   |  |
| PHYS-601                            | Graduate Physics Seminar I             |
| PHYS-602                            | Graduate Physics Seminar II            |
| <i>Choose two of the following:</i> |  |
| PHYS-610                            | Mathematical Methods for Physics       |
| PHYS-611                            | Classical Electrodynamics I            |
| PHYS-614                            | Quantum Theory                         |
| <i>Choose one of the following:</i> |  |
| PHYS-630                            | Classical Mechanics                    |
| PHYS-640                            | Statistical Physics                    |
| <i>Choose one of the following:</i> |  |
| PHYS-790                            | Graduate Research & Thesis             |
|                                     | Physics (or closely related) Elective  |
|                                     | Physics (or closely related) Electives |
| <b>Second Year</b>                  |  |
| <i>Choose one of the following:</i> |  |
| PHYS-610                            | Mathematical Methods for Physics       |
| PHYS-611                            | Classical Electrodynamics I            |
| PHYS-614                            | Quantum Theory                         |
| PHYS-790                            | Graduate Research & Thesis             |
| <b>Total Semester Credit Hours</b>  |  |
| <b>30</b>                           |  |

### Physics (professional option), MS degree, typical course sequence

| COURSE                              | SEMESTER CREDIT HOURS                 |
|-------------------------------------|---------------------------------------|
| <b>First Year</b>                   |                                       |
| PHYS-601                            | Graduate Physics Seminar I            |
| PHYS-602                            | Graduate Physics Seminar II           |
| <i>Choose two of the following:</i> |                                       |
| PHYS-610                            | Mathematical Methods for Physics      |
| PHYS-611                            | Classical Electrodynamics I           |
| PHYS-614                            | Quantum Theory                        |
| <i>Choose one of the following:</i> |                                       |
| PHYS-630                            | Classical Mechanics                   |
| PHYS-640                            | Statistical Physics                   |
|                                     | Physics (or closely related) Elective |
|                                     | Professional Electives                |
| <b>Second Year</b>                  |                                       |
| PHYS-780                            | Graduate Physics Project              |
|                                     | Professional Elective                 |
|                                     | Physics (or closely related) Elective |
| <b>Total Semester Credit Hours</b>  |                                       |
| <b>30</b>                           |                                       |

### Electives

These lists are representative of the types of elective courses available to students in the physics program. Other RIT courses may be used as electives upon approval by the program director.

#### *Physics (or closely related) electives*

| COURSE   |  |
|----------|--|
| ASTP-660 | Introduction to Relativity and Gravitation           |
| ASTP-861 | Advanced Relativity and Gravitation                  |
| CLRS-601 | Principles of Color Science                          |
| CLRS-602 | Color Physics and Applications                       |
| EEEE-605 | Modern Optics for Engineers                          |
| EEEE-689 | Fundamentals of MEMS                                 |
| IMGS-616 | Fourier Methods for Imaging                          |
| IMGS-619 | Radiometry   |
| IMGS-628 | Design and Fabrication of Solid State Cameras        |
| IMGS-633 | Optics for Imaging                                   |
| IMGS-639 | Principles of Solid State Imaging Arrays             |
| IMGS-642 | Testing of Focal Plane Arrays                        |
| MATH-602 | Numerical Analysis I                                 |
| MATH-702 | Numerical Analysis II                                |
| MATH-712 | Numerical Methods for Partial Differential Equations |
| MATH-831 | Mathematical Fluid Dynamics                          |
| MCEE-620 | Photovoltaic Science and Engineering                 |
| MCEE-713 | Quantum and Solid-State Physics for Nanostructures   |
| MCSE-702 | Introduction to Nanotechnology and Microsystems      |
| MCSE-712 | Nonlinear Optics                                     |
| MCSE-713 | Lasers   |
| MCSE-731 | Integrated Optical Devices & Systems                 |
| MCSE-771 | Optoelectronics                                      |
| MCSE-889 | Special Topics                                       |

| COURSE   |  |
|----------|--|
| MTSE-601 | Materials Science                                    |
| MTSE-632 | Solid State Science                                  |
| PHYS-612 | Classical Electrodynamics II                         |
| PHYS-616 | Data Analysis for the Physical Sciences              |
| PHYS-667 | Quantum Optics                                       |
| PHYS-670 | Teaching and Learning Physics                        |
| PHYS-689 | Graduate Special Topics                              |
| PHYS-715 | Advanced Quantum Theory                              |
| PHYS-720 | Computational Methods for Physics                    |
| PHYS-732 | Advanced Solid State Physics                         |
| PHYS-751 | Soft Matter Physics                                  |
| PHYS-752 | Biological Physics                                   |
| PHYS-760 | Radiation Interactions & Scattering Probes of Matter |
| PHYS-767 | Optical Coherence and Light-Matter Interactions      |
| PHYS-770 | Advanced Methods in Physics Education Research       |
| PHYS-799 | Independent Study                                    |

#### *Professional electives*

| COURSE   |  |
|----------|--|
| ACCT-603 | Accounting for Decision Makers                           |
| ACCT-794 | Cost Management in Technical Organizations               |
| BLEG-612 | Legal and Accounting Issues for New Ventures             |
| CSCI-603 | Computational Problem Solving                            |
| CSCI-605 | Advanced Object-Oriented Programming Concepts            |
| CSCI-610 | Foundations of Computer Graphics                         |
| CSCI-620 | Introduction to Big Data                                 |
| CSCI-714 | Scientific Visualization                                 |
| CSCI-720 | Big Data Analytics                                       |
| DECS-744 | Project Management                                       |
| EEEE-610 | Analog Electronics Design                                |
| EEEE-620 | Design of Digital Systems                                |
| ESCB-705 | Economics and Decision Modeling                          |
| FINC-605 | Financing New Ventures                                   |
| FINC-721 | Financial Analysis for Managers                          |
| ISUS-704 | Industrial Ecology                                       |
| ISUS-705 | Technology, Policy, and Sustainability                   |
| ITDS-611 | STEM Education: Concepts and Practice                    |
| ITDS-613 | STEM Education: Research Methods and Theory              |
| MGIS-650 | Introduction to Data Analytics and Business Intelligence |
| MGMT-735 | Management of Innovation in Products and Services        |
| MGMT-740 | Leading Teams in Organizations                           |
| MGMT-741 | Managing Organizational Change                           |
| MGMT-755 | Negotiations   |
| PSYC-716 | Graduate Social Psychology                               |
| PUBL-630 | Energy Policy  |
| PUBL-701 | Graduate Policy Analysis                                 |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college in physics, applied physics, or a closely-related discipline within the physical/mathematical sciences or engineering fields.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students

below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

**Bridge Courses**

If an applicant lacks any prerequisites, bridge courses may be recommended to provide students with the required knowledge and skills needed for the program. If any bridge courses are indicated in a student's plan of study, the student may be admitted to the program on the condition that they successfully complete the recommended bridge courses with a grade of B (3.0) or better (courses with lower grades must be repeated).

## Faculty

### Dean's Office

**Sophia A. Maggelakis**, BS, MS, Ph.D., Old Dominion University—Dean

### Bioinformatics

**Gregory Babbitt**, BA, Ohio Wesleyan University; MS, Ph.D., University of Florida—Associate Professor: evolution of the biophysical properties of whole genomes and their interactions with DNA binding proteins

**Eli Borrego**, BS, Ph.D., Texas A&M University—Assistant Professor: plant biochemistry and pathology

**Larry Buckley**, BA, University of Missouri; MS, Southern Illinois University at Edwardsville; Ph.D., Southern Illinois University at Carbondale—Senior Associate Dean for Academic Affairs; Associate Professor, Biology: herpetology, anatomy, evolution, biogeography, systematics

**Feng Cui**, MS, Truman State University; Ph.D., Iowa State University; MD, Hunan Medical University (China)—Graduate Program Director, Bioinformatics; Associate Professor, Bioinformatics: next-generation sequencing data analysis, chromatin organization, epigenomics, cancer genomics and p53-DNA interactions

**André Hudson**, BS, Virginia Union University; Ph.D., Rutgers University—Head, Thomas H. Gosnell School of Life Sciences; Professor, Biology: amino acid metabolism, bacterial cell wall metabolism, plant- bacterial interactions

**Michael V. Osier**, BS, University of Vermont; Ph.D., Yale University—Associate Professor; Bioinformatics: high-throughput sequencing analysis, human genetics

**Gary R. Skuse**, BA, University of Rochester; Ph.D., Syracuse University—Professor, Bioinformatics: cancer genetics, RNA processing, natural language

processing to mine the scientific and medical literature, computer networking, wired and wireless communications

**Hyla C. Sweet**, BS, Union College; Ph.D., University of Texas at Austin—Associate Professor, Biology: Genomics/transcriptomics of invertebrates

**Julie A. Thomas**, B.App.Sc., Ph.D., LaTrobe University, Bendigo (Australia)—Associate Professor, virology, phage genetics and genome structure, phage gene expression

**Crista Wadsworth**, BA, Smith College; Ph.D., Tufts University—Assistant Professor, microbial evolution, populations dynamics and genomics.

### Environmental Science

**Eli Borrego**, BS, Texas A&M University, Ph.D., Texas A&M University—Assistant Professor, Biology: plant biochemistry and pathology

**Larry Buckley**, BA, University of Missouri; MS, Southern Illinois University at Edwardsville; Ph.D., Southern Illinois University at Carbondale—Senior Associate Dean for Academic Affairs; Associate Professor, Biology: herpetology, anatomy, evolution, biogeography, and systematics

**Sandra Connelly**, BS, Juniata College; MS, University at Buffalo; Ph.D., Miami University of Ohio—Principal Lecturer, Biology: ecotoxicology, freshwater ecosystems, anthropogenic stresses, UV-radiation, evolution

**Elizabeth N. Hane**, BA, Rice University; MA, University of Kansas; Ph.D., Brown University—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

**André Hudson**, BS, Virginia Union University; Ph.D., Rutgers University—Head, Thomas H. Gosnell School of Life Sciences; Professor, Biology: amino acid metabolism, bacterial cell wall metabolism, plant- bacterial interactions

**Christine Keiner**, BA, McDaniel College; Ph.D., Johns Hopkins University—Associate Professor, College of Liberal Arts, Science, Technology and Society/Public Policy: history of ecology and biology, U.S. environmental politics, and relations between science and politics

**Karl F. Korfmacher**, BA, Carleton College; MS, Ph.D., Duke University—Professor, Environmental Science: GIS-based habitat suitability, transportation, hydrologic, and pollution modelling, green infrastructure land cover analysis, soil science

**Jeffrey S. Lodge**, BA, University of Delaware; Ph.D., University of Mississippi—Associate Professor, Biology: bioremediation of oil, pharmaceuticals, personal care products, and other pollutants in soils and water, microbial ecology (especially water systems), use of microalgae to treat various industrial waste streams, wastewater microbiology and food waste to energy

**Carmody K. McCalley**, BA, Middlebury College; Ph.D., Cornell University—Graduate Program Director, Environmental Science; 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—Professor, Chemistry/Laboratory Science Technology: aquatic chemistry, environmental chemistry, sensor/instrument design, environmental monitoring

