Doctor of Philosophy (PhD) in Electrical Engineering (EE)
Doctor of Philosophy (PhD) in Computer Science (CS)
Doctor of Engineering (DE) in Electrical Engineering (EE)
Master of Science (MS) in Electrical Engineering
Master of Science (MS) in Computer Engineering (CoE)
Master of Science (MS) in Computer Science (CS)
Master of Science (MS) in Information Technology

Department Highlights
Highlights of the graduate programs in Electrical Engineering and Computer Science (EECS) include:

- Average of $7M per year in research expenditures, $206K/tenure-track faculty member
  - Two designated research centers: ITTC and CReSIS
- More than thirty scientific journal papers, fifty-eight papers in technical conferences, authored or co-authored two textbooks, contributed twenty-three chapters to other books, and were awarded twelve patents
- 13 senior faculty members are members of their respective professional societies, and five faculty members have been honored by their peers as fellows of their professional societies
- Faculty members are also active serving on external review panels including the National Science Foundation (NSF), the Office of Naval Research, the National Aeronautics and Space Administration (NASA), and on two international research organizations review committees. One faculty member has served as a program manager at the Defense Advanced Research Projects Agency. Two have served a two-year assignment as Program Managers at the NSF, and one faculty member is currently on assignment as a Program Director in the Division of Computer and Network Systems at NSF. Two faculty members have served NASA in a similar capacity, one serving as Program Manager of NASA’s Polar Programs, and another is currently serving as Program Executive for Technology at NASA Headquarters.
- Faculty average 8,800 SCH per academic year
- Receipt of 20+ School and University teaching awards, including three Kemper Fellowships for Teaching Excellence, and three Sharp Teaching Professorships
- Between 2007 and 2009, the EECS department averaged approximately 209 graduate students (of which an average of 70 were PhD students), 53 Master's degrees, and 7 Doctoral degrees.
- Graduates are in top demand.
- Overall quality of graduate programs is excellent.
- New IT program that meets needs of working professionals in Kansas City area
- DE program that meets the needs of advanced engineers in industry
1. What do we do and why do we do it?

1A. Mission of Unit
Our academic programs seek to ensure that our graduates have the solid preparation necessary for a successful career. We established the following vision statement for the Electrical Engineering and Computer Science (EECS) department:
• Have classes populated by outstanding students;
• Be world-class in specific areas of research;
• Have faculty members with high visibility among their peers.

From the vision, we drew the mission of the EECS Department as the following:
• Provide an advanced education for the next generation of electrical engineers, computer engineers and computer scientists;
• Discover, apply, and disseminate knowledge;
• Serve as an asset to the community and society.

1B. Unit Goals and Priorities
The objectives of our graduate degree programs are to provide students with the following:
• Understanding of the use of appropriate numerical computation techniques, operating systems, and programming language for specific development requirements and constraints;
• Ability to produce original knowledge about a specific area of importance to computer science, and publish this knowledge in recognized peer reviewed journals;
• Mathematical maturity to integrate concepts, tools, and theories to find and formulate problems, think analytically, and solve technology-based problems.

1C. Short Mission Statement
The most promising discoveries to contemporary challenges in computing, communication, climate change, and human health are made at the intersections of disciplines. Collaborative multidisciplinary and interdisciplinary investigations are a hallmark of EECS. Distinguished scholars advance knowledge and transform discoveries into new technologies. Students gain hands-on research experience under faculty direction in one of two state-of-the-art research centers that support EECS endeavors.

1D. Role of Unit
EECS graduate programs are exceptional, and they constantly evolve as technology changes in accordance with new faculty research interests, and the imperative of funded research. Programs focus on the development of fundamental knowledge about the theories and technologies required for computer
software, electronic, and computer system design and development. Graduate programs emphasize advanced courses in all of the traditional computing specialty areas: algorithms and data structures, hardware-software interfaces, and computer hardware, internet security, artificial intelligence, graphics, databases, compiler construction, radar and telecommunications, mobile and fixed communications networks, optics and electromagnetics.

EECS graduate programs provide the student with further classroom instruction at an advanced level, and a significant program of guided and independent research. The hallmark of this degree program is in-depth research that advances the fundamental understanding of some specialty area, or technology associated with computing. The research culminates in a dissertation and one or more publications in scholarly, peer-reviewed journals.

EECS faculty research facilities are in Nichols Hall, which is the home of the Information and Telecommunication Technology Center (ITTC), and Center for Remote Sensing of Ice Sheets (CReSIS). ITTC has helped create, through its research programs, the technologically-rich world we live in today. ITTC’s focus is on the design and development of new hardware technologies that has allowed the Computer Science graduate programs to keep the curriculum current in our rapidly changing world. CReSIS focuses on the study of innovative geophysical radar sensors that are used to look deep into the ice sheet of Greenland and Antarctica. These sensors and their associated antennas and signal processing systems are among the most sophisticated geophysical sensors being built in the world. Electrical engineering doctoral students gain experience with these systems, which makes them very attractive to industry.

