Erik Jonsson School of Engineering & Computer Science

Graduate Program in Computer Engineering

Objectives

The master's (MS) and doctoral (PhD) degrees in Computer Engineering (CE) emerged as a bridge between the increasingly overlapping disciplines of Computer Science and Electrical Engineering. The MS CE degree program provides intensive preparation for engineers who seek knowledge and skills necessary for the design of complex systems comprised of both hardware and software components. It has a heavy emphasis on the design of high speed and complex hardware and highly reliable and time critical software systems.

Computer Engineering at UT Dallas is a broadly based engineering discipline dealing with the sensing, processing, and transmission of information by making extensive use of electrical engineering and computer science principles. The CE program at UT Dallas also encourages students and faculty to develop synergies with disciplines outside of engineering, such as medicine and the life sciences. CE faculty members are actively involved in advanced research and teaching in all major areas of computer engineering. The Erik Jonsson School is home to several research centers, and promotes graduate and undergraduate curriculum innovation. It is the driving force behind computer engineering's rapid success and growth. The Erik Jonsson School has a large infrastructure of computing and other laboratory resources. The MS CE degree program provides intensive preparation for engineers who seek knowledge and skills necessary for the design of complex systems comprised of both hardware and software components. It has a heavy emphasis on the design of high speed and complex hardware and highly reliable and time critical software systems. It is designed to serve the needs of engineers who wish to continue their education. Courses are offered at a time and location convenient for the student who is employed on a full-time basis.

Facilities

The Erik Jonsson School of Engineering and Computer Science has developed a state-of-the-art computational facility consisting of a network of Sun servers and Sun Engineering Workstations. All systems are connected via an extensive fiber-optic Ethernet, and through the Texas Higher Education Network, have direct access to most major national and international networks. In addition, many personal computers are available for student use.

The Engineering and Computer Science Building provides extensive facilities for research in electrical engineering, telecommunications, and computer science and engineering.

The Center for Systems, Communications, and Signal Processing, with the purpose of promoting research and education in general communications, signal processing, control systems, medical and biological systems, circuits and systems and related software, is located in the Erik Jonsson School.
In the Digital Signal Processing Laboratory several multi-CPU workstations are available in a network configuration for simulation experiments. Hardware development facilities for real time experimental systems are available and include microphone arrays, active noise controllers, speech compressors, and echo cancellers. The Distributed Computing Laboratory has a network of personal computers running Linux to support network simulation using discrete-event simulation packages. The Hardware/Software Co-design Laboratory has many workstations and PCs with DSP modules to support the experiments for various implementations in DSP and communications.

In addition to the facilities on campus, cooperative arrangements have been established with many local industries to make their facilities available to UT Dallas graduate engineering students.

Master of Science in Computer Engineering

33 semester credit hours minimum

Program Faculty


Professor Emeritus: William J. Pervin

Associate Professors: Jorge A. Cobb, Zhiqiang Lin, Neeraj Mittal

Clinical Associate Professor: Nicholas Gans

Assistant Professors: Joseph Callenes-Sloan, Benjamin Carrion Schafer, Joseph Friedman, Cong Liu, Jeyavijayan Rajendran

Senior Lecturers: Diana Cogan, Chris I. Davis, Richard Goodrum, Greg Ozbirn, William (Bill) Swartz

Admission Requirements

The University's general admission requirements are discussed on the Graduate Admission page (catalog.utdallas.edu/2016/graduate/admission).

A student lacking undergraduate prerequisites for graduate courses in electrical engineering and computer science must complete these prerequisites or receive approval from the graduate advisor and the course instructor. A diagnostic exam may be required. Specific admission requirements follow.

The student entering the MS CE program should meet the following guidelines:

- An undergraduate preparation equivalent to a baccalaureate in computer science or electrical engineering from an accredited engineering program.
• A grade point average (GPA) in upper-division quantitative coursework of 3.0 or better on a 4.0 point scale.

• GRE revised scores of 154, 156, and 4 for the verbal, quantitative, and analytical writing components, respectively, are advisable based on our experience with student success in the program.

Applicants must submit three letters of recommendation from individuals able to judge the candidate's probability of success in pursuing master's study. Applicants must also submit an essay outlining the candidate's background, education, and professional goals.

Students from other engineering disciplines or from other science and math areas may be considered for admission to the program on a case-by-case basis; however, some additional coursework may be necessary before starting the master's program.

Degree Requirements

The University's general degree requirements are discussed on the Graduate Policies and Procedures page (catalog.utdallas.edu/2016/graduate/policies/policy).

The MS CE requires a minimum of 33 semester credit hours.

All students must have an academic advisor and an approved degree plan. Courses taken without advisor approval will not count toward the 33 semester credit hour requirement. Successful completion of the approved course of studies leads to the MS CE degree.

The MS CE program has both a thesis and a non-thesis option. All part-time MS CE students will be assigned initially to the non-thesis option. Those wishing to elect the thesis option may do so by obtaining the approval of a faculty thesis supervisor.

All full-time, supported students are required to participate in the thesis option. The thesis option requires six semester credit hours of research, a written thesis submitted to the graduate school, and a formal public defense of the thesis. The supervising committee administers this defense and is chosen in consultation with the student's thesis advisor prior to enrolling for thesis credit.

