

Computer and Systems Engineering (CSE) Master of Science Programs

The **Computer and Systems Engineering (CSE) degree** offered by the University of Houston (UH) is a graduate level interdisciplinary program administered by the Department of Electrical and Computer Engineering (ECE) that provides specialization in Computer Engineering.

Applicants can have a BS. in any one of the following fields: Electrical Engineering, Computer Engineering, Computer Science or a degree in any Engineering field or Quantitative Science. Depending on previous background a set of prerequisites might have to be satisfied before the student starts the graduate program in CSE. A student can complete the degree either on a full or part time basis and has the option of doing a thesis or not. Students in the non-thesis option may not receive any form of financial assistance from the department at any time during the course of their studies.

Detailed information on the application process can be obtained from the web at <http://www.ee.uh.edu/graduate/prospective-graduate-students>.

Prospective students can get academic advising from Dr. Markenscoff (pmarkens@central.uh.edu) by making an appointment.

1. Admission Requirements

A. Unconditional Admission

- A bachelor's degree in Engineering from an ABET accredited program, a degree in Computer Science, or a degree in Quantitative Science, with a grade point average of at least 3.0/4.0 on the last 60 hours of the undergraduate degree and on any coursework completed since graduation.
- General GRE scores must be submitted. While no minimum GRE scores are used to exclude students, typically students entering the program have GRE scores greater than 150 on the Verbal, greater than 159 on the Quantitative and greater than 4.0 on the Writing Assessment.
- International students must submit an official TOEFL. Recommended score 92 or better
- Three letters of recommendation on official letterhead with mailing address, phone and fax numbers, and email of the recommender.

B. Conditional Admission

- Same as unconditional admission except that the grade point average may be between 2.6 and 3.0 on the last 60 hours with high GRE scores.
- Student must be a citizen or permanent resident of the United States.

NOTE: The conditionally admitted student must earn a GPA of at least 3.0 on the first 12 hours of graduate work after enrolling in the program.

A general petition needs to be submitted to change conditional admission status after completing 12 hours.

2. Prerequisites

Upon admission to the program, each student will meet with the Director of the CSE Program (*Computer Engineering Option*) who will review the student's background and inform the student of the prerequisite courses, if any, that the student must complete before taking any graduate level courses. The prerequisites are grouped in the following three areas:

A. Mathematics

A student must have a mathematics background that includes *calculus, differential equations, linear algebra, and numerical methods*. These prerequisites may be satisfied by the following courses at UH or similar courses at another university:

MATH 1431	CALCULUS I
MATH 1432	CALCULUS II
MATH 2432	CALCULUS III
MATH 3331	DIFFERENTIAL EQUATIONS

B. Computers

A student must have had courses in high level and assembly language programming, elementary data structures, and in digital logic design and microcomputers. These prerequisites may be satisfied by the following courses at UH or similar courses at another university:

ECE 1331	Computer and Problem Solving
ECE 3441	Digital Logic Design
ECE 4436	Microprocessor Systems
COSC 6304	Data Structures
COSC 6310	Fundamental of Operating Systems

C. Circuits and Electronics

A student must have had courses in circuits and electronics. These prerequisites may be satisfied by the following courses at UH or similar courses at another university:

ECE 2300 and ECE 2100	Circuit Analysis and Circuit Analysis Lab
ECE 3355 and ECE3155	Electronics and Electronics Lab
ECE 3457	Digital Electronics

In addition, there may be other prerequisites depending on the choice of elective courses. Courses in Technology Programs cannot be used to satisfy prerequisite requirements.

3. **Required Graduate Courses**

To receive the degree of Master of Science, the student is required to complete (on a part-time or full-time basis), with a grade point average of at least 3.0, a minimum of 36 semester credit hours for the non-thesis option or a minimum of 30 semester hours for the thesis option.

Upon admission to the program, the student will meet with the Director of the CSE Program to develop a plan that involves any required prerequisite courses as well as the appropriate courses for the degree plan. If the student follows the thesis option he/she will be advised to find an advisor who will supervise and direct his/her research. The thesis advisor will subsequently advise the student about his/her degree plan. A student who has received an assistantship from the Cullen College of Engineering is not eligible for the non-thesis option.

Non-thesis option:

A student that follows the non-thesis option should complete a minimum of 36 semester credit hours of coursework (12 courses).

- Four of these courses should be from the List of Required ECE Courses shown next while the remaining can be from the List of Suggested Elective ECE courses.
- A minimum of six courses should be from the Department of Electrical & Computer Engineering.
- A maximum of six courses can be from outside the ECE department (Department of Computer Science, College of Engineering or College of Business Administration).

