
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). It offers two options: The ***Computer Engineering Option*** whose Director is Dr. Pauline Markenscoff and the ***Computer Controlled Systems Option*** whose Director is Dr. Leang-San Shieh providing the opportunity to specialize either in Computer Engineering or in Computer Controlled Systems. The two options have same regulations and admission standards but they have some differences in the required courses as well as in the suggested elective courses. A student can complete the degree either on a full or part time basis and has the option of doing a thesis or not.

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

Detailed information on the application process as well as application forms can be obtained from the web at <http://www.egr.uh.edu/ece/graduate/prospective/?e=application>.

Prospective students can get academic advising from Dr. Markenscoff (Markenscoff@uh.edu) for the Computer Engineering Option or from Dr. Shieh (Lshieh@uh.edu) for the Computer Controlled Systems Option by making an appointment.

Computer Engineering Option

Director: Dr. Pauline Markenscoff

1. Description of the Program

The Computer and Systems Engineering (CSE) degree offered by the University of Houston (UH) is a graduate level interdisciplinary program providing specialization in Computer Engineering.

Both thesis and non-thesis options are offered in the program. 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.

2. 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 450 on the Verbal, greater than 750 on the Quantitative and greater than 4.0 on the Writing Assessment.
- International students must submit an official TOEFL score of 580 or better for the paper based test and a score of 237 or better for the computer based one.
- 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.

3. 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 2331	Numerical Methods
ECE 3441	Digital Logic Design
ECE 4436	Microprocessor Systems
COSC 6304	Introduction to Structured Programming and Analysis or
COSC 2320	Data Structures
COSC 4330	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 3455	Electronics I
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.

4. **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 (*Computer Engineering Option*) 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 (*Computer Engineering Option*).

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*).

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.

Computer Engineering Option: 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 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 6366/5366	Physical design of VLSI Circuits
ECE 6376	Digital Pattern Recognition
ECE 6397	Special Topics: Reconfigurable Computing
ECE 6466	Integrated Circuit Engineering
ECE 7342	Advanced Topics in Signal Processing
ECE 7349	Advanced Topics in Microelectronics
ECE 7366	Advanced Process Integration for VLSI

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 (*Computer Engineering Option*).

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.
- 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.

5. **Thesis Option**

A student selecting the thesis option must choose a thesis advisor that must be approved by the Director of the CSE Program (*Computer Engineering Option*). 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.

A. **Thesis Committee:**

The student should form a Thesis Committee with the Thesis Advisor (who must be a tenure-track faculty member in the Department of Electrical and Computer Engineering) as chair as soon as the thesis topic is selected. The Committee must consist of at least one additional faculty member from the Electrical and Computer Engineering Department and at least one University of Houston tenure-track faculty member outside this department. The thesis committee form must be submitted well before the proposal defense is scheduled since the latter cannot take place unless the thesis committee has been formally approved by the Director of the CSE Program (*Computer Engineering Option*) & the Associate Dean for Research and Graduate affairs of the Cullen College of Engineering.

B. **Thesis Proposal:**

Once the Thesis Committee has been formed and approved, the student should prepare and defend a Thesis Proposal. During this semester, the student must be enrolled in ECE 6399. The Thesis Committee should confirm their approval by signing the Thesis Proposal Form. This form, together with a copy of the approved thesis proposal, has to be submitted to the ECE Dept. by the deadline specified on the semester calendar. Appropriate forms for the Thesis Committee formation and the Thesis Proposal defense can be obtained from the Department of Electrical and Computer Engineering web site:

<http://www.egr.uh.edu/ece/graduate/?e=forms>.

C. Thesis Defense:

The student must prepare a thesis announcement in order to let the public know that he/she has completed successfully his/her research and that he/she is ready for graduation. The announcement must be distributed to all faculty and students. One additional copy must be submitted to the ECE Department for filing. Further information can be found at the following site

http://www.egr.uh.edu/ece/graduate/annoucement_defense.doc

After the successful defense of the Thesis Proposal, the student may register for ECE 7399. Ideally, the student should enroll in ECE 7399 during the semester in which the thesis is defended and in which the student plans to graduate. The student should adhere to the thesis submission deadlines posted on the Dept. calendar. In case the student does not complete the thesis while enrolled in ECE 7399, he/she should enroll in research courses (ECE 6x98) in future semesters until the thesis is completed to the satisfaction of the committee.

