School of Mathematical Sciences

Undergraduate Student Handbook

2020-21

RIT | College of Science
School of Mathematical Sciences

Rochester Institute of Technology
College of Science
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Dear Student,

Welcome to the 2020-2021 academic year at Rochester Institute of Technology! The School of Mathematical Sciences is pleased to have you as a student. We hope you will enjoy and professionally benefit from your studies with us.

As you become familiar with our faculty and facilities, you will find that we put our student's educational needs first. Our faculty truly enjoy developing relationships with you. As we navigate the unique circumstances of this particular academic year, making connections with faculty may look a bit different than 'stopping by' a physical office but rest assured, our faculty want to connect with you. Drop them an email and ask for a Zoom meeting. They will be delighted to talk with you.

We are proud of our computer laboratories, classrooms, and the unique ways we are leveraging virtual spaces for educational purposes. Our computer facilities include the statistics lab, located on the second floor opposite the School Administrative Office, as well as teaching and walk-in labs, located on the first floor.

This handbook has been specially prepared to give you current information about the School of Mathematical Sciences. We have included information about our programs, requirements, co-op opportunities, our faculty, and other related matters. Through constant feedback from business and industry, we continually update our programs, and we work diligently to develop new and exciting co-op and permanent employment opportunities.

Please feel free to make any comments or suggestions you may have. We have always benefited greatly from student input, and we are pleased to have a strong bond between our students and faculty in the School. We look forward to getting to know you during your time at RIT. You have our best wishes for a successful year.

Sincerely,

Mary Lynn Reed
Professor, Head
School of Mathematical Sciences

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1. Introduction

1.1. The Leadership and Staff of the SMS

SMS Leadership			
Name	Title	Email	Office
Mary Lynn Reed	Head	mlrsma	GOS-2334
Jobby Jacob	Associate Head, PACM	jxjsma	GOS-2312
Robert Parody	Associate Head, PASS	rjpeqa	HLC-2215
Nathan Cahill	Director, Mathematical Modeling PhD Program	ndcsma	GOS-2358
Michael Cromer	Director, Applied & Computational Math MS Program	mec2sma	GOS-2266

SMS Administrative and Student Services Staff			
Name	Title	Email	Office
Larissa Barresi	Academic Advisor	ljbsse	GOS-1278
Lindsay Cohen	Academic Advisor	laciao	GOS-1296
Lindsay D'Alleva	Academic Advisor	lkdiao	GOS-2340
Ginny Gross	Senior Staff Specialist	ginny.gross	GOS-2308
Shawna Hayes	Senior Staff Assistant	seqsma	HLC-2219
Kate Koch	Senior Staff Assistant	kate.koch	GOS-2330
Corinne Teravainen	Student and Admin Support Specialist	cxtsma	GOS-2338

1.2. An Overview of the Undergraduate Programs

RIT offers three programs within the School of Mathematical Sciences: *Applied Mathematics, Computational Mathematics,* and *Applied Statistics and Actuarial Science*. Each leads to a Bachelor of Science degree. Graduates from all three programs are successful, whether they choose to take employment upon graduation or go directly to graduate school in pursuit of advanced degrees.

Applied Mathematics

The *Applied Mathematics* program focuses upon the study and solution of problems which can be effectively analyzed through the use of mathematics. Business and industry have a great need for students with this type of training. Students declare an applications interest, called a "program concentration." By choosing a sequence of courses from one of more than twenty applications areas, students gain the knowledge and skills necessary to collaborate on complex problems with scientists, engineers, computer specialists, business analysts, imaging specialists or other analysts.

Computational Mathematics

The *Computational Mathematics* program prepares students for careers in applied mathematics and mathematical computing. It has been specially designed to incorporate a heavy concentration of computer science. Students are prepared to become mathematical analysts, systems analysts, scientific programmers, and software engineers. In this program, much emphasis is given to using the computer as a tool to solve physical problems that have been mathematically formulated.

Applied Statistics and Actuarial Science

The *Applied Statistics and Actuarial Science* program provides students with a solid foundation in mathematical and statistical principles, experience in the applications of statistics, knowledge of statistical software, and the necessary skills to communicate the results of a statistical analysis. The demand for graduates with this type of preparation is high. Business, industry and government recognize that a large number of problems can be effectively analyzed and solved through use of statistical methodology. Graduates from our program collaborate with specialists in scientific and technical areas in mathematical and statistical analyses of problems.

2. DEGREE REQUIREMENTS

The degree requirements usually are grouped into one of three categories: *general education*, *non-general education* and *program requirements*. Additionally, there is an Experiential Learning component (section 2.3) that is not necessarily tied to a specific course.

2.1. GENERAL EDUCATION

RIT's framework for general education (GE) provides students with courses that meet specific university approved general education learning outcomes and New York State Education Department liberal arts and sciences requirements. The general education framework intentionally moves through three educational phases designed to give students a strong foundation, an introduction to fundamentals of liberal arts and sciences disciplines, and the opportunity for deeper study and integrative learning through immersion in a cluster of related courses.

The general education curriculum consists of the following requirements:

The Foundation Course of First Year Writing: A course in the first year that introduces students to the intellectual life of the university, and provides a focus on communication skills to prepare students for future coursework and life-long learning.

Perspectives: Eight courses designed to introduce students to seven key areas of inquiry that develop ways of knowing the world. The perspective courses introduce students to fundamentals of a liberal arts and sciences discipline (methods, concepts, and theories) while addressing specific general education learning outcomes.

1. Ethical
2. Artistic
3. Global
4. Social
5. Natural Science Inquiry (See Science Sequence Requirement)
6. Scientific Principles (See Science Sequence Requirement)
7. Mathematical (2 courses) (fulfilled by first-year calculus courses for SMS students)

Immersion: A series of three related general education courses that further broadens a student's judgment and understanding within a specific area through deeper learning.

The Writing Intensive Course Requirement: Students must complete three writing intensive (WI) credit bearing courses:

1. One introductory WI course in the first year (ENGL 150, UWRT 150, or ISTE 110).
2. One course in the SMS program (MATH 421 or STAT 325).
3. A third course that can be a general education elective or a second WI course within the SMS program.

Science Sequence Requirement: All SMS students are required to complete one year of a lab science. This will fulfill the Natural Science Inquiry and Scientific Principles perspective requirements. The following sequences fulfill the Science requirement:

Biology	BIOL 101 & 103 General Biology I and lab (3+1 units) BIOL 102 & 104 General Biology II and lab (3+1 units)
OR	
Chemistry	CHMG 141 & 145 General & Analytic Chemistry I and lab (3+1 units) CHMG 142 & 146 General & Analytic Chemistry II, lab (3+1 units)
OR	
Physics	PHYS 211 University Physics I or PHYS 211A University Physics IA (4 units) PHYS 212 University Physics II (4 units)

Computer Science Sequence Requirement: All SMS students will complete one or two introductory computer science courses taken from the following three courses:

ISCH 110 Principles of Computing

CSCI 141 Computer Science I
CSCI 142 Computer Science II
See each individual program (sections 2.4, 2.5, or 2.6) for an explanation of the courses needed.

GE Electives and the Total Number of GE Credits: Each student must earn at least 60 general education credits. That is typically not done with only the requirements above. Each program must therefore take additional general education electives in order to bring this total to at least 60. See each program for the specific number of general education electives needed.

2.2. NON-GENERAL EDUCATION

Wellness Requirement: All students must take at least two ***distinct*** wellness activity courses before graduation. More information can be found at http://www.rit.edu/programs/undergraduate-graduation-requirements#wellness.

RIT 365 Requirement: All freshmen students at RIT take YOPS-010 RIT 365: RIT Connections, the first year requirement course. It is a zero credit course. More information on this course can be found at https://www.rit.edu/studentlife/year-one-programs.

Open Electives: Depending on the program, three or more open electives (a.k.a. *free electives*) are available for the student. See each program (sections 2.4, 2.5, and 2.6) for the number available. These courses can be used to fulfill a minor (section 3.1), double major (section 3.2), and any credit bearing course at RIT.

2.3. EXPERIENTIAL LEARNING

All students in the College of Science are required to complete Experiential Learning (EL) before they graduate. The experiential learning requirement can be fulfilled through a variety of methods including co-op, undergraduate research, summer research experiences, designated EL courses, etc. These experiences all emphasize learning through doing or performing actions that promote the skills of critical thinking in iterative cycles of both reflection and active experimentation.

In the SMS, each student must participate in one of the following activities:

- Undergraduate research (at least one semester, usually more).
- Co-op or internship (as deemed appropriate).
- Successful completion of any course designated by the SMS as an EL course.

2.4. THE APPLIED MATHEMATICS PROGRAM – Plan code: APPMTH-BS

The *Applied Mathematics* program focuses upon the application of mathematics to problems arising in the sciences, engineering or business environments. The computer is used as a tool in the analysis of such problems. Business and industry have a great need for students with this type of education. Therefore, this program requires a program concentration in one of a variety of fields of application chosen by the student.

The minimum number of credit hours needed for certification of the degree is 121, although typically a student will earn more than the minimum number.

