The University of Kansas

Department of Electrical Engineering & Computer Science
Graduate Catalog Information

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Professors: Ambler, Demarest, Evans, Frost, Gogineni, Grzymala-Busse, Hinton, Minden, Prescott, Roberts, Rowland, Saiedian, Shanmugan, Tsatsoulis

Professors Emeriti: Daugherty, Dean, Moore, Rummer, Schweppe, Smith, Talley, Unz, Wallace

Associate Professors: Alexander, Allen, Andrews, Brown, Chakrabarti, J. Gauch, S. Gauch, Kinnersley, Kong, Miller, Niehaus, Petr

Associate Professor Emeritus: Doemland

Assistant Professors: Agah, Hui, James, Lohmeier, Stiles

The department offers M.S. degrees in electrical engineering, computer engineering, and computer science; Ph.D. degrees in electrical engineering and computer science; and D.E. degrees in electrical engineering. The department currently has specific plans of study in the following areas of focus: advanced language systems, advanced networking, computer-based systems engineering, human-machine interactions, intelligent systems, remote sensing, and wireless and optical communication systems. Class lists and teaching schedules for each area are available in the EECS graduate office or on the department web site www.eecs.ukans.edu. Other plans of study can be constructed, in conjunction with a faculty advisor, to fit individual student needs.

The M.S. programs in electrical engineering and computer engineering are available at the Edwards campus in the Kansas City area as well as in Lawrence. The M.S. program in computer science and Ph.D. and D.E. degrees are currently available only in Lawrence.

Admission
Admission to the department's graduate programs is open to college and university graduates whose previous records indicate an ability to succeed with graduate work in the chosen discipline.

An applicant for the M.S. program in electrical engineering or in computer engineering normally presents a baccalaureate degree in electrical or computer engineering. An applicant for the M.S. program in computer science normally presents a baccalaureate degree in computer science. However, a student with good preparation in some other field of engineering, mathematics, business, or science may qualify for one of the programs by taking appropriate additional undergraduate courses. Such courses normally do not count toward the graduate degree. Lists of specific prerequisite courses for each M.S. program are available in the EECS graduate office or on the department web site.

Applicants for the M.S. program in computer science or computer engineering who have strong academic credentials but little or no prior formal computing training may qualify for a special sequence of "fast-path" courses. This sequence of classes is designed to permit students to complete their M.S. in computer science or computer engineering with just one additional year of prerequisite course work.

An applicant for the Ph.D. or D.E. program in electrical engineering normally presents an M.S. in electrical or computer engineering. An applicant for the Ph.D. in computer science normally presents a M.S. in computer science or computer engineering. In exceptional circumstances, an applicant may be admitted directly into one of the Ph.D. programs or the D.E. program without having an M.S. in the requisite field. Applicants for graduate admission should demonstrate evidence of aptitude for graduate work, as shown by suitable performance in undergraduate and (if available) graduate course work, by suitable aptitude test scores on the Graduate Record Examination (GRE), and by academic letters of reference. The requirement to take the GRE can be waived where other data are judged by the department to be unusually strong. A non-refundable application fee of $30 is required. Unless the applicant's native language is English or the applicant has received a baccalaureate degree or higher from an accredited U.S. institution of higher education, he or she must meet the department's standard for the Test of English as a Foreign Language (TOEFL), which is higher than that normally required by the Graduate School. If such prospective students are applying for graduate teaching assistantships, they also must submit scores on the Test of Spoken English (TSE).

Applications and all accompanying materials for fall admission should be received by February 1 for maximum consideration for fellowships and assistantships and in any case should be received by April 15. For spring admission, the application deadline is October 15.

M.S. Degree Requirements
The M.S. degree programs in electrical engineering, computer engineering, and computer science require a minimum of 30 student credit hours of approved graduate course work and offer thesis and nonthesis options. Central to each degree program is the development of a plan of study by each student. The plan must be approved by a committee of three EECS Graduate Faculty members, one of whom serves as the

student's program advisor. The plan of study must be developed and submitted to the department graduate office during the first semester of graduate enrollment. The plan describes all course work to be taken and designates the option to be followed. Modifications to the plan must also be approved by the student's committee and submitted to the graduate office. The course work for these three degree programs must include a minimum of 15 semester credit hours of EECS courses numbered 700 or higher, excluding Master's Thesis research (EECS 899), Introduction to Research (EECS 803), or seminar hours (EECS 801 or 891). A maximum of 9 credit hours outside the department and a maximum of 6 credit hours numbered below 700 may be counted toward the 30 credit hours required for the degree. Courses numbered below 500 can not count toward the graduate degree. All plans of study must include at least one semester of EECS Colloquium (EECS 802).
Students admitted in the fast-path sequence for the M.S. in computer science or computer engineering must take the equivalent of EECS 804, 805, 806, 807, 808, 678, and one elective chosen from EECS 628, 638, 644, 647, 649, 660, 663, 665, and 672. Only EECS 678 and the 600 level elective count toward the M.S. degree requirements, which otherwise remain the same.

Thesis Option. Subject to the general restrictions on M.S. course work, a thesis option requires a minimum of 24 semester credit hours of course work approved in a plan of study, 3 to 6 credit hours of Master's Thesis research (EECS 899), and a general oral examination. EECS 803, Introduction to Research, will not count toward the 30 credit hours required for the degree. The thesis advisor is a Graduate Faculty member of the department selected by the student before thesis work begins. If necessary, the student can change program advisors at that time.

The general oral examination must be taken in the last semester of the student's program. It is conducted by an examining committee consisting of the thesis advisor and at least two other Graduate Faculty members of the department. The examining committee, selected by the student and thesis advisor, determines if the written thesis, oral presentation of the research, and general knowledge of the discipline meet the department's standards.

