Bachelor of Science in Electrical Engineering

B.S. in Electrical Engineering Program

Educational Objectives

Graduates who have earned the bachelor's degree in electrical engineering, within a few years following graduation, will have demonstrated technical proficiency, collaborative activities, and professional development.

Technical Proficiency

Graduates will have achieved success and visibility in their chosen careers as shown by technical accomplishments in industry, government, entrepreneurial activities, or academia.

Collaborative Activities

Graduates will have exercised shared responsibilities through activities such as contributions to multiperson or multidisciplinary technical projects, participation in professional society/organization functions, or performing collaborative research. In all such cases, graduates will have contributed to documentation of the collaborative activities.

Professional Development

Graduates will have demonstrated continual updating to extend their expertise and adapt to a changing environment through graduate studies; short courses, conferences, and seminars; or professional self-study. In addition, graduates will have demonstrated evidence of increasing technical and/or managerial impact.

Careers

Professional Opportunities

Electrical engineers may work in circuit design, electronic devices, electrical and optical communications, control and automation, electromagnetics, instrumentation, energy and power, or signal processing. Electrical engineers may work in telecommunications, consumer electronics, or public utility companies; government agencies; and defense-related or consulting firms.

Undergraduate Admission to the School of Engineering

Admission to the KU School of Engineering (and its degree programs) is selective.

Students may be admitted to an engineering or computer science degree program (http://enr.ku.edu/sites/enr.drupal.ku.edu/files/docs/pdfs/Majors_and_Curriculum_Guide_2014_Online.pdf) as freshmen (first year) students, but all admissions, for both in-state and out-of-state students, are selective. Applications are judged on several factors, such as high school record, scores on national tests, academic record at college or university level, and trend of grades and more. High school transcripts and ACT scores (or equivalent SAT scores) are required.

Minimum Academic Standards for Admission

To be considered for admission to the School of Engineering, beginning first-year students must meet or exceed the following minimum standards:

- Must be admissible (http://admissions.ku.edu/apply/requirements/usfreshmen) to the University of Kansas by assured admissions or individual review AND
- Have a 3.0+ GPA AND
- Have a mathematics ACT score of 22 (or math SAT score of 540).

Important: Simply meeting these requirements won't guarantee admission to a School of Engineering degree program. Students who perform beyond these minimums will have a better probability of being admitted to their selected major.

Minimum Academic Standards for Direct Admission into Degree Program for incoming Freshmen

Students with a 26+ Math ACT (600+ Math SAT) or meet eligibility requirements for MATH 125 (Calculus I) (http://catalog.ku.edu/liberal-arts-sciences/math/#undergraduate) may be admitted directly into their chosen major, with the exception of those seeking admission into an EECS program. Electrical Engineering, Computer Science, Computer Engineering, and Interdisciplinary Computing students must have a 28+ Math ACT (640+ Math SAT) or eligibility for MATH 125 for direct admission.

First-Year General Engineering Program

Students with a 22-25 Math ACT (540-580 Math SAT) or meet eligibility requirements for Math 104 (Pre-Calculus) (http://catalog.ku.edu/liberal-arts-sciences/math/#undergraduate) are admitted to the School of Engineering First-Year Experience non-degree program for undergraduate students.

First-year Engineering students have one academic year (two semesters and one summer) to transition into a degree program. Admission to a degree program is possible after one of the following is met:

- Complete 12+ credit hours at KU, earn a "B" or higher in Math 104 (Pre-Calculus), earn a "C" or higher in all science and engineering courses, and earn a KU GPA of 2.5+ OR
- Earn a "C" or better in MATH 125 (Calculus I), earn a "C" or better in all science and engineering courses, and earn a KU GPA of 2.5+

Pre-Engineering

Students not admitted directly to the School of Engineering or their major but who are admissible to the university may be admitted to the College of Liberal Arts and Sciences as a pre-engineering student. They can later re-apply to the School of Engineering during the semester they are completing the admission requirements for transfer students.

Transfer Admission Standards

Applications from all transfer students, whether from other institutions or from other academic schools at the University of Kansas, are evaluated on a case-by-case basis. Transfer students must be admissible (http://admissions.ku.edu/apply/requirements/ustransfer) to KU AND have a cumulative college transferable grade-point average of 2.5+ to be considered. In addition, students must have grades of "C" or better in
those courses in math (must include MATH 125 Calculus I or equivalent), science, and engineering applicable to the engineering degree.

Students interested in the Information Technology program are admitted as juniors. They must have completed 60 hours of pre-requisite courses including foundational courses in math, science, and computer science and have a 2.5+ cumulative GPA or better. The Information Technology program resides at the Edwards Campus in Overland Park, KS. Click here (http://edwardscampus.ku.edu/overview-bachelors-information-technology) for more information.

Current KU Students admitted to other academic units may apply to the School of Engineering by completing a Change of School form (http://engineering.ku.edu/forms). This must be turned in to the School of Engineering Dean’s Office by the appropriate deadlines indicated below.

Already Applied to KU, But Not Engineering?

Don’t worry. It’s not too late to change your mind if you’ve already applied to KU and selected a major outside the School of Engineering. If you think one of the 12 engineering or computer science majors is a better fit for your talents, you can still change your requested major — preferably before May 1 — and be considered for admission to the School of Engineering and all the benefits that go with it.

To update your application, visit Undergraduate Admissions (http://admissions.ku.edu/update-your-application) and click on “Change application term, major, mailing address, and/or email address.”

Please contact a member of our recruitment team (studyengineering@ku.edu), 785-864-3881, if you have any difficulty.