General Education

	CH
ENGL 150: First-Year Writing (WI)	3
Perspectives	
Artistic Perspective	3
Ethical Perspective	3
Global Perspective	3
Social Perspective	3
General Education Lab Science	
Natural Science Inquiry	4
Scientific Principles	4
General Education Mathematics	
MATH 181: Project-Based Calculus I	4
MATH 182: Project-Based Calculus II	4

	CH
Designated MATH GE Course	
MATH 221: Multivariable/Vector Calculus	4
LAS/General Education Immersion	
Immersion 1	3
Immersion 2	3
Immersion 3	3
General Education Computer Science	
ISCH 110: Principles of Computing	3
CSCI 141: Computer Science I	4
General Education Electives	
GE Elective 1	3
GE Elective 2	3
GE Elective 3	3

Notes for General Education

- The total number of GE credits must total at least 60. The total listed here is 60. Nearly all GE courses are worth 3 credits.
- The lab science courses must be one of the biology lab sequence (BIOL 101-103, 102-104), chemistry lab sequence (CHMG 141-145, 142-146), or physics lab sequence (PHYS 211, 212).
- The SMS does recommend for students with the necessary background to start in CSCI 141 Computer Science I and take the follow-up course CSCI 142 Computer Science II (also worth 4 credit hours).

Non-General Education

	CH
RIT 365	0
Wellness Education	
Activity 1	0
Activity 2	0

	CH
Open Electives	
Open Elective 1	3
Open Elective 2	3
Open Elective 3	3
Open Elective 4	3

Program Requirements

	CH
Mathematics and Statistics Core	
MATH 199: Math/Stat Seminar	1
MATH 200: Discrete Math and Intro to Proof	3
MATH 231: Differential Equations	3
MATH 241: Linear Algebra	3
MATH 251: Probability and Statistics I	3
MATH 252: Probability and Statistics II	3
MATH 399: Math Sciences Job Seminar	0
MATH 411: Numerical Analysis	3
MATH 421: Mathematical Modeling (WI)	3
MATH 431: Real Variables I	3
MATH 441: Abstract Algebra I	3
EL course (MATH 500 or 501)	*

	CH
SMS Program Electives	
Program Elective 1	3
Program Elective 2	3
Program Elective 3	3
Program Elective 4	3
SMS Concentration	
Program Concentration 1	3
Program Concentration 2	3
Program Concentration 3	3

Notes and Additional Requirements:

- These add up to 61 credit hours.

- Most every undergraduate MATH or STAT course of level 200 to 599 can be a program elective. There are a few exceptions.
- ***Freshman Paper Writing Requirement:*** A portion of the content of MATH 199 is for the student to write a paper which usually represents a large portion of the grade for the course. The paper topic is sometimes related to the history of mathematics/statistics. These papers are submitted by the instructor at the end of the term for an independent analysis by the SMS Writing Committee. The committee consists of four or more SMS faculty that read the paper and assign a pass/fail grade to the paper. Those papers that fail must be rewritten and resubmitted to the committee and pass in order to satisfy the requirement.
- The MATH 199 course is designed for an incoming freshman and is usually substituted if a student changes programs into Applied Mathematics or is a transfer student from another college/university. The extra credit hour is also substituted as a program elective, but you must still achieve the minimum number of credit hours for certification (121). For these transfer and change of program students, the Freshman Paper Writing Requirement is waived.
- MATH 399 is a zero credit online course.
- ***Mathematical Modeling Paper Writing Requirement:*** A portion of MATH 421 is designated for the student to write a paper on a mathematical modeling topic. Similar to the paper for MATH 199, the completed paper is submitted by the instructor at the end of the term for an independent analysis by the SMS Writing Committee. Those papers that fail must be rewritten and resubmitted to the committee and pass in order to satisfy the requirement.
- ***Program Concentration Courses:*** This group of three courses can be taken within the SMS, but may also be in a STEM-related program, economics, or philosophy (STEM is an acronym that stands for "science, technology, engineering, mathematics"). In general, the courses eligible for inclusion in the Program Concentration are those you would take in pursuit of a minor, and must be in a discipline distinct from your GE Immersion. See your academic advisor (Lindsay D'Alleva) for the details.
- ***Depth Requirement:*** Students in APPMTH-BS are required to complete one of the following: MATH 411 & 412, MATH 431 & 432, MATH 441 & 442, STAT 405 & 406, or another sequence of upper division courses approved by SMS.
- ***Experiential Learning Courses:*** See section 2.3. If not completing MATH 499, students must enroll in one of the two courses:
  - MATH 500 Senior Capstone in Mathematics (3 credit hours). This course is taken in the final year if undergraduate research or a co-op has not been completed. In this case, it would satisfy the EL requirement and count as a program elective.
  - MATH 501 Experiential Learning Requirement in Mathematics (0 credit hours). This course satisfies the EL requirement, but enrollment requires special permission.

Program Electives: The requirement for the program electives is to complete 15 credit hours in the list of the courses below. More information about these courses can be found in section 2.7. Some graduate courses may count as a program elective, but special permission must be given from both the instructor and your academic advisor.

Courses offered	**Courses offered**
MATH 255 Actuarial Mathematics	MATH 261 Topics in Mathematical Finance
MATH 295 Topics in Problem Solving	MATH 291 History of Mathematics
MATH 326 Boundary Value Problems	MATH 301 Mathematics of Simulation
MATH 341 Advanced Linear Algebra	MATH 305 Intro to Mathematical Computing
MATH 351 Graph Theory	MATH 311 Linear Optimization
MATH 361 Combinatorics	MATH 312 Nonlinear Optimization
MATH 371 Number Theory	MATH 321 Game Theory
MATH 381 Complex Variables	MATH 331 Dynamical Systems
MATH 505 Stochastic Processes	MATH 367 Codes and Ciphers
MATH 412 Numerical Linear Algebra	MATH 432 Real Variables II
MATH 495 Undergraduate Research	MATH 442 Abstract Algebra II
MATH 498 Independent Study	MATH 461 Topology
MATH 500 Senior Capstone in Mathematics	STAT 295 Statistical Analysis for Bioinformatics
STAT 305 Regression Analysis	STAT 521 Statistical Quality Control
STAT 325 Design of Experiments	STAT 335 Introduction to Time Series

STAT 405 Mathematical Statistics I	STAT 345 Nonparametric Statistics
STAT 406 Mathematical Statistics II	STAT 415 Statistical Sampling
STAT 500 Senior Capstone in Statistics	STAT 425 Multivariate Analysis
STAT 511 Statistical Software	STAT 435 Statistical Linear Models
STAT 547 Data Mining	STAT 572 Survey Design and Analysis
STAT 584 Categorical Data Analysis	

2.5. THE COMPUTATIONAL MATHEMATICS PROGRAM - Plan code: CMTH-BS

This program has been specially designed to incorporate a heavy concentration of computer science courses within an applied mathematics curriculum so that students can effectively use computers in their applied mathematics work. Job opportunities are abundant in this field.

In order to graduate from the *Computational Mathematics Program*, the student must successfully complete certain courses in mathematics and computer science, as well as some courses in non-mathematics areas.

The minimum number of credit hours needed for certification of the degree is 122, although typically a student will earn more than the minimum number.

General Education

	CH
ENGL 150: First-Year Writing (WI)	3
Perspectives	
Artistic Perspective	3
Ethical Perspective	3
Global Perspective	3
Social Perspective	3
General Education Lab Science	
Natural Science Inquiry	4
Scientific Principles	4
General Education Mathematics	
MATH 181: Project-Based Calculus I	4
MATH 182: Project-Based Calculus II	4

	CH
Designated MATH GE Course	
MATH 221: Multivariable/Vector Calculus	4
LAS/General Education Immersion	
Immersion 1	3
Immersion 2	3
Immersion 3	3
General Education Computer Science	
CSCI 141: Computer Science I	4
CSCI 142: Computer Science II	4
General Education Electives	
GE Elective 1	3
GE Elective 2	3
GE Elective 3	3

Notes for General Education

- The total number of GE credits must total at least 60. The total listed here is 61. Nearly all GE courses are worth 3 credits.
- The lab science courses must be one of the biology lab sequence (BIOL 101-103, 102-104), chemistry lab sequence (CHMG 141-145, 142-146), or physics lab sequence (PHYS 211, 212).