The MS Information Technology program is a contemporary information technology degree. The program combines graduate courses and applied research opportunities in computer science (e.g., database management systems, information retrieval, programming languages), internet engineering, information security, and software engineering/management. The program is aimed both at practitioners seeking to enhance and upgrade their technical knowledge, and at recent graduates in computing sciences, business information systems, and other information technology-related disciplines, who wish to pursue advanced studies. Courses are offered on the Edwards Campus in Overland Park, KS.

The DE program is unique in academe in that it prepares graduates to work at the highest levels of the engineering profession, yet it is not intended as a research degree, or as preparation for a faculty position at a research university. The DE degree emphasis is on engineering practice, public service and the development of leadership potential. Students typically take courses in business and engineering management, supplemented by elective graduate courses.

1E. Need and Impact Statements

Demand for EECS graduates has been consistently high over the last five years. This is reflected in the high starting salaries, and the demand for computer and electrical engineers in Kansas. Advisory Board members have indicated recently that our output of computer engineers is too low, and that KU needs to expand the output of engineers to help the economy of the state.

2. Who does it? Faculty in Profile

2A. Quantitative Indicators

The EECS faculty consists of thirty-four full-time faculty members. Nine percent of our faculty members are female and eighteen percent are international. This includes a mixture of four distinguished professors, eleven professors, eleven associate professors, and eight tenure-track assistant professors. Among the faculty are thirteen senior members of their respective professional societies; five faculty members have been honored by their peers as fellows of their professional societies.
2B. Quantitative and Qualitative Indicators

The EECS faculty is very active in pursuing the scholarly and creative mission of the University. Over the past five years, they have averaged over $7M per year in research expenditures. The average research expenditure per tenure track faculty member was $206K. The EECS faculty also averaged more than thirty scientific journal papers, over fifty-eight papers in technical conferences, authored or co-authored two textbooks, contributed twenty-three chapters to other books, and were awarded twelve patents.

Since 2004, EECS faculty members have received twenty-four School and University teaching awards, including three Kemper Fellowships for Teaching Excellence, and three Sharp Teaching Professorships.

All faculty members advise and mentor both graduate and undergraduate students. All faculty members have terminal degrees in their specialties and all hold tenured or tenure track FTE positions. The standard teaching load for the faculty is four courses per year. Faculty members engaged in a heavy research agenda teach three courses per year. The faculty collectively average 8,800 SCH per academic year.

The EECS faculty has been very involved in external service to their professional societies. All of the EECS faculty currently serve as referees for their associated scientific/engineering journals or serve on editorial boards. They have also been active serving on external review panels, including the National Science Foundation (NSF), the Office of Naval Research, the National Aeronautics and Space Administration (NASA), and on two international research organizations review committees. One faculty member has served as a program manager at the Defense Advanced Research Projects Agency. Two faculty members have served a two year assignment as Program Managers at the NSF, and one faculty member is currently on assignment as a Program Director in the Division of Computer and Network Systems at NSF. Two faculty members have served NASA in a similar capacity, one serving as Program Manager of NASA’s Polar Programs, and another one is currently serving as Program Executive for Technology at NASA Headquarters. Members of the EECS faculty also serve in many leadership positions within their professional societies, in addition to leadership and participation on state, country, and university committees. Two faculty members are also currently serving on international accreditation teams.

The EECS department currently teaches eight university-wide service courses. There are also many other EECS courses that are open to students within the School of Engineering. This service to non-majors includes the support of a computer science minor for the School of Education, a special concentration in computer science or both the School of Business and the Math department, a Bachelor’s of Science in Cognitive Psychology or the department of Psychology, and concentrations in digital electronic systems and in electromechanical control systems for the Engineering Physics program in the School of Engineering.

The EECS department employs approximately 14 Graduate Teaching Assistants (GTA’s) each semester. The GTA positions are filled by graduate students entering the doctoral program who have yet to find funded research support with one of our professors. GTA’s are responsible for 1,760 SCH per academic year. Their classroom performance is tracked through student evaluation, in the same way that faculty members are evaluated. These instructors regularly win GTA instructor awards.