NOTE:

The student may request that the members of the Thesis Committee review and comment on a preliminary version of the thesis. This procedure is encouraged since it should provide the student with ideas on how to improve the quality of the thesis and should also facilitate its acceptance. The student is required to present the final draft of the thesis to the members of the committee no later than two weeks prior to the date of the thesis defense. The student should be aware that he/she may be required to make substantial changes, before and after the defense, in the thesis in order to satisfy the requirements of the committee.

D. Thesis Approval:

Upon successful defense of the thesis, and once all signatures of the committee members have been obtained, the student must submit one copy of the thesis to the Director of the CSE Program (*Computer Engineering Option*) for review. This copy, together with the correct number of signature pages needed, must be submitted to the ECE front desk at the deadline stated in the Dept. calendar. The student may submit, simultaneously, a copy of the thesis to the Dean's Office for review. He/she should follow the format given by the Dean's Office to create the thesis signature pages, <http://www.egr.uh.edu/academics/ThesisGuide.pdf>. Once the thesis has been approved and signed by the Director of the CSE Program (*Computer Engineering Option*) & the Associate Dean for Research and Graduate affairs of the Cullen College of Engineering, the student can submit it to the Dean's Office for binding.

6. Other Requirements and Regulations

A. Transfer of Credit:

The student may transfer to this program up to 6 hours of graduate-level work completed elsewhere upon the approval of the Director of the CSE Program (*Computer Engineering Option*). Six hours of graduate-level work completed while the student has been a Post-Baccalaureate (PB) student at the University of Houston can also be transferred upon the

approval of the Director of the CSE Program (Computer Engineering Option). Courses in Technology programs cannot be transferred.

B. Other:

The student should refer to the Graduate and Professional Studies Catalog for other requirements and regulations such as course load, time limitations, 4-C rule, etc. Nothing in this document is intended to supersede or supplant the regulations set forth by the University of Houston in the Graduate and Professional Studies Catalog.

7. **Graduate Enrollment Hours**

The minimum number of semester credit hours a student should enroll for depends on his visa status (US. Citizens/permanent residents vs. International F1 students) and if it is a regular semester (Fall/Spring) or Summer.

Please note that courses taken for personal enrichment will not be counted towards the degree plan and must be approved by the advisor and the Director of the CSE Program (*Computer Engineering Option*) prior to enrollment. Enrichment hours cannot be used towards the total number of hours when assistantship is being received.

US. Citizens/permanent residents:

During each Fall/Spring semester if the student does not receive an assistantship from the department he/she should enroll for at least 1 hour.

If the student receives assistantship (RA/TA) from the department he/she should enroll for 9 hours.

Summer enrollment is not mandatory. However, enrollment for 6 hours is mandatory during the summer, if the student receives assistantship from the department.

International (F1) students:

During each Fall/Spring semester if the student does not receive an assistantship from the department he/she should enroll for at least 9 hours.

If the student receives assistantship (RA/TA) from the department he/she should enroll for 9 hours.

Enrollment for 6 hours is mandatory during the summer, if the student receives assistantship from the department.

If the student enrolls during the summer, even if he/she is unsupported, it is required to maintain full time status.

The table shown below shows the minimum credit hours a student should enroll for during the academic year depending on its visa status: **Updated information on supported enrollment hours can be found at the following college web site: <http://www.egr.uh.edu/academics/?e=gradpolicies1>.**

Supported (US/International):

	RA/GA/Scholarship/Fellowship	TA/IA
Spring	9	12
Summer	6	9
Fall	9	12

Unsupported students:

	International (F1/J1)	US
Spring	9	1
Summer	-- ¹	--
Fall	9	1

¹ Full time enrollment is required, if student enrolls.