Non-General Education

	CH
RIT 365	0
Wellness Education	
Activity 1	0
Activity 2	0

	CH
Open Electives	
Open Elective 1	3
Open Elective 2	3
Open Elective 3	3
Open Elective 4	3

Program Requirements

	CH
Mathematics and Statistics Core	
MATH 199: Math/Stat Seminar	1
MATH 200: Discrete Math w/ Intro to Proof	3
MATH 231: Differential Equations	3
MATH 241: Linear Algebra	3
MATH 251: Probability and Statistics I	3
MATH 399: Math/Stat Job Seminar	0
MATH 411: Numerical Analysis	3
MATH 421: Mathematical Modeling (WI)	3
MATH 431: Real Variables I	3
MATH 441: Abstract Algebra I	3
EL course (MATH 500 or 501)	*

	CH
Choose one of the following (Program Elective 1)	
MATH 351: Graph Theory	3
MATH 412: Numerical Linear Algebra	3
Computer Science Core	
CSCI 243: Mechanics of Programming	3
CSCI 262: Intro to Computer Science Theory	3
SMS/CS Program Electives	
Program Elective 2 (MATH/STAT)	3
Program Elective 3 (MATH/STAT)	3
Program Elective 4 (CSCI or SWEN 261)	3
Program Elective 5 (CSCI)	3
Program Elective 6 or Senior Capstone *	3

Notes and Additional Requirements:

- These add up to 61 credit hours.
- Most every undergraduate MATH or STAT course of level 200 to 599 can be a program elective. There are a few exceptions.
- ***Freshman Paper Writing Requirement:*** A portion of the content of MATH 199 is for the student to write a paper which usually represents a large portion of the grade for the course. The paper topic is sometimes related to the history of mathematics/statistics Those papers are submitted by the instructor at the end of the term for an independent analysis by the SMS Writing Committee. The committee consists of four or more SMS faculty that read the paper and assign a pass/fail grade to the paper. Those papers that fail must be rewritten and resubmitted to the committee and pass in order to satisfy the requirement.
- The MATH 199 course is designed for an incoming freshman and is usually substituted if a student changes programs into Applied Mathematics or is a transfer student from another college/university. The extra credit hour is also substituted as a program elective, but you must still achieve the minimum number of credit hours for certification (122). For these transfer and change of program students, the Freshman Paper Writing Requirement is waived.
- MATH 399 is a zero credit online course.
- ***Mathematical Modeling Paper Writing Requirement:*** A portion of MATH 421 is designated for the student to write a paper on a mathematical modeling topic. Similar to the paper for MATH 199, the completed paper is submitted by the instructor at the end of the term for an independent analysis by the SMS Writing Committee. Those papers that fail must be rewritten and resubmitted to the committee and pass in order to satisfy the requirement.
- ***Experiential Learning Courses:*** See section 2.3. If not completing MATH 499, students must enroll in one of the two courses:
  - MATH 500 Senior Capstone in Mathematics (3 credit hours). This course is taken in the final year if undergraduate research or a co-op has not been completed. In this case, it would satisfy the EL requirement and count as one of the program electives for mathematics.
  - MATH 501 Experiential Learning Requirement in Mathematics (0 credit hours). This course satisfies the EL requirement, but enrollment requires special permission.

Program Electives: The requirement for the program electives is to complete 18 credit hours in the list of the courses below. At least two of the courses must be courses from computer science. Those courses must be chosen from those computer science courses that are used to satisfy the minor in computer science. Below are the mathematics and statistics courses that can be used as program electives (note that both 351 and 412 can be

taken – one course would be used for the required portion and the other can be used as a program elective). More information about the mathematics and statistics courses can be found in section 2.7. Some graduate courses may count as a program elective, but special permission must be given from both the instructor and your academic advisor.

Courses offered	**Courses offered**
MATH 255 Actuarial Mathematics	MATH 261 Topics in Mathematical Finance
MATH 295 Topics in Problem Solving	MATH 291 History of Mathematics
MATH 326 Boundary Value Problems	MATH 301 Mathematics of Simulation
MATH 341 Advanced Linear Algebra	MATH 305 Intro to Mathematical Computing
MATH 351 Graph Theory	MATH 311 Linear Optimization
MATH 361 Combinatorics	MATH 312 Nonlinear Optimization
MATH 371 Number Theory	MATH 321 Game Theory
MATH 381 Complex Variables	MATH 331 Dynamical Systems
MATH 505 Stochastic Processes	MATH 367 Codes and Ciphers
MATH 412 Numerical Linear Algebra	MATH 432 Real Variables II
MATH 495 Undergraduate Research	MATH 442 Abstract Algebra II
MATH 498 Independent Study	MATH 461 Topology
MATH 500 Senior Capstone in Mathematics	STAT 295 Statistical Analysis for Bioinformatics
STAT 305 Regression Analysis	STAT 521 Statistical Quality Control
STAT 325 Design of Experiments	STAT 335 Introduction to Time Series
STAT 405 Mathematical Statistics I	STAT 345 Nonparametric Statistics
STAT 406 Mathematical Statistics II	STAT 415 Statistical Sampling
STAT 500 Senior Capstone in Statistics	STAT 425 Multivariate Analysis
STAT 511 Statistical Software	STAT 435 Statistical Linear Models
STAT 547 Data Mining	STAT 572 Survey Design and Analysis
STAT 584 Categorical Data Analysis	

2.6. THE APPLIED STATISTICS AND ACTUARIAL SCIENCE PROGRAM - Plan code: APPSTAT-BS

The *Applied Statistics and Actuarial Science Program* has been designed to prepare students as applied statisticians for positions in business, industry, governmental agencies and hospitals. More specifically, students in this program will be involved in the application of statistics to problems in data analysis, quality control, reliability analysis, and statistical forecasting.

The first two years of the program focus on the development of a wide range of basic skills in mathematics, statistics, and computer science. The required coursework provides the necessary background for the advanced courses to follow. The remaining years offer the student the opportunity to advance in both depth and diversity into the field of statistics. Specifically, the course of study provides the student with:

- An undergraduate mathematical preparation
- A foundation in statistical principles
- Experience in the application of statistics
- Knowledge of statistical software
- The necessary skills to communicate the results of a statistical analysis

The program prepares students for some of the exams of the Society of Actuaries that they have to pass and to earn credits with the Society of Actuaries by Validation by Educational Experience (VEE) in the areas of economics, finance, and applied statistics. It is recommended that a student plan on earning minors in Finance and Economics.

In order to become an Associate of the Society of Actuaries (SOA), a student is required to earn credits from other exams not covered in the Applied Statistics curriculum but administered by the SOA. However, the above courses in the Actuarial Studies Option offer significant advantage in taking the preliminary exams as well as expediting the process of becoming an Associate.

The Society of Actuaries maintains the website http://www.beanactuary.org , with links to dates, sites, and deadlines for Exam P/1 and to how to apply for VEE credit. The up to date list of RIT courses that are approved for VEE credit may be accessed at http://www.soa.org/education/exam-req/edu-vee.aspx. The Society of Actuaries' main website is http://www.soa.org.

The minimum number of credit hours needed for certification of the degree is 120, although typically a student will earn more than the minimum number.

General Education

	CH
ENGL 150: First-Year Writing (WI)	3
Perspectives	
Artistic Perspective	3
Ethical Perspective	3
Global Perspective	3
Social Perspective	3
General Education Lab Science	
Natural Science Inquiry	4
Scientific Principles	4
General Education Mathematics	
MATH 181: Project-Based Calculus I	4
MATH 182: Project-Based Calculus II	4

	CH
Designated MATH GE Course	
MATH 221: Multivariable/Vector Calculus	4
LAS Immersion	
Immersion 1	3
Immersion 2	3
Immersion 3	3
General Education Computer Science	
ISCH 110: Principles of Computing	3
General Education Electives	
GE Elective 1	3
GE Elective 2	3
GE Elective 3	3
GE Elective 4	3
GE Elective 5	3

Notes for General Education

- The total number of GE credits must total at least 60. The total listed here is 62. Nearly all GE courses are worth 3 credits.
- The lab science courses must be one of the biology lab sequence (BIOL 101-103, 102-104), chemistry lab sequence (CHMG 141-145, 142-146), or physics lab sequence (PHYS 211, 212).
- The SMS does recommend that, for students with the necessary background, to take CSCI 141 Computer Science I (4 credit hours) instead of ISCH 110. This replacement course is very useful because it means you would not need to take the GE Elective 5 course (in this case the total number of GE credits would be exactly 60).