**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

**Kaitlin Stack-Whitney**, BS, Cornell University; Ph.D., University of Wisconsin-Madison—Assistant Professor, Biology: insects, ecology, novel ecosystems, environmental policy, critical open studies, animal studies, and pollinators

**Anna Christina Tyler**, BS, Cornell University; MS, Ph.D., University of Virginia—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—Professor, Imaging Science: remote sensing of natural resources, application of hyperspectral, light detection and ranging for spectral- structural characterization of natural systems, integrated modeling approaches, scaling of natural resources remote sensing solutions through sensor interoperability

**Jeffrey Wagner**, AB, University of Missouri at Columbia; MS, Ph.D., University of Illinois-Urbana—Professor, College of Liberal Arts, Economics: sustainable waste management, green consumption, economics of active transportation, economics of endangered species recovery

### Applied and Computational Mathematics, Applied Statistics

**Anurag Agarwal**, MS, Indian Institute of Technology (India); Ph.D., State University of New York at Buffalo—Associate Professor, number theory, cryptography, algebra, graph theory

**Ephraim Agyingi**, BS, MS, University of Ilorin (Nigeria); Ph.D., University of Manchester (United Kingdom)—Associate Professor, numerical analysis

**Olaekan Babaniyi**, BS, MS, Ph.D., Boston University—Assistant Professor, inverse problems, computational mechanics, biomechanical imaging, uncertainty quantification

**Peter Bajorski**, MS, University of Wroclaw (Poland); Ph.D., Technical University of Wroclaw (Poland)—Professor, regression models, multivariate analysis, nonparametrics, statistical approaches to spectral image processing

**Mihail Barbosu**, BS, Ph.D., Babes-Bolyai University (Romania); MS, Ph.D., Paris VI University (France)—Professor, mathematical modeling, dynamical systems, celestial mechanics and space dynamics, symbolic computation systems, data analytics, management science

**Nathaniel Barlow**, BS, Ph.D., Clarkson University—Associate 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, dynamical systems, financial mathematics

**Nathan Cahill**, BS, MS, Rochester Institute of Technology; D.Phil., University of Oxford (United Kingdom)—Graduate Program Director, Mathematical Modeling; Associate Professor, Mathematics: scientific computing, biomedical image analysis, computer vision, advanced mathematical approaches to image processing

**Manuela Campanelli**, Laureate in Mathematics, University of Perugia (Italy); Ph.D., University of Bern (Switzerland)—Director, Center for Computational Relativity and Gravitation; Professor, Mathematics:

numerical relativity, gravitational physics, computational astrophysics, black holes, gravitational waves

**Lucia Carichino**, BS, MS, Politecnico di Milano (Italy); Ph.D., Purdue University—Assistant Professor, mathematical modeling, scientific computing

**Linlin Chen**, BS, Beijing University (China); MCS, Rice University; MA, Ph.D., University of Rochester—Associate Professor, statistics, biostatistics, statistical consulting, genetics, bioinformatics and computational biology

**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—Graduate Program Director, Applied and Computational Mathematics; Associate Professor, mathematical modeling of complex fluids, asymptotics and perturbation methods, simulation

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**Emmett Ientilucci**, BS, MS, Ph.D., Rochester Institute of Technology—Assistant Professor, Imaging Science: remote sensing, hyperspectral image processing, multivariate statistics, target detection, radiometry

**Christopher Kanan**, BS, Oklahoma State University; MS, University of Southern California, Ph.D., University of California, San Diego—Associate Professor, Imaging Science: computer vision, object categorization, active vision, visual saliency, eye movement analysis

**Joel H. Kastner**, BS, University of Maryland; MS, Ph.D., University of California, Los Angeles—Professor, Imaging Science: astronomical imaging, including x-ray, infrared and radio spectroscopy; young stars and planet formation; evolved stars and planetary nebulae

**John P. Kerekes**, BS, MS, Ph.D., Purdue University—Professor, Imaging Science: multispectral remote sensing systems, multidimensional imaging system, pattern recognition

**Robert L. Kremens**, BS, The Cooper Union; MS, University of Rochester; MS, Ph.D., New York University—Research Professor, Imaging Science: wildland fire behavior and effects, remote sensing instrumentation, autonomous remote instruments for environmental monitoring, electronics measurement systems

**Cristian Linte**, BSc, University of Windsor (Canada); MSc, Ph.D., University of Western Ontario (Canada)—Associate Professor, Biomedical Engineering: image-guided visualization and navigation for minimally invasive therapy

**Nishant Malik**, BS, MS, University of Delhi (India), Ph.D., University of Potsdam (Germany)—Assistant Professor, network science, nonlinear dynamics, stochastic processes

**David W. Messinger**, BS, Clarkson University; Ph.D., Rensselaer Polytechnic Institute—Director, Professor, and Xerox Chair, Imaging Science: remote sensing image exploitation, advanced mathematical approaches to spectral image processing, LWIR hyperspectral processing, cultural heritage imaging

**Zoran Ninkov**, B.Sc., 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

**Shima Parsa Moghaddam**, B.Sc., Iran University of Science and Technology (Iran); M.Sc., Tabriz University (Iran); Ph.D., Wesleyan University—Assistant Professor

**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

**Flip Phillips**, BFA, MA, Ph.D., The Ohio State University—Professor, Motion Picture Science, MAGIC Center

**Jie Qiao**, BS, University of Science and Technology Liaoning (China); MS, Tsinghua University (China); MBA, University of Rochester; Ph.D., University of Texas at Austin—Associate Professor, Imaging Science: optical metrology, optical instrumentations, adaptive optics and active optics, ultrafast laser systems and applications (remote sensing, material processing), optical system design and performance evaluation

**Eli Saber**, BS, State University of New York at Buffalo; MS, Ph.D., University of Rochester—Professor, Electrical and Microelectronic Engineering: signal, image and video processing; computer vision



**Carl Salvaggio**, BS, MS, Rochester Institute of Technology; Ph.D., Syracuse University and the State University of New York College of Environmental Science and Forestry—Professor: novel techniques for the measurement of spectral optical properties, quantitative reflective and emissive remote sensing, digital image processing, three-dimensional geometry extraction from imagery, and scene simulation and modeling

**Andreas Savakis**, BS, MS, Old Dominion University; Ph.D., North Carolina State University—Professor, Computer Engineering: digital image processing, computer vision

**Grover Swartzlander**, BS, Drexel University; MSEE, Purdue University; Ph.D., Johns Hopkins University—Professor, Imaging Science: optical vortices, optical coronagraphs and high contrast imaging, pattern formation in linear and nonlinear optics, optical tweezers, optical coherence, solar sailing, metamaterials

**Brian Tomaszewski**, BA, University of Albany; MA, University of Buffalo; Ph.D., Pennsylvania State University—Associate Professor, Interactive Games and Media: geographic information science and technology, visual analytics, context modeling and representation, disaster management

**Jan van Aardt**, BSc, University of Stellenbosch (South Africa); MS, Ph.D., Virginia Polytechnic Institute and State University—Professor, Imaging Science: remote sensing of natural resources, application of hyperspectral, light detection and ranging for spectral-structural characterization of natural systems, integrated modeling approaches, scaling of natural resources remote sensing solutions through sensor interoperability

**Anthony Vodacek**, BS, University of Wisconsin; MS, Ph.D., Cornell University—Professor, Imaging Science: imaging spectrometry applications environmental characterization and monitoring; remote sensing data assimilation in environmental models; thermal and non-thermal techniques for wildland fire detection; coastal remote sensing and aquatic optics

**Richard Zanibbi**, BA, MSc, Ph.D., Queen's University (Canada)—Professor, Computer Science: pattern recognition, machine learning, document recognition, CAPTCHAs, human-computer interaction, and programming languages

## Mathematical Modeling

**Ephraim Agyingi**, BS, MS, University of Ilorin (Nigeria); Ph.D., University of Manchester (United Kingdom)—Associate Professor, numerical analysis

**Mihail Barbosu**, BS, Ph.D., Babes-Bolyai University (Romania); MS, Ph.D., Paris VI University (France)—Professor, mathematical modeling, dynamical systems, celestial mechanics and space dynamics, symbolic computation systems, data analytics, management science

**Nathaniel Barlow**, BS, Ph.D., Clarkson University—Associate Professor, stability and propagation of waves in fluids, asymptotic methods

**Maurino P. Bautista**, BS, Ateneo de Manila University (Philippines); MS, Ph.D., Purdue University—Professor, numerical analysis, applied mathematics

**Bernard Brooks**, BS, University of Toronto (Canada); MBA, Rochester Institute of Technology; MS, Ph.D., University of Guelph (Canada)—Professor: mathematical modeling, dynamical systems, financial mathematics

**Nathan Cahill**, BS, MS, Rochester Institute of Technology; D.Phil., University of Oxford (United Kingdom)—Graduate Program Director, Mathematical Modeling; Associate Professor, Mathematics: scientific computing, biomedical image analysis, computer vision, advanced mathematical approaches to image processing

**Manuela Campanelli**, Laureate in Mathematics, University of Perugia (Italy); Ph.D., University of Bern (Switzerland)—Director, Center for Computational Relativity and Gravitation; Professor, Mathematics: numerical relativity, gravitational physics, computational astrophysics, black holes, gravitational waves

**Matthew Coppengrader**, 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—Graduate Program Director, Applied and Computational Mathematics; Associate Professor, mathematical modeling of complex fluids, asymptotics and perturbation methods, simulation

**Moumita Das**, BS, MS, Jadavpur University (India); Ph.D., Indian Institute of Science—Associate Professor, Physics: theoretical soft condensed matter, mechanical response of biological materials and living systems

**Joshua Faber**, BS, State University of New York at Stony Brook; Ph.D., Massachusetts Institute of Technology—Professor, Mathematics: numerical relativity, computational astrophysics, dynamics

**Raluca Felea**, BS, University of Iasi (Romania); Ph.D., University of Rochester—Professor, microlocal analysis

**Anthony A. Harkin**, BS, State University College at Brockport; MS, Massachusetts Institute of Technology; Ph.D., Boston University—Associate Professor, applied and computational mathematics, partial differential equations

**Matthew J. Hoffman**, BA, Williams College; MS, Ph.D., University of Maryland—Associate Professor, data assimilation, applied mathematics, ocean and atmospheric forecasting, remote sensing; hyperspectral vehicle tracking

**Bonnie C. Jacob**, BA, Smith College; MS, Ph.D., Clemson University—Associate Professor

**Jobby Jacob**, BS, Bharata Mata College (India); MS, Indian Institute of Technology (India); MS, Ph.D., Clemson University—Associate Head, Applied and Computational Math; Associate Professor, graph theory

**Baasansuren Jadamba**, BS, National University of Mongolia (Mongolia); MS, University of Kaiserslautern (Germany); Ph.D., University of Erlangen-Nuremberg (Germany)—Associate Professor, partial differential equations, inverse problems, numerical optimization

**Akhtar Khan**, MS, Technical University Kaiserslautern (Germany); Ph.D., Michigan Technological University—Professor, applied math, optimization, inverse problems, variational inequalities, elasticity imaging

**Cristian Linte**, BSc, University of Windsor (Canada); MSc, Ph.D., University of Western Ontario (Canada)—Associate Professor, Biomedical Engineering: image-guided visualization and navigation for minimally invasive therapy