Requests to enroll below the minimum number of hours required may be granted to students that are in the last semester in the program, if they need fewer hours than the minimum required, and have satisfied one of the following requirements:

- Have filed and given approval of their degree plan (for non-supported and non-thesis option students).
- Have filed and given approval of their degree plan that shows that all degree requirements (except thesis) have been met, and who will defend their thesis no later than the 12th day of class (approximately September 5, February 1 and June 10) (for thesis option students).

All requests must be made by a General Petition, submitted to the ECE Department before the first day of the semester. Students must attach a copy of the thesis Defense announcement. Please note that full-time enrollment is required for all students during the semester seeking an exception to enrollment requirements. The Department will adjust the enrollment hours once the petition to enroll below the minimum hours has been approved.

8. Academic honesty

Students have to observe all accepted principles of academic honesty. Academic honesty policy and procedural information are available in the student’s handbook and on the web site below.

<http://www.uh.edu/dos/publications/handbook.php>

When a case of academic dishonesty occurs, the department will enforce the academic honesty guidelines that are provided by the university.

9. **Cumulative Grade Point Average (GPA)**

This average is on all courses attempted at the university during the graduate program. Students must maintain an overall GPA of 3.0 or better in order to remain in good academic standing. An “academic stop” will be placed on the student’s record when he/she fails to maintain this average. Each semester the overall GPA is below 3.0 the student will be notified by a letter. For the stop to be removed, before enrollment the student must make an appointment and meet with the advisor.

10. **Major Grade Point Average (MGPA)**

This average is only on courses that are for the student’s degree. Students must maintain in their major a GPA of 3.0 prior to applying for graduation.

11. **Four C-rule**

The following passage is from the university’s graduate & professional catalog:

“A student who receives a grade of C+ or lower in 12 semester hours of credit attempt at this institution for graduate credit or for application toward the graduate degree, whether or not in repeated courses, is ineligible for any advanced degree at this institution and will not be permitted to re-enroll for graduate study”. For more information, please refer to the following web site:

http://www.uh.edu/gs/grad_catalog/garr/c_rule.html

The department will place an academic stop on the student’s record for the first “C” received during the graduate program. The student must then seek the advisor for assistance. If no progress has been made by the student and the limit of four “C” grades has been reached, the department will send a letter to the student terminating him/her from the graduate program.

12. **Leave of Absence**

When enrollment is not possible for a given semester, in order to maintain good academic status a student must request a leave of absence from the graduate program by submitting a general petition to the Graduate Admissions Office. Once a decision has been made by the Director of the CSE program, an academic stop will be placed on his/her record.

13. **Reinstatement**

A general petition is needed for reinstatement to the graduate program. In addition to the general petition, the student must include a degree plan with all the courses taken and an advising form indicating in which courses the student intends to enroll during the semester for which reinstatement is sought. Such requests must be filed by the graduate admission deadline for new students to avoid delay in preferred enrollment for the returning semester. A student can only enroll when the petition has been approved.

14. **Time limitation**

The M.S. degree must be completed within five years from the date of enrollment at the University of Houston. In the event that the student cannot complete his/her degree within this time limit, he/she must submit to the ECE department a general petition requesting an exception. He/she must attach to the general petition an outline of expired course(s), an expected date of graduation, and a current degree plan. For more information, please refer to the following web site:

<http://www.egr.uh.edu/academics/?e=gradpolicies1>

15. **Withdrawal from the graduate program**

If a student is not able to continue his studies, he/she should submit to the ECE department a general petition requesting his/her withdrawal from the program. However, in case that he/she decides to resume his/her studies, he/she will need to reapply by following the procedures for new applicants. This process is not recommended for students that have the intention of completing their studies at a later time.

16. **Change of major/program**

Students who are interested in switching majors must get approval by submitting to the ECE department a general petition requesting their withdrawal from this program as well the transfer to the new department/program. If the petition is approved, the student's file will be sent to the new department. Of course, the new department/program will have to admit them independently. An academic stop will remain on the student's record until this procedure is completed.