Non-General Education

	CH
YearOne	0
Wellness Education	
Activity 1	0
Activity 2	0

	CH
Open Electives	
Open Elective 1	3
Open Elective 2	3
Open Elective 3	3

Program Requirements

	CH
Mathematics and Statistics Core	
MATH 199: Math/Stat Seminar	1
MATH 200: Discrete Math w/ Intro to Proof	3
MATH 241: Linear Algebra	3
MATH 251: Probability and Statistics I	3
MATH 252: Probability and Statistics II	3
MATH 255: Actuarial Mathematics	3
MATH 261: Topics in Mathematical Finance	3
MATH 399: Math/Stat Job Seminar	0
STAT 305: Regression Analysis	3
STAT 325: Design of Experiments (WI)	3
STAT 405: Mathematical Statistics I	3
STAT 406: Mathematical Statistics II	3
STAT 500 Senior Capstone in Statistics	3

	CH
SMS Program Electives	
Program Elective 1	3
Program Elective 2	3
Program Elective 3	3
Program Elective 4	3
Program Elective 5	3

Notes and Additional Requirements:

- These add up to 58 credit hours.
- At least three of the five program electives must be chosen from the following:
  STAT 521 Statistical Quality Control
  STAT 511 Statistical Software
  STAT 572 Survey Design
  STAT 547 Data Mining
  STAT 584 Categorical Data Analysis
  STAT 335 Introduction to Time Series
  STAT 345 Nonparametric Statistics
  STAT 425 Multivariate Analysis
  MATH 505 Stochastic Processes

  The remaining two program electives can be most every undergraduate MATH or STAT course of numbered 200 to 599.
- ***Freshman Paper Writing Requirement:*** A portion of the content of MATH 199 is for the student to write a paper which usually represents a large portion of the grade for the course. The paper topic is sometimes related to the history of mathematics/statistics Those papers are submitted by the instructor at the end of the term for an independent analysis by the SMS Writing Committee. The committee consists of four or more SMS faculty that read the paper and assign a pass/fail grade to the paper. Those papers that fail must be rewritten and resubmitted to the committee and pass in order to satisfy the requirement.
- The MATH 199 course is designed for an incoming freshman and is usually substituted if a student changes programs into Applied Mathematics or is a transfer student from another college/university. The extra credit hour is also substituted as a program elective, but you must still achieve the minimum number of credit hours for certification (120). For these transfer and change of program students, the Freshman Paper Writing Requirement is waived.
- MATH 399 is a zero credit online course.
- ***Design of Experiments Paper Writing Requirement:*** A portion of STAT 325 is designated for the student to write a paper on a design of experiments topic. Similarly to the paper for MATH 199, the completed paper is submitted by the instructor at the end of the term for an independent analysis by the SMS Writing Committee. Those papers that fail must be rewritten and resubmitted to the committee and pass in order to satisfy the requirement.
- ***Experiential Learning Course:*** See section 2.3. The course STAT 500 is a designated Experiential Learning course. Since it is a core course, then this requirement is satisfied by taking the course.

Program Electives: The requirement for the program electives is to complete 15 credit hours in the list of the courses below. More information about these courses can be found in section 2.7. Some graduate courses may

count as a program elective, but special permission must be given from both the instructor and your academic advisor.

Courses offered	**Courses offered**
MATH 231 Differential Equations	MATH 291 History of Mathematics
MATH 295 Topics in Problem Solving	MATH 301 Mathematics of Simulation
MATH 326 Boundary Value Problems	MATH 305 Intro to Mathematical Computing
MATH 341 Advanced Linear Algebra	MATH 311 Linear Optimization
MATH 351 Graph Theory	MATH 312 Nonlinear Optimization
MATH 361 Combinatorics	MATH 321 Game Theory
MATH 371 Number Theory	MATH 331 Dynamical Systems
MATH 381 Complex Variables	MATH 367 Codes and Ciphers
MATH 505 Stochastic Processes	MATH 432 Real Variables II
MATH 411 Numerical Analysis	MATH 442 Abstract Algebra II
MATH 412 Numerical Linear Algebra	MATH 461 Topology
MATH 421 Mathematical Modeling	STAT 295 Statistical Analysis for Bioinformatics
MATH 431 Real Analysis I	STAT 521 Statistical Quality Control
MATH 441 Abstract Algebra I	STAT 335 Introduction to Time Series
MATH 495 Undergraduate Research	STAT 345 Nonparametric Statistics
MATH 498 Independent Study	STAT 415 Statistical Sampling
MATH 500 Senior Capstone in Mathematics	STAT 425 Multivariate Analysis
STAT 511 Statistical Software	STAT 435 Statistical Linear Models
STAT 547 Data Mining	STAT 572 Survey Design and Analysis
STAT 584 Categorical Data Analysis	

2.7. SMS Courses

Note that courses running are dependent on sufficient enrollment. The school reserves the right to cancel any course if the resources are not available to do so. The following table contains all the undergraduate courses 200 or higher including the terms (Fall, Spring, or Summer) and an indication if the course is only offered every other year (OY).

Course	Name	Prerequisite(s)	Fall	Spr	Su	OY
MATH 200	Discrete Math and Intro to Proof	MATH 182	X	X		
MATH 219	Multivariable Calculus	MATH 182	X	X	X	
MATH 220	Vector Calculus	MATH 219		X		
MATH 221	Multivariable and Vector Calculus	MATH 182	X	X	X	
MATH 231	Differential Equations	MATH 182	X	X	X	
MATH 241	Linear Algebra	MATH 219	X	X	X	
MATH 251	Probability and Statistics I	MATH 182	X	X	X	
MATH 252	Probability and Statistics II	MATH 251	X	X		
MATH 255	Actuarial Mathematics	MATH 251		X		
MATH 261	Topics in the Mathematics of Finance	MATH 219, 251		X		
MATH 291	History of Mathematics	MATH 181				X
MATH 295	Topics in Math. Problem Solving	MATH 182	X			
MATH 301	Mathematics of Simulation	MATH 252				X
MATH 305	Intro to Mathematical Computing	MATH 219, 241, CSCI 141				X
MATH 311	Linear Optimization	MATH 241				X
MATH 312	Nonlinear Optimization	MATH 219, 311				X
MATH 321	Game Theory	MATH 241				X
MATH 326	Boundary Value Problems	MATH 219, 231	X	X	X	
MATH 331	Dynamical Systems	MATH 231, 241				X
MATH 341	Advanced Linear Algebra	MATH 241	X	X	X	
MATH 351	Graph Theory	MATH 200	X	X		
MATH 361	Combinatorics	MATH 200		X		
MATH 367	Codes and Ciphers	MATH 200				X
MATH 371	Number Theory	MATH 200		X		
MATH 381	Complex Variables	MATH 219	X	X	X	
MATH 505	Stochastic Processes	MATH 241, 251		X		

MATH 411	Numerical Analysis	MATH 231, 241	X			
MATH 412	Numerical Linear Algebra	MATH 221, 231, 341		X		
MATH 421	Mathematical Modeling	MATH 200, 221, 231, 241	X			
MATH 431	Real Variables I	MATH 200, 221	X	X		
MATH 432	Real Variables II	MATH 431				X
MATH 441	Abstract Algebra I	MATH 200, 241	X	X		
MATH 442	Abstract Algebra II	MATH 441				X
MATH 461	Topology	MATH 431				X
MATH 495	Undergraduate Research	Special permission				
MATH 498	Independent Study	Special permission				
MATH 500	Senior Capstone in Mathematics	MATH 411, 421, and 431 or 441		X		
STAT 295	Statistical Analysis for Bioinformatics	MATH 200				X
STAT 305	Regression Analysis	MATH 241, 252		X		
STAT 521	Statistical Quality Control	MATH 252				X
STAT 325	Design of Experiments	MATH 252	X			
STAT 335	Introduction to Time Series	MATH 252				X
STAT 345	Nonparametric Statistics	MATH 252	X			
STAT 405	Mathematical Statistics I	MATH 252	X			
STAT 406	Mathematical Statistics II	STAT 405		X		
STAT 415	Statistical Sampling	MATH 252				X
STAT 425	Multivariate Analysis	STAT 305				X
STAT 435	Statistical Linear Models	STAT 305				X
STAT 500	Senior Capstone in Statistics	STAT 305, 325		X		
STAT 511	Statistical Software		X	X		
STAT 547	Data Mining	STAT 305		X		
STAT 572	Survey Design and Analysis	MATH 252	X			
STAT 584	Categorical Data Analysis	STAT 305		X		

Course Restrictions: There are certain courses offered by the School of Mathematical Sciences which students majoring in Applied Mathematics, Computational Mathematics, and Applied Statistics and Actuarial Science may not take for credit that can be applied to the program.

MATH	STAT
090 Algebra 101 College Algebra 104 Contemporary Mathematics 111 Precalculus 131 Discrete Mathematics 161 Applied Calculus 185 Mathematics of Graphical Simulation I 186 Mathematics of Graphical Simulation II 211 Elements of Multivariable Calculus and Differential Equations 233 Linear Systems and Differential Equations	Any course with a number less than STAT-295 may not be used as a program elective.

3. PROGRAM ENHANCEMENTS/OPPORTUNITIES

3.1. MINORS

RIT encourages all students to pursue a minor to broaden their knowledge. A list of all minors with their requirements is available at https://www.rit.edu/study/minors-and-immersions. To declare a minor, a student must fill out the "Minor Authorization / Change" form available on the registrar's website: https://www.rit.edu/academicaffairs/registrar/forms.html.

In general, a student cannot declare a minor that is offered within their home department. However, the School of Mathematical Sciences permits a student with a plan in Applied Mathematics or Computational Mathematics to have a minor in Statistics. Likewise, it is allowable for a student with a plan in Applied Statistics and Actuarial Science to have a minor in Mathematics. If you are interested in a minor in mathematics or statistics, contact smsminors@rit.edu.

Within the past few years, the most popular minors for SMS students have been Computer Science and Economics.

3.2. DOUBLE MAJOR OR DUAL DEGREE

Double Major

A double major is a program of study that meets the requirements of two distinct majors in a single Bachelor's degree. The program of study consists of courses required to meet the degree requirements for each of the two majors, together with the liberal arts and science courses needed to meet the general education requirements for the degree. The minimum number of credit hours required for a double major equals the total number of credit hours required for the major comprising the larger number of credit hours for the degree.

