RIT | Department of Cybersecurity

Master of Science in **Cybersecurity**

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ROCHESTER INSTITUTE OF TECHNOLOGY
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Master of Science in Cybersecurity

Introduction

The Master of Science in Cybersecurity (CSEC) focuses on the theoretical, organizational, and applied aspects of computing security. The curriculum is unique as it provides both research and applied experiences to our students.

Program Goals and Objectives

Upon completion of the MS in CSEC program, successful students will have acquired the necessary skills to do the following:

- Demonstrate ability in critical thinking and problem-solving in computing security
- Demonstrate a depth of knowledge in a selected area of computing security
- Communicate and write effectively in areas of computing security
- Comprehend and analyze regulatory and ethical issues related to computing security
- Describe technologies, theories, and methodologies emerging in the field of computing security

Program Design

The MS in Cybersecurity program consists of core courses, research electives, and advanced electives that provide a knowledge base in the theoretical and practical principles of computing security and information assurance today. Together, these courses ensure that graduates acquire the intellectual tools necessary to stay up to date in this challenging and rapidly evolving discipline. Students can develop depth in an area of expertise in systems and network security, systems and network forensics, cryptography and authentication, and AI for cybersecurity. The program of study may be capped off with a six-credit thesis (replaces a research elective + advanced elective).

This MS degree comprises 30 semester credits of graduate study that include:

- 3 core courses (9 credits): focusing on the foundation of computer security concepts, cryptography, and enterprise security.
- 1 research elective (3 credits): focusing on a current research area in cybersecurity.
- 4 advanced elective courses (12 credits): to develop breadth and depth in security topics of individual interest.
- MS capstone experience/exit strategy (6 credits): Option 1: MS Thesis (6 credits), or Option 2: an additional research elective (3 credits) + advanced elective (3 credits).

Entrance Requirements

MS in Cybersecurity is designed for individuals whose undergraduate degree is in a computing discipline (e.g. Cybersecurity, Computer Science, Computer Engineering, Information Technology, or related fields) with a solid theoretical foundation in computing and mathematics. Exceptional students from other disciplines may be admitted with the contingency of completing a bridge study as assigned by the graduate program director, to ensure that they have the prerequisite knowledge necessary for success in this program.

Degree applicants should minimally have a baccalaureate or equivalent degree from an accredited institution of higher education and a minimum cumulative grade-point average equivalent to 3.0/4.0 (‘B’ average). International students must also have an equivalent of at least a 3.0/4.0 from an accredited university using the US system of grading or at least a first-class degree from an accredited university

using the British system of grading. Graduate Record Examination (GRE) scores[1] are optional for all applicants.

Applicants whose native language is not English must submit TOEFL, IELTS or Duolingo exam scores. A minimum score of 88 for TOEFL, 6.5 for IELTS, and 130 for Duolingo is required.

Prerequisites

- Competency in Discrete Mathematics and Statistics required. Calculus recommended.
- Solid computer programming skills (proficiency in two programming languages, including Python, required)
- Knowledge and hands-on experience in basic networking concepts, including Ethernet, TCP/IP, routing and switching, and basic LAN design and construction principles.
- Knowledge of basic networking infrastructure services, including DHCP, DNS, and other discovery and name resolution protocols.
- Knowledge of basic system services and system administration functions, including scripting for UNIX, user administration, networked file systems, web services, networked information systems (such as NIS), and networked security and permission issues.

The Bridge Program

Students whose undergraduate preparation does not satisfy the above requirements can make up for this deficiency by taking one or more bridge courses, as determined by the graduate program director. This coursework may be completed at any accredited college or university that assigns letter grades for courses. **However, such courses must be approved in advance**. Contact the graduate program director (see contact information later in this document) for approval before beginning bridge coursework at other institutions.

Alternatively, the bridge courses may be completed during the first semester at RIT after the student is admitted and matriculated in the MS in Cybersecurity program.

The courses offered by RIT that can be used to satisfy the above prerequisites are:

- Discrete mathematics (equivalent to MATH 190 Discrete Mathematics for Computing)
- Applied Statistics (equivalent to STAT-614)
- Computer Programming skills (equivalent to CSCI-141 Intro to Programming I and CSCI-142 Intro to Programming II or GCIS-123 Software Development & Problem Solving I and GCIS-124 Software Development & Problem Solving II)
- Introduction to Computing Security (CSEC-140 or CSEC-600)

Notes on the Bridge Program

- Students are expected to earn a minimum cumulative GPA of **3.0 (B average)** in the coursework completed as part of the bridge program.
- Bridge program courses do not count toward the 30 semester credit hours required for the master's degree.
- Grades for bridge courses taken after matriculation are included in the student's graduate grade-point average.
- Students who have been admitted to the program before completing prerequisite requirements must satisfactorily complete bridge coursework within the first two semesters of matriculation to continue in the program.
- To meet individual needs, a bridge program can be designed differently from that described above, in consultation with the graduate program director.