17. **Graduation**

Graduation is not automatic; the student must file an application for graduation and a completed degree plan form. He/she should be enrolled during the semester that he/she is applying for graduation. In case that he/she does not graduate the indicated semester, a new graduation application and an updated degree plan must be submitted.

18. **Curricular Practical Training (CPT—for international students with F-1 visa only)**

The purpose of curricular practical training (CPT) is to gain insight to the student's academic program; therefore, it must be considered as "an integral part of an established curriculum."

The ECE Department will allow up to six (6) hours of CPT ("internships") in the following situations.

1. Students in the MEE Telecommunications program (*note*: this is NOT the same as the signals/communications option) can elect to take up to six (6) hours of internship by enrolling in ECE 6392 or ECE 7392.
2. MSEE or PhD students who need to be employed by an outside agency in order to collect data for their thesis/dissertation.
3. **All MEE, MSEE and PhD candidates, not covered by 1) or 2), provided that:**
 - A. A general petition is submitted before the start of the semester in which the student intends to participate in an internship. The petition must include a formal job offer, on the hiring company's stationary, a description of the work to be performed, and the salary offered. MSEE and PhD candidates must obtain approval from their thesis/dissertation advisor as well.
 - B. The work must be related to the practice of electrical and/or computer engineering.
 - C. Upon approval of the general petition, the participating student enrolls in ECE 6392 or ECE 7392.
 - D. Students enrolled in internship courses will meet weekly at UH to present oral progress reports and discuss issues related to their internship experience.
 - E. A final report, describing the work performed, must be submitted within two weeks of the conclusion of each semester's enrollment in ECE 6392 or ECE 7392.
 - F. Only half-time employment is allowed during Fall and Spring semesters. Full-time employment is allowed during the Summer semester.
 - G. ECE 6392 and ECE 7392 cannot be repeated.
 - H. MEE students can elect to replace two three-hour non-core courses by ECE 6392 and ECE 7392. Non-core courses are those regularly-scheduled courses in NSM, Computer Science, the Business School, or Engineering other than ECE, which are currently acceptable to meet the MEE degree requirements. ECE 6392 and ECE 7392 cannot be used as a substitute for any of the six ECE courses required to meet the 'area of concentration' requirements.

- I. MS and PhD students can substitute up to six hours of research courses (ECE 6x98 or ECE 8x98).

CPT will not be approved under any other circumstances.

<http://www.issso.uh.edu/f1/test7.html>

http://www.uh.edu/gs/gps_policy.htm

<http://www.egr.uh.edu/academics/?e=gradpolicies3>

Computer Controlled Systems Option

Director: Dr. Leang-San Shieh

1. **Description of the Program**

The Computer Controlled Systems Option of the Computer and System Engineering Program provides advanced study in the following areas:

- Design of digital systems
- Engineering systems modeling, simulation and optimization
- Robotics and aerospace systems
- Systems and control theory

The core courses provide the student background in mathematical concepts, computer and information engineering, design of computer systems, and systems theory. Laboratories equipped with modern computing systems as well as instruction in the most recent analytical techniques and technological developments are available. The program is designed to be relevant to the work of engineers in the fields of software engineering, design of computer systems, and computer controlled systems.

This option has the same admission as well as other requirements and regulations as the Computer Engineering Option of the CSE Program. It is different though from the Computer Engineering Option in the prerequisite and required courses.

2. **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 450 on the Verbal, greater than 750 on the Quantitative and greater than 4.0 on the Writing Assessment.
- International students must submit an official TOEFL score of 580 or better for the paper based test and a score of 237 or better for the computer based one.
- 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.