**Carlos Lousto**, MS, Universidad Nacional De La Plata (Argentina); Ph.D., Universidad De Buenos Aires (Argentina)—Professor, numerical relativity

**Carl V. Lutzer**, BS, Michigan State University; MA, Ph.D., University of Kentucky—Director, Honors Program; Professor, mathematical physics

**Kara L. Maki**, BS, University of New Hampshire; MS, Ph.D., University of Delaware—Associate Professor, mathematical modeling, scientific computing

**Nishant Malik**, BS, MS, University of Delhi (India); Ph.D., University of Potsdam (Germany)—Assistant Professor, network science, nonlinear dynamics, stochastic processes

**Panos P. Markopoulos**, BS, MS, Technical University of Crete (Greece); Ph.D., University at Buffalo—Assistant Professor, Communication and Signal Processing

**Laura M. Munoz**, BS, California Institute of Technology; Ph.D., University of California at Berkeley—Assistant Professor, mathematical biology, dynamical systems, applied control theory

**Darren A. Narayan**, BS, State University of New York at Binghamton; MS, Ph.D., Lehigh University—Professor, graph theory, discrete math

**Jason Nordhaus**, BA, BS, MS, Ph.D., University of Rochester—Associate Professor, Science and Mathematics, National Technical Institute for the Deaf: computational astrophysics, core-collapse supernovae, binary interactions, strongly magnetized compact objects, physics of common envelopes

**Jennifer O’Neil**, BS, Rochester Institute of Technology; Ph.D., Purdue University—Assistant Professor, Mechanical Engineering Technology: fluid dynamics, non-Newtonian liquids

**Richard O’Shaughnessy**, BA, Cornell University; Ph.D., California Institute of Technology—Associate Professor, gravitational wave astrophysics

**Niels F. Otani**, BA, University of Chicago; Ph.D., University of California at Berkeley—Associate Professor, mathematical biology

**Poornima Padmanabhan**, B.Tech., Indian Institute of Technology, Madras (India); Ph.D., Cornell University—Assistant Professor, Chemical Engineering: self-assembly, thermodynamics, materials design, soft matter

**Mary Lynn Reed**, BS, Georgia Institute of Technology; MFA, University of Maryland; Ph.D., University of Illinois—Head, School of Mathematical Sciences; Professor, abstract algebra, network science, cybersecurity, statistical modeling

**David Ross**, BA, Columbia College; Ph.D., New York University—Professor, differential equations and numerical analysis

**George Thurston**, AB, Oberlin College; Ph.D., Massachusetts Institute of Technology—Graduate Program Director, Physics; Professor, Physics: biological and chemical physics, experimental and theoretical studies of phase transitions, physical and chemical basis of protein condensation diseases, nuclear magnetic resonance, light, x-ray, and neutron scattering

**John T. Whelan**, BA, Cornell University; Ph.D., University of California at Santa Barbara—Professor, computational relativity and gravitation, gravitational wave data analysis

**Steven J. Weinstein**, BS, University of Rochester; MS, Ph.D., University of Pennsylvania—Department Head; Professor, interfacial transport processes, hydrodynamic wave phenomena, applied mathematics

**Tamas Wiandt**, BS, Jozsef Attila University (Hungary); Ph.D., University of Minnesota—Professor, dynamical systems

**Yosef Zlochower**, BS, Ph.D., University of Pittsburgh—Professor, numerical relativity, relativistic astrophysics, black hole physics

# Golisano Institute for Sustainability

Nabil Nasr, Associate Provost and Institute Director  
rit.edu/gis

## Programs of Study

|                         |     |
|-------------------------|-----|
| Architecture, M.Arch.   | 182 |
| Sustainability, Ph.D.   | 184 |
| Sustainable Systems, MS | 185 |

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.

Please visit the college’s website for in depth information on academics, faculty, facilities, research initiatives, advising, and more.

### 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.

## Architecture, M.Arch.

[www.rit.edu/study/architecture-march](http://www.rit.edu/study/architecture-march)

**Architecture Department**

**585-475-4990, [archdept@rit.edu](mailto:archdept@rit.edu)**

### Program overview

Sustainability concerns are changing how we think about architecture. Buildings account for a large percentage of the world's energy expenditures and carbon emissions, which has driven demand for more sustainable architecture. In RIT's accredited master of architecture program, we're moving sustainability forward to elevate the value of architectural design. As a student here, you'll learn how to design with context and substance in areas such as positive energy, performance building, climate-responsive designs, passive resiliency, and more.

Our accredited architecture program offers an immersive program focused on investigating the complexity of designing buildings with people, space, and the environment in mind. Whether you have a background in the building design sector or are new to the field, the program will prepare you for a path to positively contribute to the design of tomorrow's buildings, neighborhoods, and communities.

Our program offers foundation courses as well as more in-depth classes exploring integrated building systems, urban planning, industrial ecology, and more. You'll also have the flexibility to choose electives in other subject areas based on your unique talents and career goals, such as business, engineering, energy, or additional design skills.

### What Sets Us Apart

1. Design matters: As a program emphasizing design, the program's core education takes place in the studio. Our studio curriculum integrates construction technologies, material science, and mechanics into design.
2. Hands-on education: Expect a hands-on learning environment, working on real-world projects and utilizing our 75,000-square-foot, LEED Platinum-certified building to observe and test building efficiency. The City of Rochester and the western New York region also serve as an active learning environment for our students.
3. Work experience: A professional co-op will help you build your resume before you graduate. RIT's cooperative education program lets you work in the field with local architects and present neighborhood improvement ideas to planning boards.
4. Global experience: Our global experience requirement lets you experience new cultures, settings, and contexts to expand your understanding of diverse architectural interests and needs.
5. STEM-designated: Our program is STEM-designated, which increases scholarship and research opportunities for students, and offers up to two additional years of work/study for international students.
6. NAAB-accredited: We're one of the few master of architecture degree programs in the U.S. to be accredited by the National Architectural Accrediting Board (NAAB)—that means you're getting one of the best architecture educations in the country.
7. Thesis: Our thesis option allows you to integrate everything you learn into a comprehensive project. Past student theses include designs for an urban master plan for Rochester's downtown, a net-zero or positive energy building, and a turbine system to harvest rainwater for energy.

### Plan of Study

There are two primary tracks of study offered in the M.Arch. program. We work with each student individually to determine the best track and can customize course requirements based on levels of prior experience.

8. For those with previous experience and an undergraduate degree in architecture, an Advanced Standing track provides a two to two-and-a-half year path.
9. For those with no prior experience or background in architecture, the Standard Admissions track is available, providing a three and half year path.

Designed as a full-time program, courses are offered on campus, primarily during the day, and often include open periods between classes to allow time for students to gain work experience with an architectural firm while they complete their degree.

With design, creative exploration, and critical thinking as key underpinnings, our program is grounded around four primary areas:

- Sustainability: With a global need for a more sustainable world, including buildings and their impact on energy consumption and carbon footprints, the focus of many courses reflect the conditions of sustainable design and practice.
- Technology: Design exploration is enhanced through the understanding of the implication of technology on both design process and product. The program enables students to focus and collaborate in many specialized areas of technology, including engineering, computer science, imaging science, materials and construction, and products and remanufacturing.
- Urbanism: The complexity of the urban environment requires an interdisciplinary approach to architecture education—one that references economics, public policy, sociology, and regional culture. With this in mind, the program also focuses on the practices and principles of preservation and adaptive reuse.
- Integrated learning/practice: From the outset, students often approach design problems within teams, learning to value and leverage collective and collaborative participation. Through integrated learning and evidenced-based models, we prepare students for the increasingly integrated practice of architecture, where architects are orchestrating teams of professionals from a variety of fields, including engineering, management, science, and computer science.

### Enhanced Career Opportunities

RIT's master of architecture program is proud of the 100 percent job placement rate among our graduates. Our alumni are employed in architectural firms around the world and are working in diverse fields, from community development to smart growth to green building materials. Within firms and elsewhere, they serve as architectural designers, research scientists, sustainability consultants, planning engineers, start-up entrepreneurs, and more. Plus, our professional co-ops are a compelling program requirement that often leads to employment offers from architects and other firms working in construction, urban design, and facilities management.

### Innovation Through Diversity

Enhancing the value of design requires constructive collaboration and a breadth of skills and viewpoints, interwoven in a way that elevates and celebrates everyone's differences and strengths at RIT. Behind our focus on creativity and innovation is a dedication to diversity and inclusion that is fundamental to our mission. The master of architecture degree is suited for students with or without a background in the architecture or sustainability fields. Many of our students have been former art teachers, film students, engineers, interior designers, lawyers, and more before beginning their studies. They bring these backgrounds to the program in ways that enriched conversations and perspectives about design and human needs. Plus, approximately one-third of our students are international students, bringing cultural experiences and architectural design concepts from every continent.

## Curriculum

### Architecture, M.Arch. degree, typical course sequence

| COURSE                             | SEMESTER                              | CREDIT HOURS |
|------------------------------------|---------------------------------------|--------------|
| <b>First Year</b>                  |                                       |              |
| ARCH-611                           | Architectural Representation I        | 3            |
| ARCH-612                           | Architectural Representation II       | 3            |
| ARCH-621                           | Architectural History I               | 3            |
| ARCH-622                           | Architectural History II              | 3            |
| ARCH-631                           | Architectural Design I                | 6            |
| ARCH-632                           | Architectural Design II               | 6            |
| ARCH-641                           | Fundamentals of Building Systems      | 3            |
| ARCH-761                           | Understanding Sustainability          | 3            |
| <b>Second Year</b>                 |                                       |              |
| ARCH-699                           | Coop Architecture (summer)            | 0            |
| ARCH-731                           | Architectural Studio I: Site          | 6            |
| ARCH-734                           | Architectural Studio II: Urban        | 6            |
| ARCH-741                           | Integrated Bldg Systems I             | 3            |
| ARCH-742                           | Integrated Building Systems II        | 3            |
| ARCH-751                           | Architectural Theory                  | 3            |
| ARCH-752                           | Urban and Regional Planning           | 3            |
| ARCH-762                           | Industrial Ecology Fundm              | 3            |
| ARCH-763                           | Sustainable Building Metrics          | 3            |
| <b>Third Year</b>                  |                                       |              |
| ARCH-698                           | Global Experience (summer)            | 0            |
| ARCH-733                           | Architectural Studio III: Adaptive    | 6            |
| ARCH-735                           | Architecture Studio IV: Integrative   | 6            |
| ARCH-743                           | Integrated Building Systems III       | 3            |
| ARCH-744                           | Integrated Building Systems IV        | 3            |
| ARCH-753                           | Research Seminar/Thesis Prep          | 3            |
|                                    | Open Graduate Sustainability Elective | 3            |
|                                    | Open Graduate Electives               | 6            |
| <b>Fourth Year (fall only)</b>     |                                       |              |
| ARCH-771                           | Professional Practice                 | 3            |
| ARCH-790                           | Thesis                                | 6            |
|                                    | Open Graduate Electives               | 6            |
| <b>Total Semester Credit Hours</b> |                                       | <b>105</b>   |

## Accreditation

The master of architecture program is accredited by the National Architectural Accrediting Board (NAAB). In addition, the program is now designated as a STEM program in Architectural and Building Sciences/Technology (CIP code 04.0902) making international graduates eligible to extend their F-1 visas for up to three years in order to work in the United States.

