

Graduate Certificate
Department of Electrical and Computer Engineering
Computer Networking

Proposal Description

The Electrical and Computer Engineering (ECE) Department offers a graduate certificate in Computer Networking consisting of five courses from its graduate curriculum. The Computer Networking certificate is meant to provide a coherent foundation for graduate students interested in studying, designing, and building computer networks. This certificate covers issues related to mathematical foundations of data transport, network design and analysis, and software design and analysis for networking issues. 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 5 courses)

- ECE510: Foundations of Computer Systems
- ECE644: Computer System and Network Security
- ECE671: Computer Networks
- ECE647: Security Engineering
- ECE673: Simulation and Evaluation of Computer Networks

To receive the Computer Networking certificate, students must develop and complete a project in computer networking 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 computer networking. 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. ECE671 examines mathematical, protocol, and physical limitations of computer networks. ECE673 introduces the simulation of networks that can be used for research. Finally, ECE688F/P provide the students an opportunity to work in a small group to

complete a hands-on project related to computer networking. 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 Networking, the student is ineligible for an ECE graduate certificate in Computer Systems Security, Internet of Things, or Embedded Systems.

Purposes and goals

By completing the courses associated with this certificate, students will become familiar with the state-of-the-art in computer networks. This important field involves the design of network routers, network processors, network security, and communication protocols. By completing a certificate in this area, ECE students are able to demonstrate their deep knowledge of networking making them more attractive to employers and providing for career advancement.

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