Each student must take a total of 33 hours from three categories:

1. CE-Depth (Core) Courses:
   - EEDG 6304 Computer Architecture
   - EECT 6325 VLSI Design
   - CS 6363 Design and Analysis of Computer Algorithms
   - CS 6378 Advanced Operating Systems

2. CE-Breath Electives:

Each student must take four CE-electives from the following two groups:
Group 1

- **EEDG 6301** Advanced Digital Logic
- **EEDG 6302** Microprocessor Systems
- **EEDG 6303** Testing and Testable Design
- **EEDG 6306** Application Specific Integrated Circuits
- **EESC 6367** Applied Digital Signal Processing
- **EEDG 6370** Design and Analysis of Reconfigurable Systems

Group 2

- **CS 6308** Real-Time Systems
- **CS 6324** Information Security
- **CS 6353** Compiler Construction
- **CS 6360** Database Design
- **CS 6375** Machine Learning
- **CS 6390** Advanced Computer Networks

- None-Thesis Option: The students must take any two courses in Group 1 and any two courses in Group 2.
- Thesis Option: The students must take one course in Group 1, one course in Group 2 and MSCE Thesis. The student can choose to take either one MSCE Research course or an additional course in Group 1 or Group 2. Pre-approval by MS Thesis advisor is required.

3. ECS Free Electives:

Each student must complete three free electives that satisfy the following:

- Must be a course in ECS School.
- Only one 5000 level course is allowed if: (a) is a pre-requisite to a course in the list above, and (b) it precedes the 6000 level course.
- Only one Special Topic is allowed.
- Pre-approval is required for: (i) one independent study (by a faculty advisor) and (ii) up to two non-ECS courses (by MS Thesis advisor).

Doctor of Philosophy in Computer Engineering

*75 semester credit hours minimum beyond the baccalaureate degree*
Program Faculty


Professor Emeritus: William J. Pervin

Associate Professors: Jorge A. Cobb, Zhiqiang Lin, Neeraj Mittal

Clinical Associate Professor: Nicholas Gans

Assistant Professors: Joseph Callenes-Sloan, Benjamin Carrion Schafer, Joseph Friedman, Cong Liu, Jeyavijayan Rajendran

Objectives

The PhD in Computer Engineering is awarded primarily to acknowledge the student's success in an original research project, the description of which is a significant contribution to the literature of the discipline. Applicants for the doctoral program are therefore selected by the Computer Engineering Program Graduate Committee on the basis of research aptitude, as well as academic record. Applications for the doctoral program are considered on an individual basis.

Admission Requirements

The University's general admission requirements are discussed on the Graduate Admission page (catalog.utdallas.edu/2016/graduate/admission).

The admission requirements will be basically the same as the existing ones for admission to the PhD programs in Electrical Engineering and Computer Science. The entrance requirements are:

- A master's degree in Computer Engineering or a closely associated discipline such as Electrical Engineering or Computer Science. Consideration will be given to highly qualified students wishing to pursue the doctorate without satisfying all of the requirements for a master's degree.
- GPA (grade point average) in graduate level coursework of 3.5 or higher on a 4.0 point scale.
- GRE revised scores of 154, 156, and 4 for the verbal, quantitative, and analytical writing components, respectively, are advisable based on our experience with student success in the program.

Applicants must submit three letters of recommendation from individuals able to judge the candidate's probability of success in pursuing doctoral study. Applicants must also submit an essay outlining the candidate's background, education, and professional goals.

Applicants must also submit a narrative describing their motivation for doctoral study and how it relates to their professional goals.
For students who are interested in a PhD but are unable to attend school full-time, there is a part-time option. The guidelines for admission to the program and the degree requirements are the same as for full-time PhD students. All students must have an academic advisor and an approved plan of study.

Degree Requirements

The University's general degree requirements are discussed on the Graduate Policies and Procedures page (catalog.utdallas.edu/2016/graduate/policies/policy).

The program will require a minimum of 75 semester credit hours beyond the baccalaureate degree. These credits must include at least 30 semester credit hours of graduate level courses beyond the baccalaureate level in the major concentration. The core requirements for the PhD degree in Computer Engineering are the same as the ones for the MS in Computer Engineering. All PhD students must demonstrate competence in the master's level core courses in their research area. However, a student's supervising committee may impose course requirements that are necessary and appropriate for the student's research program. It is expected that MS degree students planning to enter the proposed doctoral program will take most of the courses as part of their MS degree requirements. All students must have an academic advisor and an approved plan of study.

Also required are:

- A qualifying examination (QE), as approved by the CE graduate committee, demonstrating competence in the PhD candidate's research area. A student entering the PhD program with a MS CE must pass this exam within 3 long semesters, and a student entering without an MS CE must pass this exam within 4 long semesters. A student has at most two attempts at this qualifying exam. The exam will be given during the fall and spring semesters.
- A comprehensive exam consisting of: a written dissertation proposal, a public seminar, and a private oral examination conducted by the PhD candidate's supervising committee.
- Completion of a major research project culminating in a dissertation demonstrating an original contribution to scientific knowledge and engineering practice. The dissertation will be defended publicly. The rules for this defense are specified by the Office of the Dean of Graduate Studies. Neither a foreign language nor a minor is required for the PhD. However, the student's supervisory committee may impose these or other requirements that it feels are necessary and appropriate to the student's degree program.

Dissertation

A dissertation is required and must be approved by the graduate program. A student must arrange for a dissertation advisor willing to guide this dissertation. The student must have a dissertation supervising committee that consists of no less than four members. The dissertation may be in computer engineering exclusively or it may involve considerable work in an area of application.