## Admission requirements

We encourage applicants to demonstrate creative curiosity along with an interest in collaboration and leadership. We value applicants who can show an eagerness to contribute to the built environment and a sustainable future. To be considered for admission to the M.Arch. program, candidates must:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.

- Submit a portfolio. Refer to Graduate Portfolio Requirements for more information.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

We encourage applicants to demonstrate creative curiosity along with an interest in collaboration and leadership. We value applicants who can show an eagerness to contribute to the built environment and a sustainable future.



## Sustainability, Ph.D.

[www.rit.edu/study/sustainability-phd](http://www.rit.edu/study/sustainability-phd)

**Sustainability Department**

**585-475-7363, [sustdept@rit.edu](mailto:sustdept@rit.edu)**

### Program overview

Our approach to sustainability means working in the broader context of environmental assessment, economics, and policy. Each faculty member in the Golisano Institute for Sustainability sponsors a select number of students for specific research projects, with the scope varying from fundamental science to applied engineering to corporate sustainability applications. On acceptance into a sponsored research project, you will receive a fully funded education, a stipend to help with living expenses, your own office space, and the time to develop your technical expertise in sub-areas dependent on your research.

In the sustainability Ph.D. program, you'll have the opportunity to learn from areas across the entire university to develop your own innovative approach to the field, building off of methodologies such as life cycle assessment, environmental risk and impact assessment, design for the environment, pollution prevention, closed loop supply chain management, and product life assessment. Moreover, you'll work side-by-side with our world-renowned faculty who are avid researchers in diverse areas including biofuels, transportation, energy policy, resource recovery, smart products and systems, and more.

The Ph.D. degree helps you think innovatively about how sustainability can positively impact systems all over the world through big-picture solutions, from training future business leaders to maximizing natural resources. You don't need a background in sustainability to join this program; you just need a desire to create positive change in the world. We bring in students of all ages, from all backgrounds—from biotechnology to business—and from all over the world. You'll also find a wide range of experience—many of the program's students have more than 10 years of career experience and/or education when they enroll.

The faculty are well-known scholars and active researchers who not only bring their knowledge into the classroom but also directly involve students in their scholarship. This work includes a wealth of hands-on experience in our impressive research facilities, including a 75,000-sq.-ft., LEED Platinum certified research building with over nine labs and six technology testbeds. With this level of experience, you'll be prepared for diverse academic and industry jobs where you can make an impact on the way the world views and utilizes sustainable practices, from the macro to the micro.

### Plan of study

With the Ph.D. degree's integrative curriculum, you will develop a deep foundation in sustainability science, sustainable systems, risk analysis, and more. You can also choose several electives from across colleges at RIT—from Computational Modeling and Simulation to Principles of Statistical Data Mining—to tailor your degree and create interdisciplinary relationships throughout the university.

Through your sponsored research project, you'll have the opportunity to make novel and impactful contributions to the development and understanding of sustainable technologies. Recent dissertation examples include:

- Implications of Consumer Lifestyle Changes and Behavioral Heterogeneity on U.S. Energy Consumption and Policy
- Criticality of Byproduct Materials: Assessing Supply Risk, Environmental Impact, and Strategic Policy Response for Tellurium
- Development of an Integrated Reformer and Fuel Cell System for Portable Power Applications

### Active research areas

#### *Sustainable Energy*

- Fuel cells
- Photovoltaics
- Energy supply/demand models
- Energy policy

#### *Circular Economy*

- Life cycle assessment
- Electronic waste and battery recycling
- Waste-to-energy processes
- Food waste management
- Remanufacturing

#### *Sustainable Urban Systems*

- Smart Cities
- Transportation systems analysis
- Food Waste Management
- Food-Energy-Water Nexus

### Community Involvement

Rochester, NY, is a hub for sustainability professionals and home to rich natural resources, such as fertile farmland and the nearby Finger Lakes. Many students share their passion for sustainability with the local community by working in volunteer service on projects like K-12 education, community gardens, farmer's markets, and more. In addition, you will connect with the larger sustainability world by attending and presenting at professional conferences all over the world.

## Curriculum

### Sustainability, Ph.D. degree, typical course sequence

| COURSE                                 | SEMESTER   | CREDIT HOURS |
|--|--|--------------|
| <b>First Year</b>                      |  |              |
| ISUS-702                               | Fundamentals of Sustainability Science                         | 3            |
| ISUS-704                               | Industrial Ecology   | 3            |
| ISUS-706                               | Economics of Sustainable Systems                               | 3            |
| ISUS-806                               | Risk Analysis  | 3            |
| ISUS-808                               | Multicriteria Sustainable Systems                              | 3            |
|  | Elective   | 3            |
| <b>Second Year</b>                     |  |              |
| Complete 8 credits from the following: |  | 8            |
| ISUS-807                               | Research   |              |
| ISUS-890                               | Dissertation Research  |              |
| PUBL-810                               | Technology, Policy and Sustainability (or approved substitute) | 3            |
|  | Electives  | 9            |
| <b>Third Year</b>                      |  |              |
| ISUS-890                               | Dissertation Research  | 8            |
|  | Electives  | 6            |
| <b>Fourth Year</b>                     |  |              |
| ISUS-890                               | Dissertation Research  | 8            |
| <b>Total Semester Credit Hours</b>     |  | <b>60</b>    |

### Admission requirements

To be considered for admission to the Ph.D. program in sustainability, candidates must fulfill the following requirements:

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.

- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a writing sample, of which you are the sole author, which should be a report or paper from previous academic or professional work that reflects your critical thinking and writing abilities.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed at least two science courses, one calculus course, and one statistics course.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.
- Contact the department with a few sentences detailing your work and/or research experience, especially as it relates to the area you're interested in, so we can identify a potential sponsored research project match for you.

## Sustainable Systems, MS

[www.rit.edu/study/sustainable-systems-ms](http://www.rit.edu/study/sustainable-systems-ms)

**Sustainability Department**

**585-475-7363, [sustdept@rit.edu](mailto:sustdept@rit.edu)**

### Program overview

Sustainable systems accepts students from any academic background and encompasses a wide range of interdisciplinary studies in sustainability science. Here, you won't be restricted to one sustainability topic or methodology. You will comprehensively learn and experience the methods that lead to environmental, social, technological, and business success, working one-on-one with a faculty advisor to tailor the degree to your sustainability interests.

In the sustainable systems MS, you will start with a broad foundation of knowledge in environmental life cycle assessment, sustainable decision making, economic and policy strategies, and more. Then, you will have the opportunity to customize your degree in areas that suit your interests and career goals—such as renewable energy or mobility—as well as get the hands-on experience that employers are seeking. In as little as one year of study, you will be prepared to make sustainability decisions that you can apply to any career.

Not only will you be able to focus on an area that interests you, but you will be able to get hands-on in your projects with the use of one of our many labs or through design modeling tools. This degree allows you the flexibility to adapt your career over time and in response to the ever-changing developments in sustainability. The Golisano Institute for Sustainability is dedicated to groundbreaking sustainability research and its business applications. Our research facilities are second to none, including Sustainability Institute Hall, a 75,000-sq.-foot, LEED Platinum certified research building and multiple state-of-the-art research centers.

You don't need a background in sustainability to join this program; just a desire to create positive change in the world. We bring in students of all ages, from all backgrounds—from mechanical engineering to political science—and from all over the world so that your learning experience comes not just from the classroom, but from the different perspectives of fellow students.

### Plan of Study

Through a flexible and interdisciplinary curriculum, you'll begin your degree with core courses in industrial ecology, risk assessment, the economics of sustainability, and more. Several electives from across the university will allow you to further tailor your degree to your talents and career goals, from sustainable craft brewing and distilling to corporate social responsibility.

Your degree culminates with a research thesis or a capstone project. Recent thesis examples include:

- Techno-Environmental Analysis of Generating Animal Feed from Wasted Food Products
- Fabrication and life cycle assessment of organic photovoltaics
- Characterizing adaptive capacity to climate change in developing countries: a case study on Peru

### Potential Tracks

#### *Sustainable Energy*

- Sustainable Energy Systems
- Food-Energy-Water Nexus
- Energy Policy

Example research project: Inspection of wind turbine blades with unmanned aerial vehicles (UAVs)

### Circular Economy

- Introduction to Geographic Information Systems (GIS)
- Data Analysis for Sustainability
- Innovation Policy
- Corporate Social Responsibility (CSR)

Example research project: Assessing a baseline case for reaching carbon neutrality in Monroe County by 2027

### Sustainable Urban Systems

- Sustainable Mobility Systems
- Graduate Sustainable Communities
- Sustainable Building Metrics

Example research project: Evaluating strategies for sustainable renovation of RIT campus buildings

### Enhanced Career Opportunities

Our graduates have a 100 percent placement rate, in part because of RIT's dedication to career counseling and ongoing relationships with employers. This means that all of our graduates gain employment or choose to further their education shortly after graduating. And if you're interested in pursuing a career more focused in academia or research, the master's degree is also an excellent stepping stone to a doctoral program, such as RIT's Ph.D. in sustainability, if you take the route of completing a thesis while here.

### Community Involvement

Rochester, NY, is a hub for sustainability professionals and entrepreneurship. Students in the sustainable systems degree program are often regularly involved with local companies and organizations, from teaching about sustainability practices at inner-city high schools to completing a capstone project for companies including Rochester Regional Health or Wegman's Food Market's corporate headquarters.

## Curriculum

### Sustainable Systems (capstone option), MS degree, typical course sequence (semesters)

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>   |                       |
| ISUS-702 Fundamentals of Sustainability Science                         | 3                     |
| ISUS-704 Industrial Ecology   | 3                     |
| ISUS-706 Economics of Sustainable Systems                               | 3                     |
| ISUS-780 Capstone   | 6                     |
| ISUS-806 Risk Analysis  | 3                     |
| ISUS-808 Multicriteria Sustainable Systems                              | 3                     |
| PUBL-810 Technology, Policy and Sustainability (or approved substitute) | 3                     |
| Electives   | 6                     |
| <b>Total Semester Credit Hours</b>                                      | <b>30</b>             |

### Sustainable Systems (thesis option), MS degree, typical course sequence (semesters)

| COURSE  | SEMESTER CREDIT HOURS |
|---|-----------------------|
| <b>First Year</b>   |                       |
| ISUS-702 Fundamentals of Sustainability Science                         | 3                     |
| ISUS-704 Industrial Ecology   | 3                     |
| ISUS-706 Economics of Sustainable Systems                               | 3                     |
| ISUS-806 Risk Analysis  | 3                     |
| ISUS-808 Multicriteria Sustainable Systems                              | 3                     |
| Elective  | 3                     |
| <b>Second Year</b>  |                       |
| ISUS-790 Thesis   | 6                     |
| PUBL-810 Technology, Policy and Sustainability (or approved substitute) | 3                     |
| Elective  | 3                     |
| <b>Total Semester Credit Hours</b>                                      | <b>30</b>             |

## Admission requirements

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

- Complete an online graduate application. Refer to Graduate Admission Deadlines and Requirements for information on application deadlines, entry terms, and more.
- Submit copies of official transcript(s) (in English) of all previously completed undergraduate and graduate course work, including any transfer credit earned.
- Hold a baccalaureate degree (or US equivalent) from an accredited university or college.
- Recommended minimum cumulative GPA of 3.0 (or equivalent).
- Submit a current resume or curriculum vitae.
- Two letters of recommendation are required. Refer to Application Instructions and Requirements for additional information.
- Not all programs require the submission of scores from entrance exams (GMAT or GRE). Please refer to the Graduate Admission Deadlines and Requirements page for more information.
- Submit a writing sample, of which you are the sole author, which should be a report or paper from previous academic or professional work that reflects your critical thinking and writing abilities.
- Submit a personal statement of educational objectives. Refer to Application Instructions and Requirements for additional information.
- Have completed at least two science courses, one calculus course, and one statistics course.
- International applicants whose native language is not English must submit official test scores from the TOEFL, IELTS, or PTE. Students below the minimum requirement may be considered for conditional admission. Refer to Graduate Admission Deadlines and Requirements for additional information on English requirements. International applicants may be considered for an English test requirement waiver. Refer to Additional Requirements for International Applicants to review waiver eligibility.