[1] RIT's reporting number for ETS's GRE and TOEFL examinations is 2760.

Application & Deadlines

Please refer to https://www.rit.edu/admissions/graduate#applying-for-admission for instructions and requirements of the application. Student applications are considered for **Fall and Spring**. We have no specific deadlines, and applications are processed on a rolling basis until the program reaches its capacity for the term. The application process typically takes four to six weeks after the Office of Graduate Enrollment Services (GES) has received a complete application. However, international applications may take longer. The graduate program director only evaluates applications after all the information has been submitted and verified by staff in the RIT Office of Graduate Admissions.

Note that acceptance into the program does not guarantee the availability of prerequisite or program courses. As the start of the semester approaches, many classes become full. Students who apply just before the start of the year may need to wait until the following term before starting their coursework.

Full-time course load

MS students are enrolled in at least 9 credits of coursework per semester to be considered full-time. International students seeking an I-20 to reside in the United States while studying in this program should note that they are required to be enrolled for at least nine (9) credits per semester to maintain their full-time status. Of those 9 credits, international students may **only count one (1)** online course (or 3 credits) towards their full-time course load. They may take additional online courses "outside" of the 9 credits.

The Curriculum (MS in CSEC)

Core Classes (9 credits)

- CSEC-604 Cryptography and Authentication
- CSEC-742 Computer System Security
- CSEC-603 Enterprise Security*

Research Elective (3 credits)

- CSEC-720 Deep Learning Security
- CSEC-721 Advanced Data Privacy
- CSEC-750 Covert Communications
- CSEC-759 Graduate Seminar in Advanced Malware Forensics
- CSEC-759 Graduate Seminar in Advanced Software Security Analysis
- CSEC-759 Graduate Seminar in Human Factors in Security

Advanced Electives (12 credits)

• CSEC-620 Cyber Analytics and Machine Learning • CSEC-622 Side Channel Analysis • CSEC-630 Trusted Computing and Trusted Execution • CSEC-631 Web Applications and Server Security • CSEC-635 Open-Source Software Security • CSEC-645 Social Engineering • CSEC-659 Graduate Seminar in Offensive Security Engineering • CSEC-659 Graduate Seminar in Blockchains and Smart Contracts • CSEC-659 Graduate Seminar in Open-Source Intelligence • CSEC-659 Graduate Seminar in Generative AI in Cybersecurity • CSEC-669 Wireless Security • CSEC-677 Disaster Recovery • CSEC-730 Advanced Computer Forensics • CSEC-731 Web Server and Application Security Audits	• CSEC-733 Information Security and Risk Management • CSEC-743 Computer Viruses and Malicious Software • CSEC-744 Network Security • CSEC-751 Information Security Policy and Law • ISTE-721 Information Assurance Fundamentals • ISTE-730 Foundations of IoT • CSCI-620 Introduction to Big Data • CSCI-622 Data Security and Privacy • CSCI-642 Secure Coding • CSCI-655 Foundations of Cybersecurity • CSCI-662 Foundations of Cryptography** • CSCI-720 Big Data Analytics • CSCI-735 Foundations of Intelligent Security Systems • CSCI-764 Quantum-Resistant Cryptography • CMPE-661 Hardware and Software Design for Cryptographic Applications

*CSEC-603 is a core class required for all MS students beginning in Fall 2025 (and after) and all BSMS students with their Requirement Term as 2251 and beyond. For everyone else, it is an advanced elective.

**Students taking CSCI-662 need a replacement class for CSEC-604 due to overlapping content.

CSEC Capstone/Exit Strategy (6 credits)

- CSEC-790 MS Thesis (6 credits) or
- An additional research elective (3 credits) + an advanced elective (3 credits) from the lists above

Course plan for MS in Cybersecurity

CORE CLASSES (9 credits)

CSEC 603^ Enterprise Security	CSEC 604 Cryptography and Authentication	CSEC 742 Computer Systems Security

RESEARCH ELECTIVES (choose 3 credits)

CSEC 720 Deep Learning Security	CSEC 721 Advanced Data Privacy	CSEC 750 Covert Communications	CSEC 759 *Must be a research seminar* *(see page 5 for the current list)*

ADVANCED ELECTIVES IN SUGGESTED AREAS (choose 12 credits)