2C. Qualitative Indicators – Maintaining Quality – Recruitment and Retention

Currently, our department is very balanced in terms of age and professional rank. In 2009, our ratio of full/assoc/assistant professors was 12/9/10 which makes us a fairly young department overall (average age is 50.5). When we hire new faculty, we seek the most qualified and potentially successful candidates from the nation’s finest schools. We always hire at the untenured assistant professor level and then attach the new faculty member to a mentor who guides that person until promoted to associate professor. Untenured professors are reviewed every academic year by the department’s Untenured Faculty Committee to track progress toward tenure.
2D. Succession Plan
Given the rank structure and faculty ages, we expect long-term stability in our educational and research programs.

3. How well do we do it, and who thinks so?

3A. Entrance Standards and Expectations
An applicant for the MS program in EE, CE, or IT normally has a baccalaureate degree in electrical or computer engineering. An applicant for the MS program in CS normally has 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, but must be completed at a level expected of a graduate student.

An applicant for the PhD or DE program normally has an MS in electrical or computer engineering. An applicant for the PhD in CS normally has an MS in computer science or computer engineering. Applicants with exceptionally strong academic credentials may be admitted directly into one of the PhD programs or the DE program without an MS in the requisite field.

Applicants must demonstrate evidence of aptitude for graduate work, as shown by suitable performance in undergraduate and any graduate course work, by aptitude test scores on the Graduate Record Examination (GRE), and by academic letters of reference.

The graduate program demographics over the past five years indicate that our typical enrollment consists of a mix of student backgrounds and cultures. During this time frame, between 200 and 340 students were admitted to EECS graduate programs, and admit-to-enroll yield ratios ranged from 16-70 percent. Standardized test scores (GRE scale) for students entering the graduate programs ranged from 700-800 (quantitative) and 390-570 (verbal).

3B. Financial Support
Financial support for graduate students is in the form of graduate teaching and research assistantships. During the academic year, we employ 30 graduate teaching assistants for a total of 15 FTE. We have been averaging 65 graduate research assistants, at 32 FTE. Compensation for GRA and GTA students includes a stipend plus the cost of tuition and fees. Scholarships and fellowships are available through competitive processes at the departmental, School, University, and national levels.

3C. Demographics (mean age, number of majors)
The department offers three bachelor’s degree programs, four master’s programs, and three doctoral programs. The average age of an entry-level graduate student is 24. For the EECS graduate programs, only around 9 percent of students are minorities, twenty-four percent are female and forty-five percent are international students (typically, fifty-three percent of these are from India).

We typically have a large number of international students from India and various other regions of Asia and the Middle East in our graduate program. Fifty-three percent of our students come to KU from outside the USA. Less than 1% of our students are minorities from underrepresented populations; 25% are female. Less than 1% of our graduate students are Native American, Black or Hispanic.

3D. Program Productivity
Over the past five years, nearly 1,700 master’s students and 500 doctoral students have enrolled in EECS graduate programs. During this time, 530 master’s and 44 doctoral students completed degrees. The median time-to-degree for master’s programs was just over 2 years, while the median time to degree for doctoral programs was around 7 years.

4. Program Quality Outcomes
The constituents of the graduate degree program are from two groups:
Our EECS students, including current students and alumni;
Employers of our BS EECS graduates, including industry and government employers, and
graduate faculty advisors.

4A. Learner Outcomes
The EECS department actively supports the teaching mission of the University. Between 2007
and 2009, the EECS department averaged approximately 209 graduate students (of which an average of
seventy were PhD students) with fifty-three Master's degrees, and seven Doctoral degrees. The
department generates (2007 – 2009 average) approximately 2,024 SCHs for 700-899 courses.

4B. Satisfaction Surveys
As Figure 1 indicates, EECS graduate students are generally satisfied with their program.

Figure 1. EECS Graduate Program Satisfaction
4C. Placement Rates, Employer Assessments

In spite of the recent downturn in the economy in almost all sectors, the demand for EECS remains high. As computers and networked information systems become more ubiquitous, computer engineers will experience an even higher demand. Advisory Board members have recently indicated that our output of computer engineers is too low, and that Kansas needs to expand the output of engineers to help the economy of the State. Computer engineering students are in great demand by Kansas companies. The average starting salary for the BS CoE graduate is in excess of $70,000. The MS CoE degree is one of the top five highest paying graduate degrees; national industries, such as Garmin, have collaborated with the KU Center for Research to set up a local facility to hire EECS students on a part-time basis to help them engineer problem solutions. This will be a conduit for Garmin to hire EECS students upon graduation. The MS IT program produces quality graduates that are in high demand by industry. The support staff is very strong, which provides a positive infrastructure for both the students and faculty in the program. The student body consists of professionals in information technology working in the Kansas City area.

5. Overall Quality

5A. External Indicators of Quality

EECS faculty members have an average expenditure per year of nearly $206K, publish extensively in scientific journals, provide numerous technical conference papers, author and co-author books and book chapters, and receive patent awards. More than twenty faculty members have also received a variety of School and University teaching awards.