3. **Prerequisites**

Basic Prerequisites. A student must have credit for the following UH courses or for similar courses at another university:

ECE 1331	Computers and Problem Solving
ECE 2331	Numerical Methods for Electrical & Computer Engineers
INDE 2333	Engineering Statistics I
ECE 3337	Electrical Engineering Analysis I

Prerequisites in Circuits, Systems, Logic and Computers

ECE 3336	Introduction to Circuits and Electronics
ECE 3441	Digital Logic Design
ECE 4436	Microprocessor Systems
ECE 4375	Automatic Control Systems

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.

4. **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 (*Computer Controlled Systems Option*) 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 also advise the student subsequently 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).

- At least four of the courses should be from the List of Required courses shown next while the remaining can be from the List of Suggested Elective ECE Courses or from another department.
- 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 (*Computer Controlled Systems Option*).

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 Required courses shown next.
- Six hours of thesis (ECE 6399 and ECE 7399)
- 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 Controlled Systems Option*).

Computer Controlled Systems Option: List of Required Courses:

A. At least two of the following:

ECE 6325	State-Space Control Systems
ECE 7333	Optimal Control Systems
ECE 6337	Introduction to Stochastic Processes
ECE 6335	Digital Control Systems

B. At least two of the following:

ECE 6336	Advanced Microprocessor Systems
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ECE 6370	Advanced Digital Design
ECE 6373	Advanced Computer Architecture
ECE 6346	VLSI Design

To satisfy the coursework requirements and form a meaningful coherent program of study a student may choose the remaining courses from the above list of required courses or from the following list of suggested ECE elective courses or from the Department of Computer Science.

Computer Controlled Systems Option: List of Suggested ECE Elective Courses:

ECE 5367	Computer Architecture and Design
ECE 6310	Robotics: Models, Controls and Sensors
ECE 6313	Neural Networks
ECE 6315	Neural Computing
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 6330	Mobile Radio Communication Systems
ECE 6331/5371	Advanced Telecommunications Engineering
ECE 6332	Wireless Telecommunication Systems
ECE 6342	Digital Signal Processing
ECE 6364	Digital Image Processing
ECE 6376	Digital Pattern Recognition
ECE 6390	Multivariable Control Systems
ECE 6397	Special Topics: Reconfigurable Computing
ECE 7331	Nonlinear and Time-Varying Feedback Control
ECE 7332	Design of Statistical Control Systems
ECE 7342	Advanced Topics in Signal Processing
ECE 7334	Advanced Digital Control Systems
ECE 7335	Robust Control Systems
ECE 7373	Advanced Topics in Computer Architecture

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 (*Computer Controlled Systems Option*).

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.

- 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.

5. **Thesis Option**

A student selecting the thesis option must choose a thesis advisor that must be approved by the Director of the CSE Program (*Computer Controlled Systems Option*). 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.

A. **Thesis Committee:**

The student should form a Thesis Committee with the Thesis Advisor (who must be a tenure-track faculty member in the Department of Electrical and Computer Engineering) as chair as soon as the thesis topic is selected. The Committee must consist of at least one additional faculty member from the Electrical and Computer Engineering Department and at least one University of Houston tenure-track faculty member outside this department. The thesis committee form must be submitted well before the proposal defense is scheduled since the latter cannot take place unless the thesis committee has been formally approved by the Director of the CSE Program (*Computer Controlled Systems Option*) & the Associate Dean for Research and Graduate affairs of the Cullen College of Engineering.

B. **Thesis Proposal:**

Once the Thesis Committee has been formed and approved, the student should prepare and defend a Thesis Proposal. During this semester, the student must be enrolled in ECE 6399. The Thesis Committee should confirm their approval by signing the Thesis Proposal Form. This form, together with a copy of the approved thesis proposal, has to be submitted to the ECE Dept. by the deadline specified on the semester calendar. Appropriate forms for the Thesis Committee formation and the Thesis Proposal defense can be obtained from the Department of Electrical and Computer Engineering web site:

<http://www.egr.uh.edu/ece/graduate/?e=forms>.