Students may apply the same coursework towards the fulfillment of requirements for both majors. Students who complete the requirements for a double major receive a single diploma that acknowledges both majors.

Some examples of double majors of SMS students:

- Applied Mathematics and Mechanical Engineering
- Applied Mathematics and Physics
- Applied Mathematics and Imaging Science
- Applied Statistics and Actuarial Science and Economics
- Computational Mathematics and Computer Science

You can find the double major policy at https://www.rit.edu/academicaffairs/policiesmanual/d012.

Dual Degree

A dual degree program is one in which the student works towards satisfying the academic requirements for two distinct degree types in an integrated fashion. Currently at RIT at the undergraduate level, this option applies solely to those students who aspire to earning the Bachelor of Science (BS) and the Bachelor of Fine Arts (BFA) in a single program of study. Students may apply the same coursework towards the fulfillment of the requirements for both degrees. To achieve the academic depth and breadth implied by a program of study that results in the awarding of two undergraduate degrees, a dual degree program consists of *substantial additional coursework* as compared to that required for a double major; namely, a minimum of 30 additional semester hours beyond the credit hours required for the degree program comprised of the smaller number of credits. Students who successfully complete a dual degree program receive two diplomas, one for each degree earned.

You can find the dual degree policy at https://www.rit.edu/academicaffairs/policiesmanual/d013.

3.3. BS/MS Degree Options

MS in Applied and Computational Mathematics – Plan Code: ACMTH-MS

The Master of Science degree program in *Applied and Computational Mathematics* focuses on the applications of mathematics in the physical sciences, engineering, business, and other areas. This is both a full-time and part-time program with the goal of providing students with advanced mathematical concepts and their relevance to solving problems in business and industry. It is designed both for students whose undergraduate education is in mathematics and also for students with other backgrounds, such as engineering, business, computer science and the physical sciences. Students tailor their program to reflect their research or career interests by choosing one of four program concentrations.

MS in Applied Statistics – Plan Code: APPSTAT-MS

The Master of Science degree program in *Applied Statistics* is designed to introduce students to advanced applied statistics methodology, and to realize the potential for that methodology as a general tool in the study of a variety of problems in business and industry. The program may also be the springboard to pursue doctoral studies in statistics. Students learn about both the foundation and tools of statistics in such areas as data mining, machine learning, design of experiments and modeling. The graduate program in Applied Statistics is flexible enough to allow students to take courses full-time on campus or part-time on line. Full-time, on campus students typically take two years to complete the program. The program consists of four core courses, electives, and either Capstone option or a Thesis option for a total of 30 semester credit hours.

Combined Undergraduate and Graduate Degrees

The School of Mathematical Sciences offers several options for combining undergraduate and graduate degrees, enabling students to complete their bachelor's and master's degrees in one year of full-time study beyond the normal undergraduate requirements. Students may apply to the appropriate graduate program when they have attained third year status (this involves completing a Change of Program form and talking to both the SMS Associate Head and the Graduate Director of the particular MS program). Additionally, the student must complete all the admission requirements of the graduate program. The following options are available:

BS Program	**MS Program**
Applied Mathematics Computational Mathematics Applied Statistics and Actuarial Science	Applied and Computational Mathematics
Computational Mathematics	Computer Science (in GCCIS)
Applied Statistics and Actuarial Science	Applied Statistics

The Saunders College of Business also offers an Accelerated MBA for RIT undergraduates. This option fits in particularly well for Applied Mathematics and Applied Statistics students that choose the recommended foundation courses for their program electives. The MBA may be completed with an additional year of coursework. Details can be found at http://saunders.rit.edu/programs/graduate/mba_accelerated.php .

3.4. Undergraduate Research

RIT is emerging as a premier undergraduate research university. Many of our majors choose to pursue research paths, working collaboratively with faculty members on innovative and exciting research projects.

The SMS at RIT has a nationally recognized program of undergraduate research. At many large universities, faculty members work with PhD students on research ventures, but at RIT, undergraduates are our main focus. Many of our majors choose to pursue research paths, working collaboratively with faculty members on innovative and exciting research projects. Students can collaborate with faculty on a variety of research projects in combinatorics, differential equations, differential geometry, dynamical systems, graph theory, hyperspectral imaging, mathematical modeling, and statistics.

After signing up with a faculty mentor, students register for **MATH 495 Undergraduate Research**. Research projects can vary in length from one term to a year or more and can be in any number of mathematical subjects. Several of our majors have participated in National Science Foundation funded Research Experience for Undergraduates (REU) programs at various universities across the country, researching topics such as biostatistics, graph theory, and knot theory.

3.5. CO-OP

What Is a Co-op? Each of our programs features an optional cooperative education plan known as "co-op." Co-op experience not only provides the student with the opportunity to work in his/her chosen career field prior to graduation but also enables the student to earn attractive salaries that can substantially offset educational costs. The additional experience and expertise acquired by the student through co-op make permanent jobs significantly easier to obtain after graduation.

When Can I Co-op? We recommend you complete two years as a full-time student in the Applied Mathematics, Computational Mathematics or Applied Statistics and Actuarial Science program (or the equivalent if you have transfer or advanced placement credit) before you co-op. Most students begin during the summer or fall after their second year.

How Do I Find a Co-op Job? The Office of Co-operative Education and Career Services offers a full range of services to help you locate a co-op job:

- Identification of employment opportunities
- Career fairs and on-campus co-op interviews
- Directories of technical companies to contact
- Individual assistance in writing your resume and cover letters
- Individual counseling for your co-op search
- Mock interviews and panel discussions

Please make an appointment with the co-op coordinator for the School of Mathematical Sciences students, Kris Stehler, Career Services Coordinator (kwsoce@rit.edu, 475-5468), at least three to four months prior to the term in which you wish to co-op. Beginning in your second year, you will be able to enroll in **MATH 399 Mathematical Sciences Job Search Seminar.** This course will acquaint you with the services and assistance available at RIT for finding your first co-op position or preparing you for the job search after graduation.

Why Should I Co-op? Although co-op is optional, the School of Mathematical Sciences urges you to co-op in order to obtain valuable experience that will make school more relevant and give you a definite advantage in finding a job when you graduate. The mathematics and statistics graduates who participate in co-op have near 100% success in obtaining permanent employment. Also, in terms of financing an RIT education, with co-op you should be able to earn enough money to substantially help in meeting your college expenses.

More information about co-ops can be found at https://www.rit.edu/co-op.

3.6. STUDY ABROAD

Interested in taking a term to take courses at some overseas campus? Visit the RIT Global office and see the opportunities that are available. Their website is https://www.rit.edu/academicaffairs/global/about-overview .

3.7. INDEPENDENT STUDY

The purpose of an Independent Studies course, like those courses that you take with other students in class, is to introduce you to new material that you did not have before. We approve and allow offering of Independent Studies for courses that we do not have in the books and are not offered on a regular basis.

If you are interested in taking an independent studies course, you need to find an instructor who is willing to offer this course. The instructor must then write up a contract with you that will include:

- The description of the course
- Units
- Meeting times
- Assessment of your success in the course (i.e. grading policy)

The contract must be signed by the instructor and the Head of the SMS. A grade will be assigned for the course to indicate quality and completion of the work.

Additionally, there are two restrictions:

- The maximum number of units for an Independent Study course is 3.
- No more than 12 units of independent study course work may count toward the degree.

3.8. PUTNAM EXAM

The William Lowell Putnam Mathematical Competition, often abbreviated to the Putnam Competition, is an annual mathematics competition (taking place the first weekend of December) for undergraduate college students enrolled at institutions of higher learning in the United States and Canada. It awards a scholarship and cash prizes ranging from $250 to $2,500 for the top students and $5,000 to $25,000 for the top schools, plus one of the top five individual scorers (designated as *Putnam Fellows*) gets graduate tuition waived at Harvard (Putnam Fellow Prize Fellowship), and the top 100 individual scorers have their names mentioned in the American Mathematical Monthly's October issue (alphabetically ordered within rank). It is widely considered to be the most prestigious university-level mathematics examination in the world, and its difficulty is such that the median score is often zero or one (out of 120) despite being attempted by students specializing in mathematics.

Contact Dr. James Marengo (jemsma@rit.edu) if you are interested.

3.9. THE MATHEMATICAL CONTEST IN MODELING

The Mathematical Contest in Modeling is a multi-day mathematics competition held annually during the first or second weekend in February, since 1985. It is sponsored by SIAM, the NSA, and INFORMS. It is distinguished from other major mathematical competitions such as Putnam by its strong focus on research, originality, teamwork, communication and justification of results.

If interested, visit http://www.comap.com/undergraduate/contests/. It will be necessary to recruit a faculty sponsor and enough students to constitute a team to participate in the contest. This will need to be done well before the contest is to take place to secure funding in order to register.