Many EECS faculty members serve as referees for their associated scientific/engineering journals, editorial boards, and on review panels at agencies such as the NSF, DARPA, NASA, Office of Naval Research, the National Aeronautics and Space Administration, and international research organizations.

5B. Reflecting on Short Mission Statement

EECS graduate programs are well positioned to meet their mission goals.

5C. Overall Assessment of Quality of Academic Programming

The graduate programs offered by the EECS department are exceptional programs that produce quality graduates, who are in high demand by industry. The support staff is very strong, which provides a positive infrastructure for both the students and faculty in the program. The student body is heavily international in origin, and the quality of students in the program is well above average. The School rating for the EECS programs is exceptional.

6. Plans for Advancement in the Program

6A. Targets for Change

EECS graduate programs are dominated by the research interests of the faculty. EECS department faculty members perform research in variety of important contemporary research areas. We believe that the performance of EECS will continue to remain high.

7. Evaluation of Future Progress and Successes

7A. Unit Metrics

The EECS graduate degree programs are regularly reviewed by the research faculty. New faculty members are encouraged to teach at least one graduate course that is focused on their research interests. This keeps the flow of the latest technology into the EECS graduate programs for the benefit of our students.
The graduate programs will be reviewed as part of the University’s and Department’s ongoing program review cycle. We also have an industry board that reviews our programs and provides feedback. The Advisory Board consists of industry leaders as well as academics from outside KU. Student learning outcomes will be measured through the use of graduating student exit interviews, on-going course evaluations by the students, and feedback from industry through the Advisory Board. Other than the general graduate program accreditation currently required by the University, there are no plans to have special accreditation for the program.
University of Kansas
Academic Program Review
2000 – 2009
August 2010

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Executive Summary
Our academic programs seek to ensure that our graduates have the solid preparation necessary for
a successful professional career, or for entry into an advanced graduate degree program. Our vision is to:
• Have classes populated by outstanding students;
• Be world-class in an increasing number of selected areas of research;
• Have faculty members with high visibility among their peers.

The EECS Department’s mission drawn from the vision is to:
• Educate the next generation of electrical engineers, computer engineers and computer
  scientists;
• Discover, apply, and disseminate knowledge;
• Serve as an asset to the community and society.

The goals and objectives of the graduate-level programs in EECS are to provide students with:
• An understanding of the use of appropriate mathematical analysis techniques, test
  equipment and computer aided design systems for specific development requirements
  and constraints;
• The ability to produce original knowledge about a specific area having importance to the
  field of electrical engineering, and publish this knowledge in recognized peer reviewed
  journals;
• A level of mathematical maturity that permits the integration of concepts, tools, and
  theories necessary to identify and formulate problems, think analytically, and solve
  technologically-based problems.

EECS graduates currently hold executive-level through entry-level positions in major
corporations across the USA. The demand for EECS graduates remains very strong, and will
undoubtedly increase as the knowledge economy continues to develop. BLs lists three of EECS’s degree
programs as among those anticipated to experience the highest rates of growth over the next decade. Two
additional programs are projected to have above-average growth.

EECS conducts the majority of its research activities through two designated centers: Information
Technology and Telecommunications and the Center for Remote Sensing of Ice Sheets. Research
activities in the last year have resulted in more than thirty scientific journal papers, over fifty-eight papers
in technical conferences, two textbooks, twenty-three book chapters, and twelve patents. Researchers
were nationally competitive as they sought funding, and produced a collective average of $7M per year in
research expenditures, or $206K in awards per tenure-track Faculty member.

Thirteen senior Faculty members are members of their respective professional societies, and five
faculty members have been honored by their peers as Fellows of their professional societies. Faculty
members are also active serving on external review panels; e.g., the National Science Foundation (NSF),
the Office of Naval Research, the National Aeronautics and Space Administration (NASA), and on two international research organization committees. One faculty member has served as a Program Manager at the Defense Advanced Research Projects Agency (DARPA). Two Faculty members have served a two-year assignment as Program Managers at NSF, and one faculty member is currently on assignment as a Program Director in the NSF Division of Computer and Network Systems. Two Faculty members have served NASA in a similar capacity; one is currently serving as Program Executive for Technology at NASA Headquarters.

The Faculty are engaged in various teaching-related activities, and average 8,800 SCH per academic year. They have received 20+ School and University teaching awards, including three Kemper Fellowships for Teaching Excellence, and three Sharp Teaching Professorships. The department’s new Master’s in Information Technology program was developed to meet the needs of working professionals in Kansas City area. Similarly, the DE program meets the needs of advanced engineers in industry.

The Department rates the overall quality of graduate programs as Exceptional.