C. Thesis Defense:

The student must prepare a thesis announcement in order to let the public know that he/she has completed successfully his/her research and that he/she is ready for graduation. The announcement must be distributed to all faculty and students. One additional copy must be submitted to the ECE Department for filing. Further information can be found at the following site

http://www.egr.uh.edu/ece/graduate/annoucement_defense.doc

After the successful defense of the Thesis Proposal, the student may register for ECE 7399. Ideally, the student should enroll in ECE 7399 during the semester in which the thesis is defended and in which the student plans to graduate. The student should adhere to the thesis submission deadlines posted on the Dept. calendar. In case the student does not complete the thesis while enrolled in ECE 7399, (s) he should enroll in research courses (ECE 6x98) in future semesters until the thesis is completed to the satisfaction of the committee.

NOTE:

The student may request that the members of the Thesis Committee review and comment on a preliminary version of the thesis. This procedure is encouraged since it should provide the student with ideas on how to improve the quality of the thesis and should also facilitate its acceptance. The student is required to present the final draft of the thesis to the members of the committee no later than two weeks prior to the date of the thesis defense. The student should be aware that he/she may be required to make substantial changes, before and after the defense, in the thesis in order to satisfy the requirements of the committee.

D. Thesis Approval:

Upon successful defense of the thesis, and once all signatures of the committee members have been obtained, the student must submit one copy of the thesis to the Director of the CSE Program (*Computer Controlled Systems Option*) for review. This copy, together with the correct number of signature pages needed, must be submitted to the ECE front desk at the deadline stated in the Dept. calendar. The student may submit, simultaneously, a copy of the thesis to the Dean's Office for review. He/she should follow the format given by the Dean's Office to create the thesis signature pages, <http://www.egr.uh.edu/academics/files/ThesisGuide.pdf>. Once the thesis has been approved and signed by the Director of the CSE Program (*Computer Controlled Systems Option*) & the Associate Dean for Research and Graduate affairs of the Cullen College of Engineering, the student can submit it to the Dean's Office for binding.

6. Other Requirements and Regulations

A. *Transfer of Credit:*

The student may transfer to this program up to 6 hours of graduate-level work completed elsewhere upon the approval of the Director of the CSE Program. Six hours of graduate-level work completed while the student has been a Post-Baccalaureate (PB) student at the University of Houston can also be transferred upon the approval of the Director of the CSE Program. Courses in Technology programs cannot be transferred.

B. *Other:*

The student should refer to the Graduate and Professional Studies Catalog for other requirements and regulations such as course load, time limitations, 4-C rule, etc. Nothing in this document is intended to supersede or supplant the regulations set forth by the University of Houston in the Graduate and Professional Studies Catalog.

7. Graduate Enrollment Hours

The minimum number of semester credit hours a student should enroll for depends on his visa status (US. Citizens/permanent residents vs. International F1 students) and if it is a regular semester (Fall/Spring) or Summer.

Please note that courses taken for personal enrichment will not be counted towards the degree plan and must be approved by the advisor and the Director of the CSE Program (*Computer Controlled Systems Option*) prior to enrollment. Enrichment hours cannot be used towards the total number of hours when assistantship is being received.

US. Citizens/permanent residents:

During each Fall/Spring semester if the student does not receive an assistantship from the department he/she should enroll for at least 1 hour.

If the student receives assistantship (RA/TA) from the department he/she should enroll for 9 hours.

Summer enrollment is not mandatory. However, enrollment for 6 hours is mandatory during the summer, if the student receives assistantship from the department.

International (F1) students:

During each Fall/Spring semester if the student does not receive an assistantship from the department he/she should enroll for at least 9 hours.

If the student receives assistantship (RA/TA) from the department he/she should enroll for 9 hours.

Enrollment for 6 hours is mandatory during the summer, if the student receives assistantship from the department.

If the student enrolls during the summer, even if he/she is unsupported, it is required to maintain full time status.
Updated information on supported enrollment hours can be found at the following college web site:
<http://www.egr.uh.edu/academics/?e=gradpolicies1>.