### Non-matriculated Students

An applicant with a bachelor's degree from an approved undergraduate institution and the appropriate background is permitted to take graduate courses as a non-matriculated student. If the student is subsequently admitted to the graduate program, a limited number of credit hours from courses taken at RIT as a non-matriculated student can be transferred to the degree program. Any applicant who wishes to register for a graduate course as a non-matriculated student must obtain permission from the chair of the graduate program and the course instructor.

## Faculty

**Nabil Nasr**, BS, Helwan University (Egypt); M.Eng., Pennsylvania State University; MS, Ph.D., Rutgers University—Associate Provost and Director, Golisano Institute for Sustainability

**Dennis A. Andrejko**, B.Arch., Arizona State University; M.Arch., Massachusetts Institute of Technology—Head, Department of Architecture, Associate Professor

**Callie W. Babbitt**, BS, Georgia Institute of Technology; ME, Ph.D., University of Florida—Associate Professor

**Julius J. Chiavaroli**, B.Arch., University of Notre Dame; MBA, Rochester Institute of Technology—Professor

**Eric Williams**, BA, Macalester College; Ph.D., State University of New York at Stony Brook—Professor

**Alissa D. DeWit-Paul**, BS, Cornell University; M.Arch., State University of New York at Buffalo; Ph.D., Binghamton University—Visiting Lecturer

**Nathaniel J. Williams**, BS, Whitworth University; MSc, Nelson Mandela University (South Africa); Ph.D., Carnegie Mellon University—Assistant Professor

# RIT Online

[www.rit.edu/ritonline/](http://www.rit.edu/ritonline/)

## Graduate Degree Programs

- Applied Statistics, MS
- Business Administration–Online Executive, MBA
- Business Analytics, MS
- Computing Security, MS
- Construction Management, MS
- Data Science, MS
- Environmental, Health and Safety Management, MS
- Health Care Interpretation, MS
- Health Informatics, MS
- Health Systems Management, MS
- Human Resource Development, MS
- Human–Computer Interaction, MS
- Imaging Science, MS
- Information Technology and Analytics, MS
- Manufacturing Leadership, MS
- Service Leadership and Innovation, MS
- Professional Studies, MS
- Product Development, MS
- Microelectronics Manufacturing Engineering, ME

## Advanced Certificate Programs

- Accounting and Financial Analytics
- Applied Statistics
- Cybersecurity
- Health Care Finance
- Workplace Learning and Instruction
- Service Leadership and Innovation
- Project Management
- Organizational Learning
- Lean Six Sigma

RIT provides flexible, career-focused online education to a diverse and global audience, reducing barriers to degrees, offering flexible and accessible pathways for a diverse student population, and providing industry with professional education opportunities. We have been providing career-focused education and servicing the demands of employers since 1944. And with over 40 years experience in delivering distance education, we have the infrastructure and expertise to deliver online education with the same level of quality and rigor as offered in face-to-face learning. Online learners benefit from the same esteemed faculty, research opportunities, exceptional education experience, and prestigious degree that traditional campus-based students value.

RIT offers 33 fully online graduate and undergraduate degree programs and over 800 classes taught by over 400 faculty, benefiting thousands of online students in the US and abroad. Online students enjoy full access to all support services that traditional students are offered including the library and its services, academic advising, coaching, tutoring, access services, proctored exam assistance, career services and co-op, and a help-desk dedicated to online students. Online students have access to 130,000+ alumni around the world for networking, mentoring, and career advancement opportunities. Online students in particular are assigned a dedicated student success coach who functions as an advocate for students, and connects them with the support resources, people, and departments across RIT to support their success in and out of class.

While online students may be learning remotely, at RIT, they are never alone. Once enrolled in a program, or even a class, students receive onboarding and orientation outreach to ensure they have everything they need to succeed. Many online students are working professionals--seeking to advance or switch their career--who appreciate the flexibility that online learning provides, allowing them to balance work, school, and personal life. In addition to flex-

ibility, online students also seek the ability to connect and engage with faculty and other students consistently and meaningfully. Online learning at RIT is both a flexible and robust learning experience that goes beyond content delivery into a social, relational experience. Faculty find creative ways using best practices in online pedagogy, tools and technology to create a rich, engaging, and interactive online class experience and community.



# Graduate Admission

[www.rit.edu/admissions/graduate](http://www.rit.edu/admissions/graduate)

Admission decisions for graduate applicants are made by the department or college offering the program, and upon receipt of a completed application file from the Office of Graduate Enrollment Services. Correspondence between the student and the university is conducted through the Office of Graduate Enrollment Services, according to the following policies and procedures:

1. Inquiries regarding academic programs, as well as all applications for graduate study, are directed to the Office of Graduate Enrollment Services, Rochester Institute of Technology, Bausch & Lomb Center, 58 Lomb Memorial Drive, Rochester, NY 14623-5604. 585-475-2229, [gradinfo@rit.edu](mailto:gradinfo@rit.edu).
2. The Office of Graduate Enrollment Services will acknowledge the inquiry or application, instructing the student as to the information required for admission by the school or department to which he or she is applying.
3. Once a student has submitted a formal application, the Office of Graduate Enrollment Services will prepare an applicant file. All correspondence and admission information is collected by the Office of Graduate Enrollment Services and placed in the applicant's file. The file will include an RIT application, previous college records (transcripts), applicable test scores, letters of recommendation, and other documents that may support admission of the candidate.
4. When all relevant admission data has been received, the applicant's file is sent to the appropriate school or department for review and an admission decision.
5. When the school or department has made a decision on the application, the decision form is returned to the Office of Graduate Enrollment Services.
6. The Office of Graduate Enrollment Services notifies candidates of admission decisions.
7. Academic units may informally advise non-degree students, but no formal program of study can be approved prior to admission.
8. The formal program is laid out by the dean's designee (department head, coordinator or program director, etc.) and is the one that must be followed by all students applying for admission or readmission in that program.
9. The basic entry requirements for graduate degree candidates include the completion of a baccalaureate degree and whatever other evidence of the applicant's potential to complete graduate studies may be required by the particular program. Rare exceptions to the baccalaureate requirement can be made in the case of candidates who have demonstrated unusual competence in their field of specialization. For these exceptions the recommendation of the department chairperson or director and the approval of the appropriate dean and the dean of graduate education are required.

The U.S. Government expects international students to prove competency in the English language prior to their acceptance to an American college or university. In keeping with this expectation, students whose native language is not English and whose secondary or higher education was completed in a non-native English speaking country must take a test of English language proficiency. Students must achieve the following minimum scores prior to consideration for admission into graduate studies: 550 (paper-based) or 79 (Internet-based) on the Test of English as a Foreign Language (TOEFL), 6.5 on the International English Language Testing System (IELTS), or 58 on the Pearson Test of English – Academic. Individual academic units may require higher standards or additional requirements.

Applicants whose test results fall below the minimum scores for admission but who otherwise meet academic requirements will be referred to the English Language Center. They will not be admitted to academic programs until they meet proficiency criteria established by the English Language Center.

In certain cases graduate students may be admitted prior to, but conditional upon completion of the baccalaureate degree. Applicants should not be considered for admission prior to the start of their final year of undergraduate study. The student must present a final transcript signifying successful completion of their baccalaureate degree by the end of the first term they are enrolled in the graduate program.

Graduate applicants who do not fully satisfy all admission criteria as to grades, test scores or other credentials, but do show sufficient promise to qualify for a trial period of graduate study may be admitted on probation to the university. Such students must achieve a 3.00 (B) program grade point average by the end of their first 9 credit hours of graduate study. Those students who do not meet this criterion will be suspended. Responsibility for specific requirements and maintenance of the student's appropriate status rests with the academic unit in consultation with the Office of Graduate Enrollment Services and the Office of the Registrar.

## New York State immunization requirement

All students registered for four or more credits and born after January 1, 1957, must comply with New York state and RIT immunization requirements. New York State Law requires proof of immunity to measles, mumps, and rubella through either two MMR immunizations or positive blood titers for each disease. New York state also requires all students, regardless of age, to sign a meningococcal awareness form. RIT requires students age 26 and under to have the meningitis shot. Required immunizations should be obtained before arrival to avoid delay in registration or interruption of classes for which students have enrolled. Contact the Student Health Center ([www.rit.edu/studentaffairs/studenthealth](http://www.rit.edu/studentaffairs/studenthealth)) with questions. Additional information and forms are available online.

## Readmission

Students who leave a graduate program, or have a lapse in enrollment greater than or equal to three terms, including summer, and wish to return to that program must reapply through the Office of Graduate Enrollment Services. All student applications are subject to admissions standards at the time of reapplication. The program of study shall be subject to review and may be rewritten. Previous waiver and/or transfer credit may be lost, and program deficiencies may need to be made up.

Each college has the responsibility, upon a student's readmission, of determining which previous courses if any, are applicable toward the degree. Be aware that standards and degree requirements may have changed and previous waiver, transfer, or competency credit may be lost and program deficiencies may need to be made up. All readmission decisions are made by the academic unit. Readmission is not guaranteed.

Graduate students must complete the graduate program within seven years of the date of matriculation into their program. This does not apply to prerequisites, bridge program courses or similar requirements.

# Costs and Payment Procedures

## Costs and Payment Procedures

**The university reserves the right to change its tuition and fees without prior notice. Nonmatriculated students are charged graduate rates for graduate courses.**

Graduate costs are listed in the table on this page. In addition, any graduate student carrying more than 18 credit hours of study will be charged the full-time tuition rate plus \$1,628/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: [www.rit.edu/fa/housing/](http://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, 25 Lomb Memorial Drive, Rochester, NY 14623. Payment also may be made in person at the Office of Student Financial Services on the first floor of the University Services Center. Credit card and e-check payment information can be found at [www.rit.edu/fa/sfs/billing-dates-and-payment-options](http://www.rit.edu/fa/sfs/billing-dates-and-payment-options).

