

Computer Science	Computer Engineering	Electrical Engineering	Systems & Control Engineering
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Program Introduction			
<p>The programs in computer engineering and computing and information sciences are similar in that they each require a strong background in both computer hardware and software, as well as a substantial amount of “hands-on” experience. The programs differ in that engineering is based mainly in physical sciences, while computer science is more strongly based in mathematical sciences as applied to more abstract notions such as properties of programming languages, analysis of algorithms, complexity considerations, and proof of correctness. The program believes that the success of its graduates at all levels is largely due to the emphasis on project and problem-oriented course material coupled with the broad-based curricular requirements. Doctoral dissertations must be original contributions to the existing body of knowledge in computer engineering and science.</p>	<p>The programs in computer engineering and computing and information sciences are similar in that they each require a strong background in both computer hardware and software, as well as a substantial amount of “hands-on” experience. The programs differ in that engineering is based mainly in physical sciences, while computer science is more strongly based in mathematical sciences as applied to more abstract notions such as properties of programming languages, analysis of algorithms, complexity considerations, and proof of correctness. The program believes that the success of its graduates at all levels is largely due to the emphasis on project and problem-oriented course material coupled with the broad-based curricular requirements. Doctoral dissertations must be original contributions to the existing body of knowledge in computer engineering and science.</p>	<p>The EE program offers graduate programs leading to the Master of Science and Doctor of Philosophy degrees. The programs are comprehensive and basic, emphasizing four major areas in which the faculty are actively engaged in research: (1) automation, sensing, intelligence and actuation; (2) solid state electronics; (3) electromagnetics, high frequency communications and devices; and (4) Circuits, Signal Processing, and Computer-Aided Design.</p> <p>Academic requirements for graduate degrees in engineering are as specified for the Case School of Engineering in this bulletin, however, some exceptions are noted below. All current rules and regulations for this program are detailed in a graduate student handbook, available from the department graduate office, which supersedes any rules contained here. A number of research assistantships are available, on a competitive basis, for the full support of qualified students.</p>	<p>Graduate programs in Systems and Control engineering include the following areas of concentration: control theory (adaptive control, stochastic filtering and control, nonlinear control), optimization and decision theory (multi-objective and large scale system theory), control of industrial and manufacturing systems (facilities layout, flexible manufacturing), biomedical control system design and analysis (control of neural prostheses, automatic control of therapeutic drug delivery), energy systems (power distribution and production planning, load forecasting), and global and environmental system analysis and control.</p>

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ADMISSION REQUIREMENTS			
		<p>The M.S.E.E. degree is open only to students who have a bachelor's degree in electrical engineering or the equivalent. The Electrical Engineering Program establishes equivalency to a B.S.E.E. degree by inspecting student records at the time of admission. Thus, it is possible for a student with a B.S. degree in another field of engineering or the physical sciences to apply for admission to the regular M.S.E.E. program. Upon satisfactory completion of all requirements, the M.S. degree in electrical engineering is granted. Students whose background is too disparate from those who have a B.S.E.E. degree may choose an undesignated degree program.</p>	
M.S. PROGRAM OF STUDY			
<p>Each student, in consultation with his/her faculty advisor, must submit a Planned Program of Study to the Chair of the Graduate Studies Committee before completing 9 semester hours of credit.</p>			<p>Each M.S. Student shall, in consultation with his/her faculty academic advisor, submit a Program of Study to the Department Graduate Studies Committee. The Program of Study should be updated as changes are made (with approval of the faculty academic advisor and the Associate Chairman for Graduate Studies). The Program of Study must be approved prior to the second semester of study.</p> <p>The student must obtain the approval of his/her faculty academic advisor each semester, prior to registration. Registration will not be permitted if an approved Program of Study is not on file with the Graduate Program Coordinator.</p>