Systems and Network Security	**Systems and Network Forensics**	**Cryptography and Authentication**	**AI for Cybersecurity**
CSEC-631 Web Applications and Server Security	CSEC-631 Web Applications and Server Security	CSEC-659 Graduate Seminar in Blockchains and Smart Contracts	CSEC-620 Cyber Analytics and Machine Learning
CSEC-659 Seminar on Offensive Security Engineering	CSEC-730 Advanced Computer Forensics	CSCI-764 Quantum Resistant Cryptography	CSEC-659 Graduate Seminar in Generative AI in Cybersecurity
CSEC-669 Wireless Security	CSEC-733 Information Security and Risk Management	CSCI-622 Data Security and Privacy	CSCI-720 Big Data Analytics
CSEC-744 Network Security	CSEC-743 Computer Viruses and Malicious Software	CMPE-661 Hardware and Software Design for Cryptographic Applications	CSCI-735 Foundations of Intelligent Security Systems

^Please see the note on CSEC 603 on page 5

Note: Several research/advanced elective seminars are available in each area of focus. Please consult the graduate program director for recommendations for a particular area.

CAPSTONE/EXIT STRATEGY (6 credits)
(pick one option)

CSEC-790 MS Thesis (6 credits)	MS Research Elective (3 credits) + MS Advanced Elective (3 credits)

Graduate Independent Study

Graduate students may undertake up to **one (1) Independent Study** (3 credits) to investigate a cybersecurity area that is of interest. This independent study may replace one of the advanced electives (NOT a research elective). The emphasis of independent study is that it is driven by a student's interest in investigating an area in a way that cannot be done through standard coursework. It may or may not relate to a faculty member's scholarship activities, but it does require a faculty member to approve the work as the advisor for the independent study, as well as approval from the department.

To pursue an independent study, please ask your sponsoring faculty member for the form. Once completed, the form needs to be submitted to the department ***by the sponsoring faculty member*** before drop/add deadline for the term in which the 3 credits need to be registered. At the conclusion of the independent study, the student will make a formal presentation to the department faculty, describing the results of the work undertaken.

Co-operative Work Experience

Students may complete up to two (2) terms of an optional cooperative education (co-op) experience prior to completing the capstone, providing an opportunity to gain professional work experience and strengthen their resume. Co-ops are not required for obtaining the MS degree but are highly encouraged. Students need to complete all bridge study (including English Language Center study), have completed 15 credits of their MS course work, and have a 3.0/4.0 or better program grade-point-average (GPA) before going on co-op. **Students on academic probation are ineligible to go on a co-op.** Students who have been suspended from RIT and have had that suspension waived are also NOT eligible for co-op until their GPA is at least a 3.0. The Office of Cooperative Education and Career Services (http://www.rit.edu/emcs/oce/) can assist students in finding a co-op position or students can find positions on their own and have them approved by the graduate program director.

Program Cost

The cost of graduate study at RIT is available on the RIT website at (https://www.rit.edu/admissions/tuition- and-fees). Cost information is available for both full- and part-time study. Information about financial aid to support study with us is available at https://www.rit.edu/admissions/financial-aid

Financial Aid

The department may offer a small merit scholarship to qualified students who are not receiving significant financial support from other sources. This award is based upon previous educational performance and employment background (if applicable). If granted, the merit scholarship is initially awarded for one (1) academic year from the semester in which the student is admitted. The award will, in general, be extended if the student has made steady progress towards the degree and has maintained at least a 3.0/4.0 GPA, which is the minimum required to graduate with an MS degree at RIT.

RIT's 7-Year Degree-Completion Rule

Graduate students must complete all of the requirements for their programs within seven (7) years of the date of the student's matriculation into the program. https://www.rit.edu/policies/d120#vii-seven-year-graduation-requirement For example, if the student was matriculated in the program in Fall term 2026 (2261), then the program must be completed before the start of Fall term 2033 (2331). Please contact the graduate program director immediately if you find that you are coming close to your 7-year deadline.

Academic Integrity
Academic honesty is an expectation of all students at RIT. Any act of improperly representing another person's work as one's own is an act of academic dishonesty. The RIT code of academic conduct is documented in the university's Policies and Procedures manual:
https://www.rit.edu/academicaffairs/policiesmanual/d080

RIT Non-Discrimination Statement
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.

Contact Information
Additional information about this program and other programs offered by the Cybersecurity (CSEC) department at RIT may be obtained by contacting us at:

US Mail:	Graduate Program Director Department of Cybersecurity Global Cybersecurity Institute Rochester Institute of Technology 100 Lomb Memorial Drive Rochester, New York 14623-5603
Telephone:	(585) 475-2963
FAX:	(585) 475-2181

Academic Calendar
RIT academic calendar is available at www.rit.edu/calendar