3.10. PROBLEM SOLVING

Why spend time solving tough problems out of mathematical journals? There are three reasons for doing so:

- Learn some new mathematics. Many times you will try a problem because it seems like a very interesting question, but find that you must teach yourself a math topic that you haven't had a class in yet. That will give you a head start for when you actually have to take that class.
- Get some experience with scientific writing. This is the part that students dread the most because you can't send your solution to the problem editors as if you would turn in as a homework assignment. You must write your solution in LaTeX (typesetting system) and in a format that other mathematicians will understand how you solved the problem. Your solution must be concise, but as short as possible – otherwise the problem editors won't put your solution in their journal.

- Pad your resume. After you graduate, most of you will either get a job or go on to graduate school. In either case, your resume will be evaluated by a range of people who will try to decide who would best fit in the position or within the department. Having your name published in a scientific journal will put you one step ahead of other applicants that did not.

Some of the journals for which there are regularly published problems are the Pi Mu Epsilon Journal, the College Mathematics Journal, Mathematics Magazine, and the American Mathematical Monthly.

Some of the SMS faculty will conveniently post some of these problems in the hallway next to room GOS-2312.

4. Recognitions and Scholarships

4.1. Dean's List

By action of the College of Science, full-time degree-seeking undergraduate students will be placed on the Dean's List if their term GPA is greater than or equal to 3.40; they do not have any grades of "Incomplete", "D" or "F", (including wellness and any other non-credit but required courses); and they have registered for, and completed, at least 12 credit hours.

For more information, see https://www.rit.edu/academicaffairs/policiesmanual/d051.

4.2. Institute and SMS Scholarships

For RIT Merit Scholarships, see https://www.rit.edu/emcs/financialaid/table_merit.html.

For SMS and COS Scholarships, see https://www.rit.edu/science/sms/scholarships.

4.3. The SMS Honors and Awards Ceremony

Each year in late April or early May, the SMS holds a ceremony where we congratulate those graduating and recognize the accomplishments of the students over the past year. A fun time is guaranteed for all.

4.4. SMS/COS Research Scholar

The COS Research Scholar award recognizes truly exceptional undergraduate researchers. The key characteristics of a COS Research Scholar are involvement in a long-term mentored-research experience, excellence in that research project, evidence of meaningful peer review of the work, and at least one instance of dissemination of the research beyond the academic unit.

4.5. The Outstanding Undergraduate Scholar

One of the traditional concerns of colleges and universities is with the definition and recognition of excellence. The Outstanding Undergraduate Scholar Award has been established to recognize excellence in academic achievement by students. Those selected to receive the award are designated RIT Scholars in perpetuity. The achievement is noted on the Scholar's transcript and recognized through a specially designed medallion symbolic of high academic achievement. The awards are presented at a special convocation held prior to the end of each academic year.

Recipients of the award must be at least third-year status and have a cumulative GPA of 3.85 or higher. The COS assigns a committee to designate all or select only a portion of the applicants based on their record of service, scholarship, and research while at RIT.

For more information, see https://www.rit.edu/academicaffairs/policiesmanual/d051.

4.6. Graduation with Honors

Honors posted to the academic record will be based upon the student's cumulative grade point average upon completion of the degree requirements. The registrar will post honors to the student's academic record and they will be reflected on the official transcript. The numerical criteria for graduation with honors are as follows.

- summa cum laude - 3.80 cumulative GPA
- magna cum laude - 3.60 cumulative GPA
- cum laude - 3.40 cumulative GPA

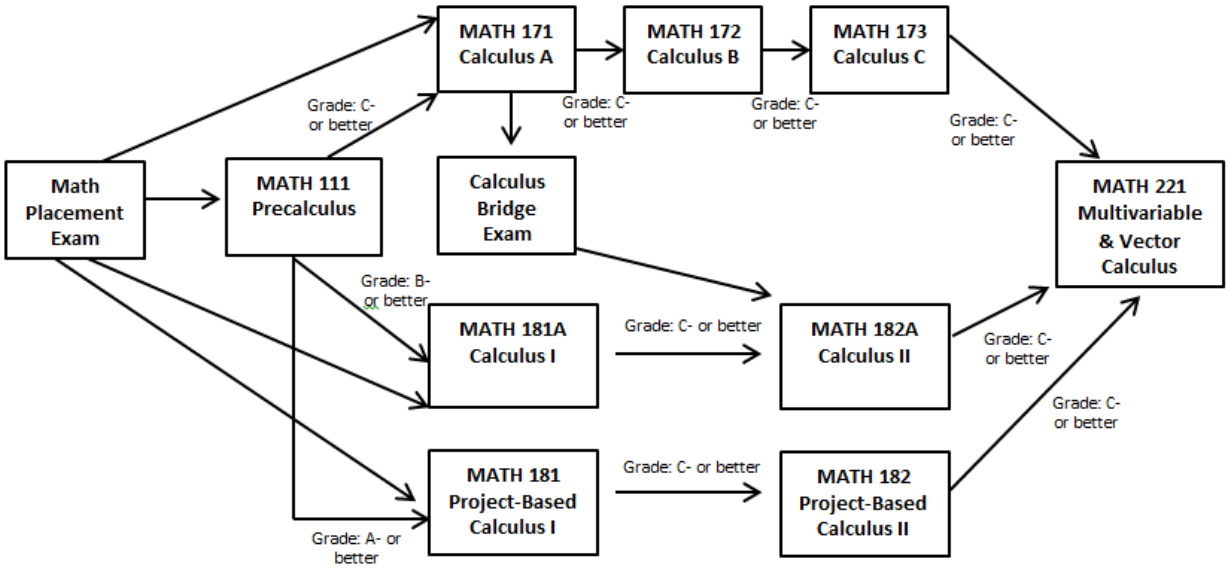
For more information, see https://www.rit.edu/academicaffairs/policiesmanual/d051.

5. ACADEMIC POLICIES AND GUIDELINES

The following subsections are drawn from RIT, COS, and SMS policies.

5.1. PLACEMENT IN CALCULUS

One of the most important factors of student success in mathematics is correct placement, so calculus at RIT begins with the math placement exam. Please refer to the math placement exam website, www.rit.edu/science/sms/mpe, for more information on the exam and score placement. Based on the results of this placement test, students in Mathematics are directed to their appropriate sequence, shown in this flow chart:



5.2. NUMBER OF HOURS TO SPEND OUTSIDE OF CLASS

The general guideline is that for each hour you spend inside a class, you should spend two hours outside of class doing homework and studying.

This means that, if you are taking 15 credits this semester, you should invest 30 hours studying each week outside of class. That would give you a 45 hour work week – or the equivalent of a full-time job.

Some students that already know a portion of the material in the course may not need to invest that much time outside of class. And there will be courses more difficult than expected and will require you to spend more time. This will depend upon the student, the instructor, and the class.

As a warning, there is a correlation between lower grades and the amount of time studying outside of class. That is, nearly all students that fail or receive a 'D' in a course have invested very little time preparing outside of the class. The positive message to take out of this is that even if you are taking a tough class, don't mentally withdraw from it – keep up on the work, and the commitment will likely pay off with a passing grade in the end.

5.3. USE OF CALCULATORS/CRIB SHEETS

The use of calculators and/or crib sheets during exams is at the sole discretion of each faculty member. However, no electronic devices can be used during final exams of all first year mathematics courses (which includes MATH-111, -171, -172, -173, -181A, -182A, -181, and -182).

5.4. ADD/DROP PERIOD

There is usually a six working day window from the first day of class to add or drop courses from your schedule.

In some cases, adding and dropping of courses can be done by the student on SIS. The form to add/drop is available on the Registrar's Office website: https://www.rit.edu/academicaffairs/registrar/forms.html.
If you are using this form, read the instructions at the top about when the form applies and who should sign it.

Instructors are aware to accommodate students that add into a class after the first day. Be sure to discuss with the instructor how this will be done and be sure to make up any work given to you.

5.5. ACADEMIC ALERTS

If you are struggling in a course, an academic alert is an email communication from the instructor to you and your academic advisor(s). This alert can occur and any time during the term, and may occur multiple times. The content of the alert is usually with regard to attendance, participation, assignment completion, and/or exam performance.

Academic alerts are used to foster student success. An academic alert is *one* option, however not the only option, that allows the course instructor to inform a student that they may be at-risk in specific areas within the course. Advisers assigned to the student also receive early alert notification(s) of the instructor's concern. Instructors and advisers can then take a coordinated approach to help students utilize campus resources and develop an action plan. If you receive an early alert(s), it is your responsibility to respond promptly to each early alert by discussing the reason for the early alert with your course faculty and academic adviser. It is your responsibility to be aware of your standing in class throughout the term.

Remember, if you experience any problems related to your course work, the best time to see your faculty and adviser is before problems get too big. This will allow you and your advising team to decide on a course of action while challenges are more easily manageable.

5.6. FRESHMEN/REGISTRATION HOLDS

There are a variety of holds in SIS that will prevent enrollment.

Incoming freshmen will have a hold put in place for enrollment into the Spring semester. This hold will require the student to set up an appointment with their academic advisor before they can self-enroll in courses. This hold is to ensure that the student will register for the proper courses that are necessary for the completion of the degree.

