

# **Computer Security & Information Assurance MS Program**

**in a Nutshell**

**2005-2006**

## **Graduate Security and Information Assurance Program in a Nutshell**

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### **In a Nutshell**

- 6 Core Courses
- 4 Electives
- Thesis

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# Introduction

CERT noted: “The area of survivable network technology concentrates on the technical basis for ensuring that a system can provide essential services in the presence of attacks, accidents, and failures, including critical infrastructure protection. Developers and acquirers need to understand the importance of building security and survivability into systems, rather than trying to add it on once the systems are installed.” This curriculum addresses these concerns by drawing on the expertise on the faculty from the three departments that together make up the Golisano College of Computing and Information Sciences. Computer Science, Software Engineering, and Information Technology. This cross-disciplinary program will enable graduates to develop a strong foundation and will prepare them for leadership positions in both the private and public sectors in the computer security area or admission to programs leading to an advanced degree.

The Security and Information Assurance MS program at RIT consists of a core curriculum, and wide variety of electives. The core provides students with a solid background in the theoretical principles underlying fundamentals, which ensures that graduates acquire the intellectual tools necessary to keep up-to-date in this rapidly evolving discipline.

The program consists of a group of six core courses that provide a common knowledge base or foundation. The courses that together make up this foundation are designed to give students a better understanding of both the technological as well as the ethical role of computer security in society. Students will then develop a specialization in one of several areas by selecting four related elective courses under the guidance of a faculty advisor. Students will conclude their program of study through the successful completion of a thesis under the guidance of a faculty mentor.

The courses are generally offered in the afternoons and evenings. A full-time student, one who takes three or four courses per quarter, may be able to complete the course work in one year; part-time students can finish in two to four years. The time required to complete a Masters thesis varies according to the student and the size of the thesis undertaken.

Related M.S. programs at RIT dealing with computers are: Computer Science, Computer Engineering (College of Engineering); Information Technology, and Software Development & Management (both in the Department of Information Technology).

## 1.1. Entrance Requirements

### Admission Requirements for the Program

Because the program encompasses a wide variety of technical disciplines, students with diverse backgrounds will be accepted. Undergraduate preparation leading to a Bachelor of Science degree in computer science, software engineering, information technology, computer engineering, electrical engineering, applied mathematics or computer engineering technology is usually required. However, exceptional students from other fields may be admitted on a contingent basis.

Required is the knowledge of the following courses or equivalent courses:

- Advanced Java Programming 4003-707
- Operating Systems 4003-713
- Calculus 1 1016-251
- Calculus 2 1016-252
- Discrete Math 1 1016-265
- OS Scripting 4002-402
- Software Engineering 4010-361

The admission committee will make the decision if a student has the required knowledge. The admission committee will assign bridge courses, if a student does not have the required knowledge in one or more of the following courses:

- Calculus 1 1016-251
- Calculus 2 1016-252
- Discrete Math 1 1016-265

A student can take an exam to test out of a bridge course.

The admission committee will ask the student to take an exam, if a student does not have the required knowledge in one or more of the following courses:

- Advanced Java Programming 4003-707
- Operating Systems 4003-713
- OS Scripting 4002-402
- Software Engineering 4010-361

The result of the exam will determine if the student has to take a bridge course or if the missing pieces of knowledge can be obtained by attending a workshop. The student only has to take the workshop modules in which the student does not have the required knowledge.

The workshop will take two weeks. It will start two weeks before fall quarter starts. The workshop will be held on campus. Material for the summer workshop will be made available to the students for self-study before the commencement of the summer workshop.

Day 1;	Test
Day 2 – Day 9	The major topics of each course will be covered in 4 half day sessions
Day 10	Each subject will be tested. The outcome determines if the student has to take the bridge course or not.

#### Workshop Content

Advanced Java Programming	<ul style="list-style-type: none"> <li>• Solid foundation of the Java Programming language</li> <li>• Collection class</li> <li>• Network programming in Java including RMI and multi threaded programming including synchronization</li> </ul>
Operating Systems	<ul style="list-style-type: none"> <li>• File system</li> <li>• Access control</li> <li>• Client-server model</li> <li>• Process model</li> </ul>
OS Scripting	<ul style="list-style-type: none"> <li>• Permissions in a Unix environment</li> <li>• User management</li> <li>• File systems management</li> <li>• Shell programming</li> </ul>
Software Engineering	<ul style="list-style-type: none"> <li>• Requirements Engineering (Requirement Elicitation, Specification, Verification, Management)</li> <li>• Design (Design Principles, Architectural and Design Patterns, Verification)</li> <li>• Testing (Black box, White box, Integration from unit testing through acceptance testing, inspection techniques)</li> <li>• Project Management (Configuration management, risk management, process and product metrics, process models)</li> </ul>

Students must have a strong record of academic achievement from their undergraduate institution, as indicated by official transcripts, proficiency on the Graduate Record Examination (GRE), and strong recommendations from at least two well-qualified individuals who are able to assess the student's potential for success in the program. It is expected that international students will achieve at least the following scores on the GRE: 650 on Quantitative, 500 on Verbal, and 650 on Analytical.

## 2. Curriculum

The graduate program of study consists of 49 credits.

### 2.1. The Core Courses

4002-780 Computer System Security
4005-779 Secure Database Systems <sup>1</sup>
4002-755 Secure Wireless and Wired Data Networks
4005-705 Cryptography I
4010-748 Secure Software Engineering: Requirements and Design
0102-785 Ethics in Technology
4010-710 Research Methods
4005-690 Thesis

### 2.2. Electives

The following table is a subset of the available courses.

4005-709 Privacy and Security
4005-759 Information Assurance
4002-882 Enterprise Security
4002-877 Secure e-Commerce
4002-760 Computer Viruses and Malicious Software
4002-841 Advanced Forensics
4005-709 Cryptography II

4005-759 Data Mining
4005-800 Theory of Computer Algorithms
4005-743 Secure Operating Systems and Networks
4005-749 Server-less Network Security
4010-758 Secure Software Engineering: Verification and Validation
Special Topics
Independent Study

### 3. MS Thesis

The Master's thesis forms the capstone of the M.S. program in Security and Information Assurance. It is a large body of work, which you undertake independently, but under the supervision of a full-time CS/IT/SE faculty member.

A thesis consists of a nontrivial software development effort and a report discussing it; or it is a report dealing with a more theoretical questions. Original insight into a problem is desirable but not required. The thesis report is expected to be a scientific paper:

- describing background and relevant results in the area,
- detailing the work carried out,
- discussing the significance of the deliverables of the endeavor, and
- providing appropriate reference citations.

A thesis should deal with a significant question and involve some original insight. Compared to a project, a thesis has a much higher level of expectation in terms of background research and justification. A thesis should also result in a paper submitted to a conference, a journal or other forms of public dissemination.

#### 4. Computer Science – MS Program of Study

##### Core Courses

Course	Cr.	Projected Qtr.	Qtr.	Grade
4002-780 Computer System Security	4			
4005-779 Secure Database Systems	4			
4002-755 Secure Wireless and Wired Data Networks	4			
4005-705 Cryptography I	4			
4010-748 Secure Software Engineering: Requirements and Design	4			
0102-785 Ethics in Technology*	4			
Elective	4			
Elective	4			
Elective	4			
Elective	4			
4010-710 Research Methods	2			
4005-690 Thesis	7			