

Graduate Certificate
Department of Electrical and Computer Engineering
Internet of Things

Proposal Description

The Electrical and Computer Engineering (ECE) Department offers a graduate certificate in Internet of Things consisting of five courses from its graduate curriculum. The Internet of Things certificate provides a coherent foundation for graduate students interested in learning how discrete electronic components can be interconnected to form networks. This certificate covers issues related to the implementation of monitoring and control systems, data analysis, and security for interconnected devices. To receive the certificate, students would 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 6 courses)

- ECE510: Foundations of Computer Systems
- ECE678: Data Analytics
- ECE671: Computer Networks
- ECE674: Green Computing
- ECE644: Trustworthy Computing
- ECE670: Advanced System Software

To receive the Internet of Things (IoT) certificate, students must develop and complete a project in IoT 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 IoT. 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. ECE678 examines practical issues regarding analyzing data from distributed sensors. ECE644 provides details on network security. ECE671 examines mathematical, protocol, and physical limitations of computer networks. ECE674 introduces the concept of using renewable energy to operate distributed computing devices. ECE670 examines programming techniques for large software

systems. Finally, ECE688F/P provide the student an opportunity to work in a small group to complete a hands-on project related to the internet of things. 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 such a 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 Internet of Things, the student is ineligible for an ECE graduate certificate in Computer Networking, Computer Systems Security, 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 the design, testing, and use of interconnected systems. The volume of everyday devices connected to the Internet has expanded exponentially over the past ten years. Systems ranging from household appliances to automobiles to smart phones are linked, allowing for immediate access to data and the ability of users to control many aspects of their living space. Expertise in IoT has become crucial for many jobs and employers often look for students with knowledge of how to design, build, and test complex IoT systems. The courses included in this certificate provide a solid basis of knowledge in these areas.

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