There are a number of other holds that can be applied by the Registrar's Office or other units at RIT. The most common is a financial hold if a bill is not paid. We recommend that you avoid all unnecessary holds to ensure you may enroll as soon as possible. Popular classes fill up quickly and a hold on your account would prevent you from getting the classes that you want.

5.7. GRADING

At the commencement of the course, and as appropriate throughout the course, it is the instructor's responsibility to: (1) Define criteria for evaluation. (2) State the process for converting the professor's evaluation criteria to the RIT grading system.

This information is usually provided to you through the syllabus.

For credit bearing courses, grades assigned at the end of the term are A, A-, B+, B, B-, C+, C, C-, D, and F. Each grade is assigned a quality point (from 4.00 for an A down to 0.00 for an F) and is used for calculating grade point averages.

5.8. C- or Better Policy

Both common sense and experience point to adequate preparation as an important element in student success. Particularly when courses are in sequence, demonstrated competence in one course provides the best foundation for success in the next. Students enrolled in the calculus sequences must have earned a grade of C- or better in the prerequisite course. There is also a C- or better required in MATH 182 or MATH 173 in order to enroll in MATH 221.

Because enrollment in courses for the subsequent term begins before the end of the current term, students are allowed to enroll in a course for which their current course is a prerequisite. But the student will be dropped if the grade earned in the course is anything other than a C- or better.

5.9. Course Withdrawal

Students are strongly advised to consult with their academic advisor and instructor before they withdraw from any courses. A student may not use the drop with a grade of "W" option to avoid charges of academic dishonesty or after the instructor has officially submitted the final grade.

More information can be found at https://www.rit.edu/academicaffairs/policiesmanual/d050.

5.10. Grade of Incomplete

COS Policy on Incomplete Grade for undergraduate and graduate students
https://www.rit.edu/science/documents/cos-policies-procedures-and-guidelines

"Incomplete" Grades: A grade of "I", will only be considered by COS faculty if a student has been attending classes and is passing coursework (homeworks, quizzes, tests). If the request for an Incomplete grade (I) is granted, all outstanding coursework must be submitted no later than the end of the following two terms; including summer session, or the "I" grade becomes an "F" grade. The general guideline is that an incomplete grade will not be granted to students that have fallen behind in their work without sufficient justification.

5.11. Repeating a Course to Raise Low Grades

An undergraduate student may repeat a course to raise a grade. If a student repeats a course, the last grade will stand as final even if the last grade earned is lower than the grade previously earned.

Courses taken at other institutions cannot be considered as repeats. Credit earned by examination/experience cannot be used to repeat previous course work. This process only applies to coursework in undergraduate programs.

5.12. Change of Program

Students who wish to change their academic plan must complete a Change of Program and/or Plan Application form with their academic adviser. Permission to change is determined on a case-by-case basis by the program applied to and, *if granted, may require additional course work and extend the time it takes to earn a degree*.

5.13. ACADEMIC PROBATION AND SUSPENSION

An undergraduate student must maintain a cumulative GPA of 2.00 or above at RIT in order to remain in good academic standing. To help students maintain satisfactory academic performance, RIT has set academic standards that serve to identify, warn, and provide timely intervention to a student who is experiencing academic difficulty.

Probation refers to the academic action taken when a student is not in good academic standing. A student placed on probation is expected to sufficiently raise his/her GPA in the succeeding term so that the probationary status can be removed. A student will also be required to satisfy specific conditions required by the SMS in the form of an academic contract in order to be removed from probation. Failure to meet the terms of probation may result in suspension.

Suspension refers to the academic action taken when a student is not permitted to enroll in courses at the university for a period of one calendar year.

1. Any degree-seeking undergraduate student whose term or cumulative grade point average falls below a 2.00 (C average) will be placed on probation.
2. Any student who is on probation according to the previous item and who is not removed from probation in the two succeeding terms (including summer session) in which credit is attempted will be suspended from RIT for a period of one calendar year.
3. Any student who has been placed on probation after having been removed from probation and whose cumulative grade point average is below 2.00 will be suspended.
4. Any student who has been placed on probation after having been removed from probation and whose cumulative grade point average is 2.00 or above will be granted one term to be removed from probation before suspension from RIT.
5. Any student whose term grade point average falls below 1.00 will be suspended from RIT for a period of one calendar year.
6. Students who have been readmitted to their original program after having been suspended and then qualify for probation will be suspended from RIT.
7. A suspended student cannot enroll in any credit or non-credit course at the university while on suspension.
8. A suspended student may appeal a suspension decision. ***If a student successfully appeals a suspension but is placed on suspension in a subsequent term, that student will have all appeals automatically denied by the SMS and the College.***
9. A suspension may be waived upon written appeal to the student's home program. Final suspension waiver 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.
10. A suspended student ***will*** be required to satisfy specific academic conditions imposed by the home department in order to be considered for readmission to his/her program.
11. 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.
12. Students must apply through undergraduate admissions for re-admission at the end of their suspension. Such re-admission must be approved by the dean (or his/her designee) of the college for which they are requesting enrollment (this may be the original college or another). For programs housed outside the college structure, the re-admission must be approved by the director (or designee) of the academic unit for which they are requesting enrollment.

More information can be found at https://www.rit.edu/academicaffairs/policiesmanual/d051.

5.14. COLLEGE RESTORATION PROGRAM

The College Restoration Program is an intensive one-semester only, academic intervention program for students facing academic suspension or probation. Students in serious academic difficulty can dramatically improve their performance with appropriate training and support.

For more information, see http://www.rit.edu/studentaffairs/crp/.

5.15. Academic Progress Toward Degree Completion

Understanding program degree requirements, including, but not limited to: course selection, course prerequisites and appropriate course sequencing, co-op requirements, and evaluation will support timely progress towards degree completion.

It is the responsibility of all students to attend their scheduled classes regularly and punctually in order to promote their progress and to maintain conditions conducive to effective learning. See https://www.rit.edu/academicaffairs/policiesmanual/d040 for more information about this policy.

Federal regulations require financial aid recipients to maintain minimum standards of satisfactory academic progress (SAP) for continued receipt of federally sponsored aid. All students receiving federal assistance must remain admitted in a degree program. Regulations require a maximum time frame for degree completion. See https://www.rit.edu/emcs/financialaid/ugrad_progress.html for more information about this policy.

5.16. Leave of Absence

There are two types of student leave of absence: voluntary (planned and immediate) and involuntary.

A student on a leave of absence, whether voluntary or involuntary, will not attend classes, must vacate university owned housing as outlined in the Terms & Conditions of Housing, Debit, and Meal Plans, and may be entitled to whatever refunds of tuition, fees, and room and board charges as would be appropriate for the effective date of the leave of absence. A student on a leave of absence will not have access to the Student Life Center facilities or the ability to check out Wallace Center materials.

For more information, see https://www.rit.edu/academicaffairs/policiesmanual/d021.

5.17. The Writing Policy of the SMS

A student will satisfy the Writing Requirement of the SMS by demonstrating proficiency in the following areas:

- Communication using the language of formal mathematics and/or statistics.
- Communication in a well-organized, clear and concise manner using written English.

Proficiency will be deemed satisfactory by accomplishing all of the following:

- Acceptance of a student-written technical project by the Writing Committee from the course requirements of the Mathematics and Statistics Seminar (MATH 199). This requirement is waived if the Mathematics and Statistics Seminar course is waived, such as for transfer students or change of program students.
- Acceptance of a student-written technical project by the Writing Committee from the course requirements of either the Mathematical Modeling course (MATH 421) or the Design of Experiments course (STAT 325). By the last week of classes of the fall term, the instructors of the Mathematical Modeling and Design of Experiments courses should forward to the Writing Committee a written technical report submitted by each student who must satisfy the Writing Requirement. The projects should be evaluated by the members of the committee and will be returned to the students during spring term.

The main objective of the Institute Writing Requirement is to assure that all BS graduates of RIT are able to write effectively. The Writing Committee has the responsibility of evaluating the writing projects of each mathematics/statistics major in order to determine if his or her writing ability is sufficiently effective. It is also the responsibility of the Writing Committee to provide a report detailing the results of the evaluation and to specify which course the project was submitted from. The deficiencies of each project that was deemed unsatisfactory must be clearly stated in the report, which will be submitted to the student with a copy to the Associate Head of the School of Mathematical Sciences and the Student Services Office.

After the Writing Committee has determined that a mathematics or statistics major has satisfied the School of Mathematical Sciences Writing Requirement, it will notify, in writing, the Associate Head of the School and the Student Services Office that the student has satisfied the Writing Requirement for graduation.

If, however, the report shows that the student has a deficiency in the ability to organize and produce written work, he or she will be required to rewrite and resubmit the project. The Writing Committee may require remedial work with the Writing Lab before resubmission of the project.

Note, however, there are institute requirements that must be satisfied in addition to the requirements here. See section 2.1.