Selection of courses for the plan of study is flexible in this option. The student may select a set of required courses from one of several pre-defined areas of focus or, working in conjunction with an advisor, customize the course selection to fit individual needs. A current list of the areas of focus and their requirements is available from the department graduate office. The three EECS Graduate Faculty members who approve the plan of study verify that courses selected meet the guidelines above and are appropriate for the student's M.S. degree program (CS, CoE, EE).

Nonthesis Option. Subject to the general restrictions on M.S. course work, the nonthesis option in any of the degree programs requires a total of 30 semester credit hours of course work approved in a plan of study, and the student must pass the M.S. exit examination. As part of the 30-credit-hour requirement, the non-thesis student must enroll in EECS 803, Introduction to Research, a three credit hour research course, in the final semester of course work. EECS 899, Master's Thesis research, may not count toward the 30 credit hours required for the degree.

The M.S. exit examination is a comprehensive oral examination based in part on the student's EECS 803 research project. It may be scheduled only after satisfactorily completing all required work of EECS 803 and must be scheduled at the end of the semester in which 803 is taken. The examination is administered by an examining committee consisting of three members of the EECS Graduate Faculty. If the student fails the examination, the student may be allowed by the examiners to retake it in the same semester. Otherwise, EECS 803 must be retaken, and the examination must passed in a later semester.
Selection of courses for the plan of study is flexible in this option. The student may select a set of required courses from one of several pre-defined areas of focus or, working in conjunction with an advisor, customize the course selection to fit individual needs. A current list of the areas of focus and their requirements is available from the department graduate office. The three EECS Graduate Faculty members who approve the plan of study verify that courses selected meet the guidelines above and are appropriate for the student's M.S. degree program (CS, CoE, EE).

Doctoral Degree Requirements
Requirements for the doctoral degree programs include a written doctoral qualifying examination, course work, a research skills requirement, a comprehensive oral examination, a dissertation, and a final oral examination. Doctoral students also must take at least one semester of EECS Colloquium (EECS 802).

Within the first semester of entering one of the doctoral programs, the student must select a major advisor and a committee on studies. This committee guides the student's selection of a program of courses, participates in the comprehensive and final examinations, and helps the student select a topic for research leading to the dissertation. Should the student's interests change, the committee membership may be changed accordingly, with the approval of the department's graduate studies committee.

The student's committee consists of a minimum of five Graduate Faculty members and is chaired by the student's major advisor. The advisor and at least two other members of the student's committee should be members of the Graduate Faculty of the department. One member of the committee must be from outside the EECS Department.

Each doctoral student must take and pass a doctoral qualifying examination. It is a written examination, to be taken within a single day, and it measures the students' ability to comprehend and interpret technical literature in an unfamiliar topical area within the discipline. The examination will be offered once each year, in the fall semester, and the student must take it on the first opportunity following completion of the M.S. or following initial enrollment in the doctoral program. If failed it may be retaken once, in the following spring semester. A more detailed

description of the examination, including sample exams, is available in the department graduate office.

The programs leading to the Ph.D. in electrical engineering or computer science also require a minimum of 24 semester credit hours of course work beyond the requirements for the M.S. degree, and a minimum of 18 semester credit hours of dissertation research. The 24 credit hours of course work must be numbered 700 or higher and exclude thesis research, seminars, or special problems. In addition, a minimum of 15 of these 24 credit hours must be in EECS. Students admitted to one of these doctoral programs without an M.S. in the intended field also must meet the course work requirements for the M.S. thesis option, for a total of 48 credit hours of course work. Waiver of required hours on the basis of graduate work done elsewhere may be allowed, by petition to the graduate studies committee.

For the D.E. program, at least 96 hours of graduate course work specified by the student's committee are required. These hours include approved master's degree course work in the discipline, 30 hours of doctoral project work, and 12 to 18 hours of industrial internship. Deviations form the course work requirement can be approved by the graduate studies committee. After passing the qualifying examination, each aspirant to the Ph.D. or D.E. degree must complete one of the following research skill requirements before being permitted to take the comprehensive examination. Selection of a particular requirement must be approved by the student's committee on studies. Selection of a non-standard skill requirement must also be approved by the graduate studies committee. The skill requirement options are:

- Demonstration of a reading knowledge of one modern foreign language in which a substantial research literature relevant to the thesis or general degree area exists.
- Demonstration of proficiency in the use of computers to solve real science and engineering problems. The student must write, debug, and document a program to solve a relevant problem.
- Non-Standard Skill. Demonstration of any other research skill that is acceptable to the graduate studies committee.

The student must take the doctoral comprehensive examination after passing the qualifying examination, completing the research skills requirement, and completing at least three-fourths of the course work requirement beyond the M.S. The student must complete the comprehensive examination before detailed work on the Ph.D. dissertation or D.E. project begins. Before the examination, the student must submit in writing to the committee a detailed proposal for a possible Ph.D. dissertation or D.E. project. In the comprehensive examination, the student is examined upon the proposal and on knowledge and insight in the field of specialization, and a dissertation committee is formed.

The examining committee for the comprehensive examination consists of five or more members of the Graduate Faculty, at least one of whom must be from the outside the department and at least three of whom are in the department. It normally includes the student's committee on studies. If the student passes the comprehensive examination and then later chooses another substantially different topic for the dissertation, a new proposal must be presented in writing and orally for the approval of the committee on studies.

Following completion of the Ph.D. dissertation or D.E. project report, the candidate is required to defend the dissertation or project report in an oral final examination. The examining committee is once again constituted as in the comprehensive oral examination.