A maximum of 9 hours of 6000-level ECE courses equivalent to 5000-level courses are allowed.

Before graduation the student's degree plan will have to be approved by the Director of the Computer and Systems Engineering Program.

Thesis option:

A student who follows the thesis option should complete a minimum of 30 semester hours

- A minimum of 21 semester credit hours of coursework (7 courses)
Four of these courses should be from the list of the required Computer Engineering courses.
- Six hours of thesis (ECE 6399 and ECE 7399) and
- The rest of the hours could either be research hours (ECE 6x98) or another approved course.

A maximum of 6 hours of 6000-level ECE courses equivalent to 5000-level courses are allowed.

Before graduation the student's degree plan will have to be approved by both the thesis advisor and the Director of the Computer and Systems Engineering Program (*Computer Engineering Option*).

List of Required ECE Courses:

ECE 6370	Advanced Digital Design
ECE 6346	VLSI Design
ECE 6373	Advanced Computer Architecture
ECE 7373	Advanced Topics in Computer Architecture

To satisfy the coursework requirements and form a meaningful coherent program of study a student may choose the remaining courses from the following list of Suggested ECE Elective Courses or from the Department of Computer Science.

List of Suggested ECE Elective Courses:

ECE 5367	Computer Architecture and Design
ECE 6313	Neural Networks
ECE 6315	Neural Computation
ECE 6316	Computational and Biological Vision
ECE 6321/5351	Principles of Internetworking
ECE 6322	Introduction to Spread Spectrum Communications
ECE 6323	Optical Fiber Communications
ECE 6324	Digital Telephony
ECE 6328/5356	CMOS analog ICs
ECE 6325	State Space Control systems
ECE 6330	Mobile Radio Communication Systems
ECE 6331/5371	Advanced Telecommunications Engineering
ECE 6332	Wireless Telecommunication Systems
ECE 6335	Digital Control Systems
ECE 6336	Advanced Microprocessor Systems
ECE 6337	Introduction to Stochastic Processes and Random Variables
ECE 6342	Digital Signal Processing
ECE 6347	Advanced Topics in MOS Devices
ECE 6354/5354	Digital Video in Telecommunications
ECE 6356/5364	Electronic Circuit design
ECE 6364	Digital Image Processing
ECE 6372	Advanced Hardware Design
ECE 6376	Digital Pattern Recognition
ECE 6390	Linear Multivariable Control Systems
ECE 6397	Robotics in Healthcare
ECE 6466	Integrated Circuit Engineering
ECE 7342	Advanced Topics in Signal Processing
ECE 7349	Advanced Topics in Microelectronics

The above list is subject to change and other graduate ECE courses can be taken with the approval of the Director of the CSE Program.

In all cases no credit will be given for courses that are equivalent to courses used in the student's undergraduate degree.

A student in the non-thesis option can also take some management or business courses from the department of Industrial Engineering or from the College of Business Administration.

For the courses taken outside the department the following restrictions apply:

- All CS courses should be at the 4000 level or higher
- COSC 6301, 6302, 6303, and 6304 cannot apply for the degree.
- The prerequisite course COSC 6310 (Operating Systems) can be used for graduate credit.
- All courses from the College of Business Administration should be at the 6000 level or higher.
- Courses from the General Business Administration (GENB) cannot apply for the degree.
- All the courses of the College of Engineering should be at the 4000 level or higher.
- Courses that do not receive a letter grade but are graded S, U or W will not be counted towards the degree plan.
- **Non- ECE courses with similar content as ECE courses.**

In case a graduate level (6000 or above) course is offered in another department with similar content to a regularly offered ECE graduate course, graduate ECE students must take the ECE version. If the course in question is not offered regularly, or in the graduating semester, then the students may be allowed to take the non-ECE version by submitting a general petition. Please see the deadline for submitting the petition on the dept. calendar.

Under no circumstances will graduate credit be awarded for both the ECE and the non-ECE version of the course.

4. **Thesis Option**

A student selecting the thesis option must choose a thesis advisor that must be approved by the Director of the CSE Prog. The student's thesis advisor will counsel the student for the remainder of his/her studies, will supervise the research, and will serve as the director of his/ her research.

IMPORTANT NOTE:

Students must refer to

<http://www.ee.uh.edu/graduate/procedures-requirements-standards>

for all procedures, other requirements and standards.