5.18. CHANGING GRADES

Once a grade has been officially reported by an instructor, it is normally not the right of any person to change this grade unless an actual error has been made in computing or recording it. If an error has been made, the instructor must complete the Change of Grade/Extension or Incomplete Form and the completed form must be approved by the head of the department in which the instructor teaches. When approved by both of these individuals, the form is to be forwarded to the Registrar's Office. There is an appeal procedure for disputed grades - see Policy D17.0-Final Course Grade Disputes.

More information can be found at https://www.rit.edu/academicaffairs/policiesmanual/d050.

5.19. STUDENT ACADEMIC INTEGRITY

As members of an academic community, both students and faculty share responsibility for maintaining high standards of personal and professional integrity. If a student violates these standards, the Academic Integrity Process affords a fair resolution. The committee outlined in the policy may be called upon to hear cases where a breach of student academic integrity is alleged by instructor. In all cases, it is the responsibility of any university representatives to render fair and appropriate decisions reaffirming standards of integrity expected in the academic community.

A breach of student academic integrity falls into three basic areas:

A. **Cheating:** Cheating is any form of fraudulent or deceptive academic act, including falsification of data, possessing, providing, or using unapproved materials, sources, or tools for a project, exam, or body of work submitted for faculty evaluation.
B. **Duplicate Submission:** Duplicate submission is the submitting of the same or similar work for credit in more than one course without prior approval of the instructors for those same courses.
C. **Plagiarism:** Plagiarism is the representation of others' ideas as one's own without giving proper attribution to the original author or authors. Plagiarism occurs when a student copies direct phrases from a text (e.g. books, journals, and internet) and does not provide quotation marks or paraphrases or summarizes those ideas without giving credit to the author or authors. In all cases, if such information is not properly and accurately documented with appropriate credit given, then the student has committed plagiarism.

The important thing to remember is that violations of academic integrity can have serious consequences even for an apparently small or minor violation. Don't be tempted and you won't have to worry about facing the Academic Integrity Committee.

More information about the policy can be found at https://www.rit.edu/academicaffairs/policiesmanual/d080.

6. Assistance and Opportunities

6.1. Academic Support Center

The ASC works in a variety of ways to increase students' effectiveness as learners. Students learn how to develop basic skills, enhance advanced skills, or cope with the academic environment. The ASC offers workshops and instruction in study skills and alternative learning strategies as well as drop-in writing instruction in the Writing Center and mathematics/physics tutoring in the Bates Study Center and Sol Study Center. Other services such as Academic Assessment Program, Structured Monitoring, and Tutor Training are available.

ASC offices are located on the second floor of Monroe Hall, room 2080. There is no charge to students for these services (with the exception of the Structured Monitoring Program). For more information, visit the ASC website at https://www.rit.edu/~w-asc/.

6.2. MathCrash! Study Sessions

MathCrash! is a three-hour plus calculus review session with pizza and soda that is held in the atrium of Gosnell Hall each semester term before final exams. Students work together, teaching and learning from each other, and faculty members from the School of Mathematical Sciences are available to help students solidify concepts and polish techniques.

6.3. Student Employment Opportunities

There are several types of academically-related student employment opportunities on campus. These are excellent opportunities to earn experience and money while enrolled in classes. Some examples of such opportunities include grader, teaching assistant, tutor, and supplemental instructor. Many of these positions are posted through the Student Employment Office or on the School of Mathematical Sciences website.

6.4. π-RIT, the SMS Student Club

The School of Mathematical Sciences Club, "PiRIT," is a student organization providing a variety of professional and social activities for students and faculty. Guest speakers provide interesting insights into special topics in mathematics and statistics. Social events are aimed at bringing students and faculty together in an informal atmosphere.

For more information, see https://www.facebook.com/Pi-RIT-122894584563648/ .

6.5 Helpful Links

The RIT website: http://www.rit.edu/
SMS Facebook Page: https://www.facebook.com/RITSMS/
MyCourses: https://mycourses.rit.edu/
SIS (Student Information System): https://sis.rit.edu/
College of Science Policies & Procedures Manual: https://www.rit.edu/science/forms-docs
RIT Policies & Procedures Manual: http://www.rit.edu/academicaffairs/policiesmanual/
Undergraduate Bulletin: http://www.rit.edu/upub/pdfs/Undergrad_Bulletin.pdf

7. SMS RESEARCH FACULTY

Rank	Name	Office No.	Phone No.	E-mail @rit.edu
Associate Professor	Dr. Anurag Agarwal	GOS-3216	5-7531	axasma
Associate Professor	Dr. Ephraim Agyingi	GOS-2222	5-2513	eoasma
Assistant Professor	Dr. Olalekan Babaniyi	GOS-2206	5-4270	obsma
Professor	Dr. Peter Bajorski	HLC-2532	5-7889	pxbeqa
Professor	Dr. Mihail Barbosu	HLC-2235	5-2123	mxbsma
Associate Professor	Dr. Nate Barlow	GOS-3308	5-4077	nsbsma
Associate Professor	Mr. David Barth-Hart	GOS-3234	5-5131	dshsma
Professor	Dr. Mao Bautista	GOS-3354	5-6122	mpbsma
Professor	Dr. Bernard Brooks	GOS-2350	5-5138	bpbsma
Associate Professor	Dr. Nathan Cahill	GOS-1130	5-5144	nathan.cahill
Professor	Dr. Manuela Campanelli	LAC-2054	5-7752	manuela@astro.rit.edu
Assistant Professor	Dr. Lucia Carichino	GOS-2278	5-2537	lcsma1
Associate Professor	Dr. Linlin Chen	HLC-2217	5-7619	lxcsma
Associate Professor	Dr. Matthew Coppenbarger	GOS-2334	5-5887	mecsma
Associate Professor	Dr. Michael Cromer	GOS-2266	5-4078	mec2sma
Assistant Professor	Dr. Blessing Emerenini	HLC-2530	TBA	boesma
Professor	Dr. Joshua Faber	LAC-2065	5-5115	jafsma
Professor	Dr. Raluca Felea	GOS-2274	5-2524	rxfsma
Professor	Dr. Ernest Fokoue	HLC-2517	5-7525	epfeqa
Research Professor	Dr. John Hamilton, Jr.	ORN-1326	5-4719	jfhsms
Associate Professor	Dr. Anthony Harkin	GOS-1344	5-2540	harkin
Associate Professor	Dr. Matthew Hoffman	GOS-2302	5-4209	mjhsma
Associate Professor	Dr. Jay Alan Jackson	GOL-2575	5-4634	jaj@igm.rit.edu
Associate Professor	Dr. Jobby Jacob	GOS-2232	5-5146	jxjsma
Associate Professor	Dr. Baasansuren Jadamba	GOS-2272	5-3994	bxjsma
Professor	Dr. Akhtar Khan	GOS-2212	5-6367	aaksma
Professor	Dr. Seshavadhani Kumar	GOS-3304	5-2547	sxksma
Associate Professor	Dr. Manuel Lopez	GOS-3118	5-4382	malsma
Professor	Dr. Carlos Lousto	LAC-2069	5-2219	colsma
Professor	Dr. Carl Lutzer	GVP-2034	5-5133	cvlsma
Associate Professor	Dr. Kara Maki	GOS-2348	5-2541	kmaki
Assistant Professor	Dr. Nishant Malik	GOS-3348	5-5439	nxmsma
Professor	Dr. Carol Marchetti	HLC-2221	5-2515	cemsma
Professor	Dr. James Marengo	GOS-3302	5-6872	jemsma
Assistant Professor	Dr. Laura Munoz	GOS-3340	5-2523	lmmsma
Professor	Dr. Darren Narayan	GOS-2228	5-2514	dansma
Assistant Professor	Dr. Shahla Nasserasr	GOS-3278	TBA	shahla
Associate Professor	Dr. Richard O'Shaughnessy	SLA-1127	5-5965	rossma
Associate Professor	Dr. Niels Otani	GOS-3350	5-5140	nfosma
Associate Professor	Dr. Robert Parody	HLC-2215	5-5288	rjpeqa
Associate Professor	Dr. Michael Radin	GOS-3116	5-7681	marsma
Professor, School Head	Dr. Mary Lynn Reed	GOS-2334	5-2163	mlrsma

Assistant Professor	Dr. Brendan Rooney	GOS-2234	5-2519	brooney
Professor	Dr. David Ross	GOS-2344	5-5275	dsrsma
Professor	Dr. Hossein Shahmohamad	GOS-2304	5-7564	hxssma
Assistant Professor	Dr. Nourridine Siewe	HLC-2214	TBA	nxssma
Associate Professor	Dr. Wanda Szpunar-Lojasiewicz	GOS-2260	5-5134	wxlsma
Professor	Dr. John Whelan	LAC-2063	5-5083	jtwsma
Professor	Dr. Tamas Wiandt	GOS-2354	5-5767	tiwsma
Assistant Professor	Dr. Tony Wong	GOS-2232	5-7486	aewsma
Associate Professor	Dr. Elmer Young	GOS-2296	5-5137	elysma
Associate Professor	Dr. Yosef Zlochower	LAC-2067	5-6103	yrzsma