The table shown below shows the minimum credit hours a student should enroll for during the academic year depending on its visa status:

Supported (US/International):

	RA/GA/Scholarship/Fellowship	TA/IA
Spring	9	12
Summer	6	9
Fall	9	12

Unsupported students:

	International (F1/J1)	US
Spring	9	1
Summer	-- ¹	--
Fall	9	1

¹ Full time enrollment is required, if student enrolls.

Requests to enroll below the minimum number of hours required may be granted to students that are in the last semester in the program, if they need fewer hours than the minimum required, and have satisfied one of the following requirements:

- Have filed and given approval of their degree plan (for non-supported and non-thesis option students).
- Have filed and given approval of their degree plan that shows that all degree requirements (except thesis) have been met, and who will defend their thesis no later than the 12th day of class (approximately September 5, February 1 and June 10) (for thesis option students).

All requests must be made by General Petition, submitted to the ECE Department before the first day of the semester. Students must attach a copy of the thesis Defense announcement. Please note that full-time enrollment is required for all students during the semester seeking an exception to enrollment requirements. The Department will adjust the enrollment hours once the petition to enroll below the minimum hours has been approved.

8. **Academic honesty**

Students have to observe all accepted principles of academic honesty. Academic honesty policy and procedural information are available in the student's handbook and on the web site below.

<http://www.uh.edu/dos/publications/handbook.php>

When a case of academic dishonesty occurs, the department will enforce the University of Houston academic honesty guidelines

9. **Cumulative Grade Point Average (GPA)**

This average is on all courses attempted at the university during the graduate program. Students must maintain an overall GPA of 3.0 or better in order to remain in good academic standing. An "academic stop" will be placed on the student's record when he/she fails to maintain this average. Each semester the overall GPA is below 3.0 the student will be notified by a letter. For the stop to be removed, before enrollment the student must make an appointment and meet with the advisor.

10. **Major Grade Point Average (MGPA)**

This average is only on courses that are for the student's degree. Students must maintain in their major a GPA of 3.0 prior to applying for graduation.

11. **Four C-rule**

The following passage is from the university graduate & professional catalogue:

"A student who receives a grade of C+ or lower in 12 semester hours of credit attempt at this institution for graduate credit or for application toward the graduate degree, whether or not in repeated courses, is ineligible for any advanced degree at this institution and will not be permitted to re-enroll for graduate study". For more information, please refer to the following web site:

http://www.uh.edu/gs/grad_catalog/garr/c_rule.html

The department will place an academic stop on the student's record for the first "C" received during the graduate program. The student must then seek the advisor for assistance. If no progress has been made by the student and the limit of four "C" grades has been reached, the department will send a letter to the student terminating him/her from the graduate program.

12.

Leave of Absence

When enrollment is not possible for a given semester, in order to maintain good academic status a student must request a leave of absence from the graduate program by submitting a general petition to the Graduate Admissions Office. Once a decision has been made by the Director of the CSE program, an academic stop will be placed on his/her record.

13.

Reinstatement

A general petition is needed for reinstatement to the graduate program. In addition to the general petition, the student must include a degree plan with all the courses taken and an advising form indicating in which courses the student intends to enroll during the semester for which reinstatement is sought. Such requests must be filed by the graduate admission deadline for new students to avoid delay in preferred enrollment for the returning semester. A student can only enroll when the petition has been approved.

14.

Time limitation

The M.S. degree must be completed within five years from the date of enrollment at the University of Houston. In the event that the student cannot complete his/her degree within this time limit, he/she must submit to the ECE department a general petition requesting an exception. He/she must attach to the general petition an outline of expired course(s), an expected date of graduation, and a current degree plan. For more information, please refer to the following web site:

<http://www.egr.uh.edu/academics/?e=gradpolicies1>

15.

Withdrawal from the graduate program

If a student is not able to continue his studies, he/she should submit to the ECE department a general petition requesting his/her withdrawal from the program. However, in case that he/she decides to resume his/her studies, he/she will need to reapply by following the procedures for new applicants. This process is not recommended for students that have the intention of completing their studies at a later time.

16.