Due dates are clearly designated on the billing statement and our website. Failure to

## Graduate Costs

| FALL 2021-2022  | PER SEMESTER    | PER YEAR        |
|---|-----------------|-----------------|
| Tuition (12-18 credit hours)  | \$26,046        | \$52,092        |
| Student Activity Fee  | \$158           | \$316           |
| Student Health Services Fee   | \$205           | \$410           |
| Estimated Living Expenses*  | \$5,812         | \$11,624        |
| Estimated costs for books, supplies, transportation, and personal expenses† | \$2,088         |                 |
| <b>TOTAL</b>  | <b>\$34,309</b> | <b>\$68,618</b> |

IMPORTANT NOTE: RIT health insurance is required for all full-time graduate students. This fee is estimated to be \$2,006 for two semesters.

\* Estimates based on a the rent of a bedroom apartment on RIT's campus. Choice of housing will determine (and possibly increase) actual cost. If you live in RIT housing, your living expenses will vary depending on where you live and if you choose a meal plan. Additional information regarding on-campus housing options and costs can be reviewed online at Housing Operations, [rit.edu/housing/incoming-graduate-transfer#rates](http://rit.edu/housing/incoming-graduate-transfer#rates).

† Photography and art students should estimate an additional \$2,000 for materials and supplies per nine-month period of study.

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, 2021**
- **Spring semester: January 15, 2022**

Payment plan option information can be found at: [www.rit.edu/fa/sfs/billing-dates-and-payment-options](http://www.rit.edu/fa/sfs/billing-dates-and-payment-options).

## 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](http://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](http://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**

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For information regarding refund policies for withdrawal during the semester, please contact the Student Financial Services Office or visit their website at [www.rit.edu/fa/sfs/refund](http://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 RIT Housing. All students on a meal plan should check out with RIT Dining. Refunds, when granted, are from the date of official check out.

Any student who intentionally defrauds or attempts to defraud the university of tuition, fees, or other charges, or who gives false information in order to obtain financial aid, is subject to legal liability, prosecution, and university disciplinary action.

# Financial Aid

[www.rit.edu/admissions/aid](http://www.rit.edu/admissions/aid)

## General Information

RIT offers a full range of financial aid programs to assist graduate students with their educational expenses. The information provided in this section is an overview of the sources of assistance available. Please consult the Office of Financial Aid and Scholarships' website for more detailed information.

Scholarships and assistantships are available in most graduate departments. In addition, some departments offer externally funded tuition remission and stipends from corporate or government sponsors. Please contact the appropriate graduate program director or the Office of Graduate Admission for additional information.

Financial aid awards are offered only once a student is accepted. Awards are generally given to full-time students, but exceptions are made for qualified part-time students.

All federal student aid programs require submission of the Free Application for Federal Student Aid (FAFSA). The FAFSA may be completed online at [www.studentaid.gov](http://www.studentaid.gov). Only US citizens or eligible non-citizens may use the FAFSA.

International students (F-1 or J-1 visa holders) may generally work on campus for up to 20 hours per week. Special authorization from International Student Services and/or the USCIS is needed for all other employment, including co-ops and internships. Please consult International Student Services at (585) 475-6943 or [www.rit.edu/studentaffairs/iss](http://www.rit.edu/studentaffairs/iss) for employment or visa questions.

## Federal Satisfactory Academic Progress Requirements

To be eligible for federal financial aid, students who are U.S. Citizens or permanent resident aliens (i.e. green card) are required by the U.S. Department of Education (34 CFR 668.34) to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. RIT has established this SAP policy to ensure student success and accountability and to promote timely advancement toward degree objectives.

All students receiving federal assistance (i.e. Direct Loans, Direct Graduate PLUS

Loans, Federal Work-Study) must remain enrolled in a degree program. Regulations require a maximum time frame for degree completion, a quantitative measurement (at RIT a student must complete 67% of credit hours attempted), and a qualitative measurement (at RIT a student must have at least a 3.0 cumulative grade point average).

Credit hours attempted include withdrawals, repeated courses, grade exclusions, non-matriculated courses, and credit by exam. Transfer credit count toward both attempted and completed credit hours.

Students must also complete their program within 150 percent of the standard time frame it would normally take to attain the degree. For example, a thirty (30) credit hour master's degree program would allow a student a maximum of forty-five (45) attempted credit hours to degree completion.

Review of academic records occurs at the end of each semester. Any student who has attempted or earned nine (9) or more credit hours but does not have a cumulative GPA of a 3.0 or higher will be considered not to be making SAP for federal financial aid programs (Direct Loans, Direct Graduate PLUS Loans). In addition, a student must have completed at least 67% of his total attempted credit hours. A student who does not meet this pace requirement also will not be making SAP. A student who does not appear to be able to meet degree completion within 150% of the program of study is not making SAP.

With the exception of the 150 percent degree completion requirements, students who do not make SAP may request Federal Financial Aid Probation by submission of a Request for Federal Financial Aid Probation available from the Office of Financial Aid and Scholarships. In addition to this form, the student must provide a Federal SAP Action Plan developed by the student's primary academic unit that demonstrates what the student must accomplish in order to regain federal SAP. The Office of Financial Aid and Scholarships will notify the student of the results of the request for probation. If approved, a student may continue to receive federal financial aid, as long as the individual meets the goals outlined within the SAP Action Plan. The

probation period may not be longer than two semesters in length. A student is only eligible for one Federal Financial Aid Probation for his entire graduate career at RIT. As such, the student should only request Federal Financial Aid Probation if seeking federal financial aid.

Course work not applicable to the student's program of study cannot be counted toward enrollment status nor in the determination of federal financial aid eligibility.

## Financial Aid Refund Policy

### Return of federal funds

In accordance with federal regulations, the Office of Financial Aid and Scholarships recalculates federal aid eligibility for students who withdraw, drop out, are suspended, or take a leave of absence prior to completing more than 60 percent of a term. "Withdrawal date" is defined as the actual date the student initiated the withdrawal process, the student's last date of academic related activity or the midpoint of the term for a student who leaves without notifying the university. Recalculation is based on the percent of earned aid using the following formula: number of days completed up to the withdrawal date/total days in the term. Aid returned to federal programs is then equal to 100 percent minus the percentage earned multiplied by the amount of federal aid disbursed.

Funds are returned to the federal government in the following sequence: Federal Direct Unsubsidized Loans, Federal Direct PLUS Loans, and other federal aid.

### Late disbursement

If the student is otherwise eligible, the first disbursement of Federal Direct Unsubsidized Loan and/or Federal Direct Graduate Plus Loan proceeds is allowed up to 180 days after the student has ceased to be enrolled. Subsequent disbursements are not allowed.

### State scholarships

Regulations vary. Any adjustments are done in accordance with the specific requirements of the sponsoring state.

### Privately funded grants and scholarships

In the absence of specific instructions from the sponsor, 100 percent of the semester award will be credited to the student's account.

### RIT grants and scholarships

Institutional funding such as RIT grants and scholarships are prorated based on the tuition refund schedule for withdrawal during a semester. For more information, please contact the Office of Financial Aid and Scholarships or visit their website at [rit.edu/admissions/aid](http://rit.edu/admissions/aid).

## Financial Aid Programs

| GRANTS/SCHOLARSHIPS                                 | ELIGIBILITY  | AMOUNT  | HOW TO APPLY   |
|---|--|---|--|
| Graduate Assistantships                             | Graduate student matriculated into an RIT graduate degree program.   | Amounts vary  | Complete Graduate Admissions Application and check appropriate box to be considered for graduate assistantships.   |
| Graduate Merit-based Scholarships                   | Graduate student matriculated into an RIT graduate degree program.   | Amounts vary  | Complete Graduate Admissions Application and check appropriate box to be considered for graduate scholarship.  |
| Veterans Tuition Award Program                      | Eligible Veterans who are New York state residents.  | Amounts vary.   | File the Free Application for Federal Student Aid (FAFSA) and TAP Application. Also file the Veterans Tuition Award Application at <a href="http://www.hesc.ny.gov">www.hesc.ny.gov</a> .  |
| 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 <a href="http://www.va.gov">www.va.gov</a> .  |
| 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 <a href="http://www.aigcs.org">www.aigcs.org</a> .  |
| 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) at <a href="http://www.studentaid.gov">www.studentaid.gov</a> . Must be a U.S. citizen or Permanent Resident.  |
| Federal Direct PLUS Loans for Graduate Students     | Matriculated students who are enrolled at least half-time and who are U.S. citizens or permanent residents.  | The maximum amount cannot exceed the cost of education minus all financial aid awarded.                                 | File the Free Application for Federal Student Aid (FAFSA) and complete a Federal Direct PLUS Loan application. Both can be completed at <a href="http://www.studentaid.gov">www.studentaid.gov</a> .   |
| 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 <a href="http://www.rit.edu/admissions/aid">www.rit.edu/admissions/aid</a> or contact the private lender directly. Students should always consider federal loans before private loans. |
| EMPLOYMENT  | ELIGIBILITY  | AMOUNT  | HOW TO APPLY   |
| Federal Work Study Program                          | Students who are U.S. citizens or permanent residents with financial need: most jobs provided are on campus, and some community service positions are available. | Varies, depending on hours and wage rate (RIT wage rates start at \$12.50 per hour).                                    | File the Free Application for Federal Student Aid (FAFSA). Contact the RIT Student Employment Office at <a href="http://www.rit.edu/seo">www.rit.edu/seo</a> .   |
| 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 \$12.50 per hour).                                    | Contact the RIT Student Employment Office at <a href="http://www.rit.edu/seo">www.rit.edu/seo</a> .  |

This chart covers the most commonly awarded financial aid programs available to full-time graduate students at RIT. Information is correct as of June 2021. Most graduate programs require satisfactory progress toward degree completion to maintain eligibility. Filing the FAFSA by October 1 will ensure priority consideration for all programs. Applications filed after this date will receive consideration as long as funds remain available. Scholarships provided by RIT will be prorated for NTID-sponsored students to reflect lower NTID tuition rates.



# University Policies and Procedures

[www.rit.edu/academicaffairs](http://www.rit.edu/academicaffairs)

## Academic Policies and Procedures

***The complete library of student academic policies and procedures may be found online at: [www.rit.edu/academicaffairs/policiesmanual/policies/student](http://www.rit.edu/academicaffairs/policiesmanual/policies/student).***

A graduate degree at RIT may be obtained in more than 70 programs ranging from business administration to imaging science. (Please refer to page 4 for a complete listing of graduate programs of study.)

Upon completion of the stipulated requirements, students are certified by their academic departments for their degrees. A statement verifying that a degree has been awarded will be posted to the transcript and diplomas are mailed to all graduates.

### Enrollment

1. Student should complete the enrollment and payment process in accordance with university enrollment/billing procedures, as indicated in the current enrollment guide.
2. It is the responsibility of the student to update their address online through the Student Information System (SIS), or to advise the registrar of any change of address.
3. University ID cards are required for students to use many campus facilities and services (e.g., the library, Student Life Center, meal plans, check cashing). Identification cards are available at the Registrar's Office.
4. Students are expected to pursue their degree without a substantial break. Failure to enroll (register) for three successive academic terms, including summer but excluding Intersession, can result in the loss of active student status.
5. RIT considers graduate-level students to be "full time" in every academic term in which they are enrolled for at least 9 semester credit hours. With approval of the department chair and associate provost for academic programs, additional equivalent credit can be granted for such activities as thesis work, teaching assistantships, and internships.

### Student Classification

Active graduate students are those who have applied to and been formally accepted into a graduate program through the Office of Graduate Enrollment Services. Such students may enroll for graduate-level courses (600 and above) that fit their home department-approved programs. When enrolling for graduate courses outside the home department, students may need to secure the approval of the department offering the course.