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<p>COURSE REQUIREMENTS</p> <p>As provided for by the School of Graduate Studies there are two plans for the Master of Science degree, each requiring 27 semester hours of credit. Plan A requires 9 semester hours of thesis (EECS 651) and 18 semester hours of courses. At least 15 hours of coursework must be at the 400-level or higher; the remaining 3 hours can be a 300-level course. In Plan B 6 hours of coursework may be at the 300-level; the remainder must be at the 400-level or higher. Plan B also requires a 3 to 6 semester hour project (EECS 602).</p> <p>Course Requirements</p> <p>The M. S. program in Computing and Information Sciences requires students to have substantial knowledge of undergraduate computer science material. This includes knowledge in data structures, algorithms and operating systems equivalent to that in the courses:</p> <p>EECS 233 Intro to Data Structures EECS 340 Algorithms and Data Structures EECS 338 Intro to Operating Sys</p> <p>This requirement is normally satisfied by taking courses at the student's undergraduate university which contain most of the material in the above courses. Students deficient in one or more of these areas can satisfy this requirement by taking the corresponding course listed above. A student taking a more advanced course in an area automatically demonstrates knowledge of the material in the area; e. g., taking EECS 454 Analysis of Algorithms</p>	<p>There are two degree plans, Plan A and Plan B. Plan B is normally restricted to part-time students who are otherwise working full-time or students in the 5 year MS/BS program. Any student choosing Plan B must petition the Department Chairman at least two semesters before the planned graduation. In Plan A, at most three (3) hours of course work at the 300 level can appear on the student's Program of Study. Any 300 level courses must be approved by the student's advisor before signing up for the course.</p> <p>PLAN A</p> <p>All Plan A students must complete 18 credit hours of course work and must sign up for a minimum of 9 credit hours to write a thesis (EECS 651).</p> <p>PLAN B</p> <p>Students selecting this plan must complete 27 credit hours, which should include at least 21 hours of course work.</p> <p>COMPUTING BREADTH REQUIREMENTS</p> <p>Candidates for the M.S. in Computer Engineering are required to be knowledgeable in the following fundamental areas:</p> <p>Computer Architecture (EECS 419) and Analysis of Algorithms (ECES 454).</p> <p>The fundamentals requirement can be met in one of two ways:</p> <p>The student may take the course which</p>	<p>The M.S.E.E. degree requires 27 credit hours, attained with acceptable grades as defined below. Of these credits, at least 21 must be in EE courses (including thesis or project) and at least 24 must be in courses (including thesis or project registration) numbered 400 or higher in EE or in other departments. As an option, 6 credits in courses numbered 300 may be used to substitute for 3 credits in courses numbered 400 or higher, thus increasing the degree requirements to 30 credits. 9 credits must be in EECS 651 (thesis) if Plan A is elected. The combined number of credits of EECS 651 and EECS 601 (independent study) applied toward the degree may not exceed 9 for Plan A or 6 for Plan B. A program of study must be filed before the completion of 9 credit hours.</p> <p>In your final semester you will be required to check in at the Graduate Studies Office in the Graduate School to apply for the degree by the date which is announced each semester. The signature of your advisor and the EEAP chairman is necessary on the form they will give you.</p>	<p>PLAN A (THESIS) MASTERS PROGRAM</p> <p>It is recommended that students who plan to pursue the Ph.D. Degree use Plan A for their M.S. Degree. A student following the Plan A (Thesis) program for the M.S. Degree must complete 18 credit hours of course work, and must enroll in at least nine credit hours of EECS 651 (Master's Thesis). At most three credit hours can be at the 300 level. No credit hours within the approved Program of Study can be below the 300 level</p> <p>University rules require that, once M.S. Thesis (EECS 651) registration has been initiated, the student must enroll for at least 3 credit hours of EECS 651 during each spring and fall semester, until nine credit hours has been achieved. After this time, the student must enroll in one credit hour per semester until completion and successful defense of the M.S. Thesis. The M.S. Thesis committee must meet at least once per year, with the student, to review research progress. The result of these meetings will be reported to the Department Graduate Studies Committee. The M.S. Thesis must be defended in an oral exam, conducted by the student's thesis committee. This defense also serves as the comprehensive examination.</p> <p>Plan B (Project) Masters Program</p> <p>A student following the Plan B (Project) program for the M.S. Degree must complete 27 credit hours, which should including at least 21 hours of</p>

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<p>demonstrates knowledge of the material in EECS 340.</p> <p>Students are required to have graduate level knowledge of some core computer science topics. This requirement is met by taking at least three of the following courses:</p> <ul style="list-style-type: none"> EECS 423 Distributed Systems EECS 425 Comp Comm Networks EECS 430 Object Oriented Software EECS 431 Software Engineering EECS 433 Database Systems EECS 454 Analysis of Algorithms EECS 491 Intelligent Systems I <p>Students are also required to have some more advanced/specialized computer science knowledge. This requirement is met by taking at least one of the following courses:</p> <ul style="list-style-type: none"> EECS 419 Comp Sys Architecture EECS 428 Web Computing EECS 435 Data Mining EECS 436 Advances in Databases EECS 440 Automata & Formal Lang EECS 445 Formal Verification EECS 458 Bioinformatics EECS 466 Computer Graphics EECS 475 Autonomous Robotics EECS 477 Dynam of Adapt Behavior EECS 478 Comput Neuroscience EECS 479 Sem Comput Neuroscienc EECS 484 Computational Intellig I EECS 591 Intelligence Systems II <p>To broaden their perspectives all full-time students pursuing graduate degrees, including BS/MS students, are required to register for EECS 500 each semester. EECS 500 is Electrical Engineering and Computer Science Colloquium which is a zero credit hour course offered every semester.</p>	<p>is associated with a particular area and obtain a grade of B or better.</p> <p>The student may take a comprehensive exam for the course, when he or she is not enrolled in the course, and pass with a B or better.</p> <p>Students who have C or lower in courses required by the fundamentals requirement have to retake these courses and get a grade of B or better or take the appropriate comprehensive exam, when not enrolled in the course, and get a grade of B or better.</p>		<p>course work. In addition, the student must complete a project and register for three to six credit hours of Special Projects (EECS 621). At most six credit hours can be at the 300 level. No credit hours within the approved Program of Study can be below the 300 level.</p>