Change of major/program

Students who are interested in switching majors must get approval by submitting to the ECE department a general petition requesting their withdrawal from this program as well the transfer to the new department/program. If the petition is approved, the student's files will be sent to the new department. Of course, the new department/program will have to admit them independently. An academic stop will remain on the student's record until this procedure is completed.

17.

Graduation

Graduation is not automatic; the student must file an application for graduation and a completed degree plan form. He/she should be enrolled during the semester that he/she is applying for graduation. In case that he/she does not graduate the indicated semester, a new graduation application and an updated degree plan must be submitted.

18.

Curricular Practical Training (CPT—for international students with F-1 visa only)

The purpose of curricular practical training (CPT) is to gain insight to the student's academic program; therefore, it must be considered as "an integral part of an established curriculum."

The ECE Department will allow up to six (6) hours of CPT ("internships") in the following situations.

1. Students in the MEE Telecommunications program (*note*: this is NOT the same as the signals/communications option) can elect to take up to six (6) hours of internship by enrolling in ECE 6392 or ECE 7392.
2. MSEE or PhD students who need to be employed by an outside agency in order to collect data for their thesis/dissertation.
3. **All MEE, MSEE and PhD candidates, not covered by 1) or 2), provided that:**
 - A. A general petition is submitted before the start of the semester in which the student intends to participate in an internship. The petition must include a formal job offer, on the hiring company's stationary, a description of the work to be performed, and the salary offered. MSEE and PhD candidates must obtain approval from their thesis/dissertation advisor as well.
 - B. The work must be related to the practice of electrical and/or computer engineering.
 - C. Upon approval of the general petition, the participating student enrolls in ECE 6392 or ECE 7392.
 - G. Students enrolled in internship courses will meet weekly at UH to present oral progress reports and discuss issues related to their internship experience.
 - H. A final report, describing the work performed, must be submitted within two weeks of the conclusion of each semester's enrollment in ECE 6392 or ECE 7392.
 - I. Only half-time employment is allowed during Fall and Spring semesters. Full-time employment is allowed during the Summer semester.
 - G. ECE 6392 and ECE 7392 cannot be repeated.
 - J. MEE students can elect to replace two three-hour non-core courses by ECE 6392 and ECE 7392. Non-core courses are those regularly-scheduled courses in NSM, Computer Science, the Business School, or Engineering other than ECE, which are currently acceptable to meet the MEE degree requirements. ECE 6392 and ECE 7392 cannot be used as a substitute for any of the six ECE courses required to meet the 'area of concentration' requirements.

- K. MS and PhD students can substitute up to six hours of research courses (ECE 6x98 or ECE 8x98).

CPT will not be approved under any other circumstances.

<http://www.issso.uh.edu/f1/test7.html>

http://www.uh.edu/gs/gps_policy.htm

<http://www.egr.uh.edu/academics/?e=gradpolicies3>

19. **Optional Practical Training (OPT)—for international students with F-1 visa only**

Optional practical training (OPT) allows international students to gain one year practical training in their related major field. The College of Engineering guidelines are as follows:

- A. Post-completion OPT is allowed for students who have completed their degrees, including submission of their thesis/dissertation for binding for MS and PhD degrees.
- B. Pre-completion part-time OPT is allowed for unsupported F-1 students during any semester but is limited to 20 hours per week. Time used is deducted from the one year eligibility at half the rate. Students must meet all applicable INS regulations regarding their status as a student.
- C. Pre-completion full-time Summer OPT is allowed but students can work full-time during the summer only. Time used is deducted from one year of eligibility. Students cannot hold a full-time OPT and be a supported student simultaneously.
- A. Pre-completion full-time OPT with only thesis or dissertation remaining is not allowed.

OPT request forms and checklist are due to the ECE dept. along with the graduation application according to the deadline for that semester. For further details, please refer to the following web sites for more information.

<http://issso.uh.edu/pdf/CPT%20Graduate%20Student.pdf>

http://www.uh.edu/gs/gps_policy.htm

<http://www.egr.uh.edu/academics/?e=gradpolicies3>