Non-degree-seeking students will be allowed to take graduate courses on a space-available basis with the department's approval, and with the knowledge that course work completed while a non-degree-seeking student will not necessarily apply to any given academic program.

Active and non-degree-seeking graduate students may enroll for undergraduate-level courses with the understanding that these courses will not apply to any RIT graduate program.

### Degree Requirements

#### ***Credit Requirements***

The minimum credit requirement for a master's degree is 30 semester credit hours. At least 80 percent of these credit hours must be earned at the graduate level and in residence at the university.

#### ***Transfer Credit***

A maximum of 20 percent of the total required semester hours for the graduate degree may be awarded through any combination of transfer credit, waived credit, and credit by competency. Only a course with a grade of B (3.0) or better may be transferred.

Transfer credits are not calculated in the student's grade point average but will count toward overall credit requirements for the degree. Transfer credits do not count toward the satisfaction of residency requirements.

A graduate student who wishes to take courses at another institution and transfer them toward degree work at RIT must obtain prior permission from the appropriate departmental officer or dean.

### Candidacy for an Advanced Degree

A graduate student must be a candidate for an advanced degree for at least one term prior to receipt of the degree. The position of the Graduate Council is that a student is a candidate for the master or doctoral degree when they are formally admitted to RIT as a graduate student.

### Dissertation, Thesis, or Project Requirements

Included as part of the total credit-hour requirement may be a research, dissertation, thesis, or project requirement, as specified by each department. The amount of credit the student is to receive must be determined by the time of enrollment for that term. For the purpose of verifying credit, an end-of-term grade of R should be submitted for each enrollment of research and thesis/dissertation guidance by the student's faculty adviser. Before the degree can be awarded, the acceptance of the thesis/dissertation must be recorded on the student's permanent record. Students also should note the following continuation of thesis/dissertation policy. Students who submit a project receive a letter grade upon completion.

Students who complete a thesis or dissertation are required to submit an electronic copy of the thesis or dissertation to ProQuest/UMI for publication.

### Continuation of Thesis/Project/Dissertation

Once work has begun on a thesis, project or dissertation, it is seen as a continuous process until all requirements are completed. If a thesis, project, or dissertation is required, or such an option is elected, and if the student has completed all other requirements for the degree, the student must enroll for the Continuation of Thesis/Project/Dissertation course each term (including summer but excluding intersession). This course costs the equivalent of one-semester credit hour, although it earns no credit.

1. Enrollment for the Continuation of Thesis/Project/Dissertation course preserves student access to RIT

services; e.g., Wallace Library, academic computing, and faculty and administrative support. With payment of appropriate user fees, access to the Student Life Center and Student Health Center also is preserved.

2. If circumstances beyond students' control preclude them from making satisfactory progress on their thesis/project/dissertation, they should consider taking a leave of absence and discuss such a leave in advance with their adviser/department head. The dean's signature of approval is required on the Leave of Absence or course, or take an approved leave of absence, their departments may elect to remove them from the program.
3. The length of time to complete a thesis/project/dissertation is at the discretion of the department. Be sure to read, however, the first point under "Summary of requirements for master's degree" on this page.

**Note:** The dissertation is required only of Ph.D. students.

### Summary Experience

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

### Overlapping Credit for Second Degree

At the discretion of the Graduate Committee in the specific degree area, a maximum of 20 percent of previous RIT master's degree earned hours can normally be applied toward satisfying requirements for a second master's degree. The use of a given course in two different programs can be allowed only if the course that was used for credit toward the first degree is a required course for the second degree. The course must be used in both programs

within five years; i.e., no more than five years between the time used for the first degree and when applied again toward the second degree.

In no case shall fewer than the minimum 30 semester credit hours be required for the second degree. If duplication of courses causes a student to go below the 30-hour limit in the second degree program, he or she would be exempted from these courses but required to replace the credit hours with departmentally approved courses. An RIT student will not be admitted through the Graduate Enrollment Services Office to the second degree program until the first program has been completed.

### Financial Standing

Tuition and fees paid to the university cover approximately 60 to 70 percent of the actual expense of a student's education. The rest of the cost is borne by the university through income on its endowment, gifts from alumni and friends, and grants from business and industry. Students, former students, and graduates are in good financial standing when their account is paid in full in the Student Financial Services Office. Any student whose account is not paid in full will not receive transcripts or degrees. The university reserves the right to change its tuition and fees without prior notice.

### Summary of Requirements for Master's Degree

1. Successfully complete all required courses of the university and the college. These requirements should be met within seven years of the date of matriculation into the student's program. Extension of this rule may be granted through petition to the dean of graduate education.
2. Complete a minimum of 30 semester credit hours for the master's degree. At least 80 percent of graduate-level course work and research (courses numbered 600 and above) must be earned in residence at RIT.
3. Achieve a program cumulative grade point average of 3.0 (B) or better.
4. Complete a thesis/project or other appropriate research or comparable profes-

sional achievement, at the discretion of the degree-granting program.

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

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

### Definition of Grades

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

| GRADE | DESCRIPTION           | QUALITY POINTS |
|-------|-----------------------|----------------|
| A     | Excellent             | 4.0            |
| A-    |                       | 3.67           |
| B+    |                       | 3.33           |
| B     | Above Average         | 3.0            |
| B-    |                       | 2.67           |
| C+    |                       | 2.33           |
| C     | Satisfactory          | 2.0            |
| C-    |                       | 1.67           |
| D     | Minimum Passing Grade | 1.0            |
| F     | Failure               | 0.0            |

C- and below grades do not count toward the fulfillment of program requirements for a graduate degree. **The grades of all courses attempted by graduate students will count in the calculation of the cumulative grade point average.** The program cumulative grade point average shall average 3.0 (B) as a graduation requirement. The dean of the college or their designee must approve all applications for graduate courses a student wishes to repeat.

The GPA is computed by the following formula:  $GPA = \frac{\text{total quality points earned}}{\text{total credit hours attempted}}$ . There are other evaluations of course work that do not affect GPA calculations. Only I

and R (as described below) can be assigned by individual instructor at the end of a term.

**Registered (R)**—A permanent grade used in graduate coursework indicating that a student has registered for a given course but has yet to meet the total requirements for the course or has continuing requirements to be met. The grade is given in graduate thesis work. Completion of this work will be noted by having the approved/accepted thesis or dissertation title, as received by the registrar from the department, added to the student's permanent record. Full tuition is charged for these courses. "R" graded courses are allowed in the calculation of the residency requirement for graduate programs; however, they do not affect GPA calculations. A student may receive a grade of "U" or "I" in a given term of an "R" graded course. A "U" grade in this case carries no credit and the course must be repeated.

**Withdrawn (W)**—A grade that indicates an official course withdrawal has been processed. See policy D05.IV.

**Satisfactory (S)**—A satisfactory grade at the graduate level may only apply to seminar, cooperative work experience, study abroad affiliate programs, and internship courses where programs have determined that a traditional alpha system letter grade is inappropriate. An "S" grade at the graduate level carries no quality points and therefore does not enter into a GPA calculation. A student may receive a grade of "U" or "I" in an "S" graded course. In this case, a "U" grade carries no credit and the course must be repeated. No more than 15% of a program's degree credits may be "S" graded courses.

**Incomplete (I)**—When an instructor observes conditions beyond the control of a student such that the student is unable to complete course requirements in the given term or session, the instructor may assign an Incomplete notation ("I") to a student. The instructor determines and advises the student of the due date, not to exceed two terms including summer session but excluding intersession, by which the student must complete course requirements. If the registrar has not received a "Change

of Grade" form from the professor after two terms including summer session but excluding intersession, then the Incomplete becomes an "F" grade or a "U" grade if the "I" was associated with an "R" or "S" graded graduate course. An extension of time may be granted at the discretion of the instructor. Credit hours are not earned and the GPA is not affected until a permanent grade is assigned.

**Unsatisfactory (U)**—A permanent grade used in certain graduate coursework indicating that a student made unsatisfactory progress towards completing the course requirements. No credit hours are earned for a "U" grade and the "U" grade does not affect the calculation of quality points or GPA. A "U" grade in an "R" or "S" graded course carries no credit and the course must be repeated.

If there are extenuating circumstances which render an instructor unable to assign a grade or evaluate a student's work and assign a grade to replace an "Incomplete" notation, the head of the academic unit in which the course was taught will select an instructor to act in the place of the original instructor. After appropriate evaluation of the student's work, that instructor will assign a grade in place of the "Incomplete" notation.

**Waived Courses (WV)**—Those courses eliminated from the list of requirements that a student must take to graduate. For undergraduate students, only physical education courses and cooperative work experience may be waived because of previously completed experience.

For graduate students, required courses may be waived because of previously completed academic work but in no case shall the resulting graduate program requirements be reduced below 30 semester credit hours. In addition, waiver credit for graduate courses can be applied only towards required courses and not towards elective courses. The process of waiving courses and thereby reducing graduate program requirements is not to be confused with the process of substituting specific courses for published requirements with an equal number of credit hours, thus retaining

the total number of credit hours in the specified program. The total combined amount of credit applied through external (non-RIT) transfer credit, waived courses, and credit by competency may not exceed 20% of the total credits in the graduate program as noted in the graduate catalog.

**X Grade (X)**—Assigned for successful completion of various assessments as defined in Policy D.02.0 Admissions. "X" grade for graduate students indicates Credit by Competency (graduate) (See policy D02.I.2).

"X" graded courses do not count toward the residency requirement and do not affect GPA calculations. Credit hours are included as hours earned.

For graduate students, the total combined amount of credit applied through external (non-RIT) transfer credit, waived courses, and credit by competency may not exceed 20% of the total credits in the graduate program as noted in the graduate catalog. Exceptions to the maximum credit by exam for graduate programs can be granted by the Graduate Council in unusual circumstances upon appeal from the dean of the college involved. For programs housed outside the college structure, the approval of the director of the academic unit is required.

**Audit (AU)**—Indicates a student has officially registered for the course for no credit. Courses available for audit are at the discretion of the college or academic unit. With permission of the instructor, the student may elect to take examinations and do course assignments. Audited courses do not count toward the residency or other degree requirements. Credit hours are not earned and GPA calculations are not affected.

A student may register for audit any time during the official registration period for the term. However, a student may not change from audit to credit or credit to audit after the official add/drop period (first seven calendar days, excluding Sundays and holidays, of the full fall, and spring terms and summer session). See Policy D03.0 - Registration. Changes from audit to credit must be accompanied by full payment of tuition.

Excluding audit courses, degree-seeking undergraduate students enrolling for 12 or more credit hours or graduate students enrolling for 9 or more credit hours may take any additional hours for audit at no incremental charge provided the total hours do not exceed 18 credit hours.

Excluding audit courses, undergraduate students enrolled for less than 12 credit hours or graduate students enrolled for less than 9 credit hours may take any additional hours for audit at a charge of one-half the normally assessed tuition rate.

### **Changing Grades**

Once a grade has been reported by an instructor, it is not within the right of any person to change this unless an actual error has been made in computing or recording it. If an error has been made, the instructor must complete the appropriate form. The completed form must be approved by the head of the department in which the instructor teaches. When approved, the form is then sent to the registrar. There is, however, an appeal procedure for disputed grades through the Academic Conduct Committee of the college in which the course is offered.