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GRADE REQUIREMENTS			
Students must achieve a grade point average of 3.0 or higher; it is computed for all of the courses, excluding project and thesis credits, on the student's program of study.	All M.S. students must have a minimum grade point average of 3.2 at the time of graduation. The grade point average will be computed from all courses on the student's program of study carrying quality points.	(i) The total cumulative GPA for coursework must be at least 3.20. (ii) One grade of C is acceptable. (iii) A grade of D or F in any course is not acceptable. (iv) All grades of I (incomplete) must be cleared.	The student must maintain a minimum cumulative grade point average of 3.00 at all times and must graduate with a GPA of at least 3.25 for all courses within the Program of Study.
RESEARCH REQUIREMENTS			
Both the thesis and the Plan B project require a formal written report, as well as a final oral examination by a committee of three faculty members, two of whom must be in the EECS department. A student whose thesis is supervised by someone outside the EECS department must also have a faculty co-advisor in the department. For Plan B students, the oral examination fulfills the Comprehensive Examination requirement of the School of Graduate Studies. Plan B is normally restricted to part-time students.	<p>The thesis must be defended in an oral examination, which also serves as a comprehensive examination. Students who plan to eventually pursue the Ph.D. degree must use Plan A.</p> <p>The examination committee for a M.S. thesis shall consist of three faculty members, at least two of whom should be members of the programs of Computer Engineering and Computer Science. Students who work on theses supervised by someone other than a program faculty member must also have a program faculty advisor whom they keep informed of their progress.</p> <p>Plan B students must complete a project and register for three to six hours of Advanced Projects Laboratory (EECS 602). The project must culminate in a written report and an oral presentation to at least three faculty members plus approval by the Chair of the Department. The project report and presentation together with the courses taken by the student fulfill the comprehensive requirement.</p>	Every M.S.E.E. student, in consultation with an advisor, is required to perform a research project, at the conclusion of which a thesis (Plan A) or report (Plan B) must be prepared. If a thesis is prepared it must: (1) conform to graduate school and library formats; and (2) be approved by the advisor and an examining committee appointed by the advisor. Similarly, the report required for Plan B must be approved by the advisor and an examining committee appointed by the advisor. A final oral presentation in addition to the written thesis or report is required of all M.S. degree candidates. The examining committee consists of no fewer than three faculty members including the advisor.	The M.S. Project must culminate in a written report and oral presentation to at least three faculty members, one of whom must be the student's faculty academic advisor. The project must also be approved by the Associate Chairman for Graduate Studies. The project report and presentation, together with the courses taken by the student, fulfill the comprehensive requirement.

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ADVISING Each student has a faculty advisor who assists the student in formulating a program of study. Normally the faculty advisor is the supervisor of the student's M. S. thesis or project; initially a faculty advisor is assigned until the supervisor has been determined.		Every M.S.E.E. student must arrange for a research advisor or major professor within the department - this includes those students whose research is being supervised by a member of another department in which case the EE professor is the major advisor. Students are required to have their M.S.E.E. course program of study approved by their advisor and the department chairman before the completion of 9 credit hours. The advisor is also required to approve the student's thesis or report and to counsel the student. Students having difficulty selecting an advisor may contact the Graduate Committee chairman or Department chairman for assistance.	<p>Before beginning enrollment in EECS 651, a faculty member must agree to serve as the student's faculty research advisor. The faculty research advisor will supervise the student's research and assign grades for the students EECS 651 work. To act in this capacity, a Faculty member holding a Research Professor, Secondary or Adjunct Faculty appointment in the Department must be approved by the Associate Chairman for Graduate Studies. When the faculty research advisor is a tenure track faculty in the Department, then this individual will also serve as the faculty academic advisor.</p> <p>The faculty academic advisor shall be responsible for forming an M.S. Thesis guidance committee which shall consist of the student's faculty academic advisor, the student's faculty research advisor and additional faculty members, as recommended by the student's academic advisor and approved by the Associate Chairman for Graduate Studies. The minimum number of faculty members on the M.S. Thesis committee is three, with at least two members having a primary appointment as a tenure track faculty member in the Program. The chairperson of the thesis committee is normally the candidate's faculty academic advisor.</p> <p>Should a student desire to change his /her faculty academic advisor, a Change of Advisor form and a new Planned Program of Study must be submitted and approved.</p>

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MS UNDESIGNATED DEGREE			
		<p>Under special circumstances, a student holding a B.S. degree in another field of engineering or in the physical sciences may request permission to pursue an undesignated M.S. degree in engineering. This program is described further in the General Bulletin. An application letter and a planned program approved by the student's advisor or major professor must be submitted to the EECS Graduate Committee preferably during the first few weeks of the first semester in residence. Upon recommendation from the EECS Graduate Committee and the School of Engineering Graduate Committee, permission may be granted to pursue the undesignated M.S. degree. The School of Engineering may place other requirements on students pursuing the M.S. undesignated degree. Refer to the regulations in the General Bulletin.</p>	