

Graduate Certificate
Department of Electrical and Computer Engineering
Computer Systems Security

Certificate Description

The Electrical and Computer Engineering (ECE) Department offers a graduate certificate in Computer Systems Security consisting of five courses from its graduate curriculum. These courses provide a solid foundation in state-of-the-art techniques in securing computer systems. To receive the certificate, students take the following required and elective courses:

Required courses

- ECE688F: Graduate Project (1st semester)
- ECE688P: Graduate Project (2nd semester)

Elective courses (students choose 3 out of 4 courses)

- ECE510: Foundations of Computer Systems
- ECE644: Computer System and Network Security
- ECE647: Security Engineering
- ECE656: Introduction to Cryptography

To receive the computer systems security certificate, students must develop and complete a project in a computer security field as part of the ECE688F/P sequence. All courses listed are three credits. There are no prerequisite courses required for these courses. The elective courses can be taken in any order although it is recommended that if a student chooses to take ECE510, this course should be taken first. ECE688F must precede ECE688P. Per UMass regulations, students must achieve a 3.0 GPA in the certificate courses to receive a certificate.

The courses provide a solid basis of state-of-the-art knowledge in the security of digital computer systems. ECE510 provides appropriate background in advanced computer engineering fundamentals for students so that students may have a solid foundation for the remaining four certificate courses. ECE644 examines practical issues in deploying secure systems from both a hardware and software standpoint. ECE647 provides a series of specific examples of contemporary secure computer systems and their limitations. ECE656 examines security from a more mathematical standpoint to provide a rigorous theoretical security basis. Finally, ECE688F/P provide students an opportunity to work in a small group to complete a hands-on project related to computer systems security. The students also learn technical presentation and writing skills as part of the project courses.

Current ECE Masters of Science (MS) students and non-matriculating students may apply for the certificate program. Non-matriculating students should have sufficient technical background, as determined by the ECE Graduate Program Director, to join the certificate program. Acceptance into the certificate program does not automatically qualify a student for the ECE MS program, although the student may attempt to join the MS program at any time. If a student joins the ECE MS program after completing the certificate, all 15 credits can be applied to the ECE MS degree. Completion of the certificate does not imply admission to the University in a specific academic program. If a student completes a graduate certificate in Computer Systems Security, the student is ineligible for an ECE graduate certificate in Computer Networking, Internet of Things, or Embedded Systems.

Purposes and goals

By completing the courses associated with this certificate, students will become familiar with state-of-the-art techniques for protecting computer systems against security weaknesses. These weaknesses include software attacks on computer systems, hardware reverse engineering, attacks on networking hardware, among others. Students will receive a solid mathematical foundation on the nature of attacks and evaluate cryptographic techniques to prevent them. The evolving nature of computer systems security and the presence of many computer hardware and software companies make this certificate attractive.

Contact for more information: Russell Tessier, Department of Electrical and Computer Engineering (tessier@umass.edu)