### **Academic Probation and Suspension**

Any degree-seeking graduate students will be placed on probation or suspended from the university according to the criteria enumerated below. All actions are taken at the end of the term; however, a student may petition the dean of their home college for reconsideration of probation or suspension should the removal of an incomplete grade (I) raise the program grade point average above those stated below. For programs housed outside the college structure, the approval of the director of the academic program in which the enrollment is requested is required.

Each degree-seeking graduate student will generate two different grade point averages that appear on the transcript - cumulative and term averages. The university cumulative average reflects all course work completed at RIT at the graduate level.

The term average reflects a single term of academic activity. In addition, each graduate student has a program average used for degree certification that is manually calculated by the academic unit and reflects course work completed at RIT applicable to graduation in a student's current academic program. The current academic program refers to the university and college degree course requirements specified by the degree granting college and noted in the graduate catalog.

In addition to the university requirements outlined below, individual colleges and/or programs may define more rigorous requirements for maintaining good academic standing. This information must be approved by the dean, clearly defined within published college policy, communicated in the university bulletin, and communicated to the Provost's Office. For programs housed outside the college structure, the approval of the director of the academic unit is required.

1. Any degree-seeking graduate student whose cumulative and/or program grade point average (see D5.0 - Grades, section VII) falls below a 3.00 after 9 credit hours (attempted or earned) subsequently will be placed on probation and counseled by the graduate program director (or his/her designee) concerning continuation in the graduate program.
2. Students on probation must raise their program cumulative and program grade point average to 3.00 within 9 credit hours (attempted or earned) or they will be suspended from the graduate program.
3. A graduate student suspended for academic reasons, must apply for readmission.
4. A suspended student cannot enroll in any credit or non-credit course at the university while on suspension.
5. A suspended student may appeal a suspension decision. Individual colleges and/or programs may set limitations on the number of appeals a student can submit.
6. A suspension may be waived upon written appeal to the student's home program. Final suspension waiver

approval requires dean (or designee) approval. For programs housed outside the college structure, the approval of the director of the academic unit in which the enrollment is requested is required.

7. A suspended student may be required to satisfy specific academic conditions imposed in order to be considered for readmission to his/her program.
8. A suspended student may be admitted to another program if it is approved by the dean (or designee) of the college in which enrollment is requested. For programs housed outside the college structure, the approval of the director of the academic program in which the enrollment is requested is required

### **Non-Degree-Seeking Undergraduate and Graduate Policy**

Any non-degree-seeking undergraduate student who has a cumulative GPA below 2.00 after 15 credit hours or non-degree-seeking graduate student who has a cumulative GPA below 3.00 after 9 credit hours (attempted or earned) may not register for credit or non-credit courses without the specific approval of the department head offering the course(s).

### **Student Conduct Policies and Procedures**

#### **Standards for Student Conduct**

The RIT community intends that campus life will provide opportunities for students to exercise individual responsibility and places high priority on self-regulation by its members. All members of the community are responsible for encouraging positive behavior by others, as well as preventing or correcting conduct by others that is detrimental to RIT's educational mission and values.

As an educational community, RIT strives for a campus environment that is free from coercive or exploitative behavior by its members. Moreover, it sets high standards that challenge students to develop values

that enhance their lives professionally and will enable them to contribute constructively to society.

RIT enjoys a diversity of backgrounds, lifestyles, and personal value systems among those who compose the academic community. Students, however, are expected to observe and respect the policies and standards of the university and the right of individuals to hold values that differ from their own and those expressed by RIT. Students are encouraged to review the Student Rights and Responsibilities Handbook for information regarding campus policies and expectations of student conduct.

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

RIT offers a number of services for graduate students. Those described in the following pages are among the most frequently used.

### ***RIT Honor Code***

Integrity and strong moral character are valued and expected within and outside of the RIT community. As members of the RIT campus community, including students, trustees, faculty, staff, and administrators, we will:

- Demonstrate civility, respect, decency and sensitivity towards our fellow members of the RIT community, and recognize that all individuals at this university are part of the larger RIT family, and as such are entitled to that support and mutual respect which they deserve.
- 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](http://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

[rit.edu/fa/compliance/student-right-know](http://rit.edu/fa/compliance/student-right-know)

## 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](http://rit.edu/publicsafety/safety/lostitems.html) to submit information related to lost property (requires RIT computer account).

**Emergency Notification**—If a family member needs to make an emergency notification to a student, he or she should contact Public Safety at (585) 475-2853 or TEXT at (585) 205-8333. Public safety will locate the student and relay the message.

**Awareness Programs**—Public safety hosts a variety of prevention awareness programs and services on various topics including crime prevention, personal safety, and alcohol awareness. A monthly newsletter, RIT Ready, is distributed to students,

faculty, and staff to bolster emergency preparedness on campus.

**Annual Security and Fire Safety Report**—Public safety's Annual Security and Fire Safety Report is available online and offers a description of security practices and information on reported occurrences of crime. The report may be accessed online at: [www.rit.edu/fa/compliance/student-right-know](http://www.rit.edu/fa/compliance/student-right-know)

**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](http://rit.edu/publicsafety/forms/tipline).

**Crime Statistics**—The Advisory Committee on Public Safety will provide, upon request, all campus crime statistics as reported to the Department of Education. RIT crime statistics can be found at the Department of Education website ([ope.ed.gov/security](http://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](http://rit.edu).

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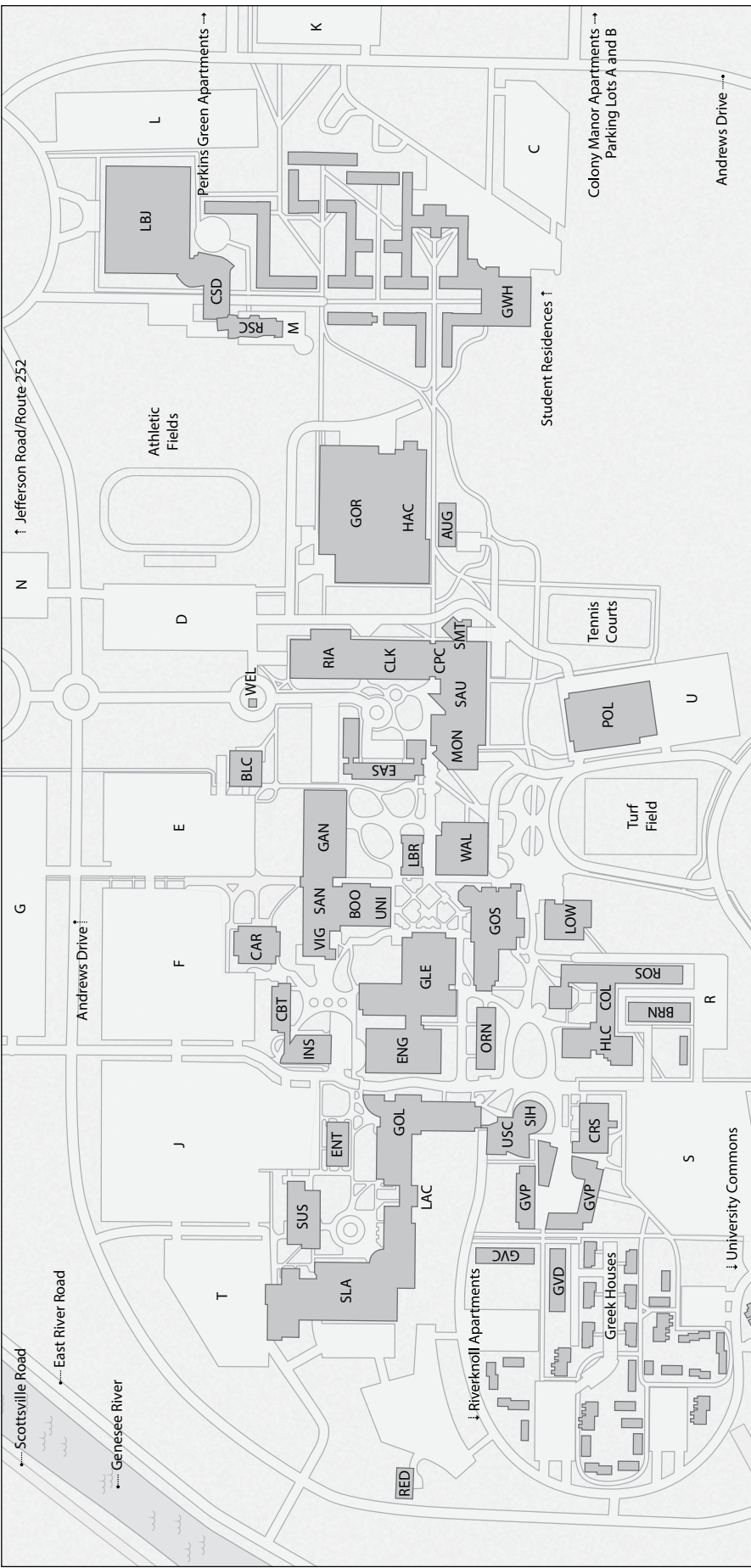


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RIT CAMPUS MAP

|     |   |     |  |     |                                  |     |                                       |
|-----|---|-----|--|-----|----------------------------------|-----|---------------------------------------|
| AUG | August Center                                 | ENG | Engineering Hall                         | HLC | Hugh L. Carey Hall               | RSC | Rosica Hall                           |
| BLC | Bausch & Lomb Center                          | ENT | Engineering Technology Hall              | INS | Institute Hall                   | SAN | Sands Family Studios                  |
| BOO | James E. Booth Hall                           | GAN | Frank E. Gannett Hall                    | LAC | Laboratory for Applied Computing | SAU | Student Alumni Union                  |
| BRN | Brown Hall                                    | GLE | James E. Gleason Hall                    | LBJ | Lyndon Baines Johnson Hall       | SIH | Student Innovation Hall               |
| CAR | Chester F. Carlson Center for Imaging Science | GOL | Golisano Hall                            | LBR | Liberal Arts Hall                | SLA | Louise Slaughter Hall                 |
| CBT | Center for Bioscience Education & Technology  | GOR | Gordon Field House and Activities Center | LOW | Max Lowenthal Hall               | SMT | Schmitt Interfaith Center             |
| CLK | George H. Clark Gymnasium                     | GOS | Thomas Gosnell Hall                      | MON | Monroe Hall                      | SUS | Golisano Institute for Sustainability |
| COL | Color Science Hall                            | GVC | Global Village Way C                     | ORN | Orange Hall                      | UNI | University Gallery                    |
| CPC | Campus Center                                 | GVD | Global Village Way D                     | POL | Gene Polisseni Arena             | USC | University Services Center            |
| CRS | Crossroads                                    | GVP | Global Village Plaza                     | RED | Red Barn                         | VIG | Vignelli Center for Design Studies    |
| CSD | CSD Student Development Center                | GWH | Grace Watson Hall                        | RIA | Frank Ritter Ice Arena           | WAL | Wallace Library                       |
| EAS | George Eastman Hall                           | HAC | Hale-Andrews Student Life Center         | ROS | Lewis P. Ross Hall               | WEL | Welcome Center                        |