Application Deadlines For New Freshman and Transfer Applicants

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 15</td>
<td>Priority deadline for current KU students to apply for spring admission to Engineering.</td>
</tr>
<tr>
<td>November 1</td>
<td>Final deadline for scholarship consideration for incoming freshmen planning to enter in fall or summer semesters.</td>
</tr>
<tr>
<td>December 1</td>
<td>Final deadline to apply for the Self Engineering Leadership Fellows Program for incoming freshmen</td>
</tr>
<tr>
<td>February 1</td>
<td>Final deadline for scholarship consideration for transfer students planning to enter in fall or summer semesters. Applications available for the Engineering Learning Community</td>
</tr>
</tbody>
</table>

February 15  Priority deadline for current KU students to apply for summer or fall admission to Engineering.

May 1  Enrollment Deposit due.

Bachelor of Science in Electrical Engineering Degree Requirements

The KU Core

This is the university-wide curriculum that all incoming undergraduate students will complete as part of their degree requirements. It comprises three general education goals and three advanced education goals. Associated with each goal is one or more learning outcomes:

- GE 1.1, Goal 1/Outcome 1, Critical Thinking;
- GE 1.2, Goal 1/Outcome 2, Quantitative Literacy;
- GE 2.1, Goal 2/Outcome 1, Written Communication (2 units);
- GE 2.2, Goal 2/Outcome 2, Oral Communication;
- GE 3H, Goal 3/Outcome 1, Arts & Humanities;
- GE 3N Goal 3/Outcome 2, Natural Sciences;
- GE 3S Goal 3/Outcome 3, Social Sciences;
- AE 4.1, Goal 4/Outcome 1, Diversity;
- AE 4.2 Goal 4/Outcome 2, Culture;
- AE 5.1/5.2, Goal 5/Outcome 1/2, Social Responsibility & Ethics (course and/or practice);
- AE 6.1/6.2, Goal 6/Outcome 1/2, Integration & Creativity.

Details of the KU Core can be found at kucore.ku.edu. Some required courses in the EECS curricula satisfy a KU Core goal and/or outcome. For these courses, the goal/outcome code is given in parentheses after the course on the pages below. Where required courses do NOT specifically satisfy KU Core goals (Goals 2, 3, and 4) students must choose from a list of several means to satisfy the required goals.

A total of 130 credit hours\(^1\) is required for the B.S. degree in electrical engineering, as follows:

**Electrical Engineering (64)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECS 101</td>
<td>New Student Seminar (Part of KU Core AE 5.1)</td>
<td>1</td>
</tr>
<tr>
<td>EECS 140</td>
<td>Introduction to Digital Logic Design</td>
<td>4</td>
</tr>
<tr>
<td>EECS 168</td>
<td>Programming I</td>
<td>4</td>
</tr>
<tr>
<td>EECS 211</td>
<td>Circuits I</td>
<td>3</td>
</tr>
<tr>
<td>EECS 212</td>
<td>Circuits II</td>
<td>4</td>
</tr>
<tr>
<td>EECS 312</td>
<td>Electronic Circuits I</td>
<td>3</td>
</tr>
<tr>
<td>EECS 360</td>
<td>Signal and System Analysis</td>
<td>4</td>
</tr>
<tr>
<td>EECS 388</td>
<td>Embedded Systems</td>
<td>4</td>
</tr>
<tr>
<td>EECS 412</td>
<td>Electronic Circuits II</td>
<td>4</td>
</tr>
<tr>
<td>EECS 420</td>
<td>Electromagnetics II</td>
<td>4</td>
</tr>
<tr>
<td>EECS 443</td>
<td>Digital Systems Design</td>
<td>4</td>
</tr>
<tr>
<td>EECS 444</td>
<td>Control Systems</td>
<td>3</td>
</tr>
<tr>
<td>EECS 470</td>
<td>Electronic Devices and Properties of Materials</td>
<td>3</td>
</tr>
<tr>
<td>EECS 501</td>
<td>Senior Design Laboratory I (Part of KU Core AE 5.1)</td>
<td>3</td>
</tr>
<tr>
<td>EECS 502</td>
<td>Senior Design Laboratory II (KU Core AE 6.1)</td>
<td>3</td>
</tr>
<tr>
<td>EECS 562</td>
<td>Introduction to Communication Systems</td>
<td>4</td>
</tr>
</tbody>
</table>
Senior electives (Any EECS course numbered 400 or above excluding EECS 498 and EECS 692. Only one of EECS 643 and EECS 645 may be used to satisfy EE degree requirements. Under unusual circumstances other courses can be considered but only with an accompanying petition.)

Mathematics (20)
- MATH 125 Calculus I (KU Core GE 1.2)  
- MATH 126 Calculus II  
- MATH 127 Calculus III  
- MATH 220 Applied Differential Equations  
- MATH 290 Elementary Linear Algebra  
- EECS 461 Probability and Statistics  

Basic Science (16)
- CHEM 130 General Chemistry I  
- CHEM 150 Chemistry for Engineers  
- PHSX 216 General Physics I Laboratory (Part of KU Core AE 5.1)  
- PHSX 313 General Physics III (KU Core GE 3N)  
- PHSX 316 Intermediate Physics Laboratory I  
- EECS 221 Electromagnetics I  

Professional Electives (6)
- 2 courses from the following list of approved technical, scientific, and professional courses:  
  - EECS: Any course except EECS 137, EECS 138, EECS 315, EECS 316, EECS 317, EECS 318, EECS 498 and 692. Only 1 of EECS 643 or EECS 645 may be used.  
  - Engineering: IT 320, IT 330, IT 416, IT 430, IT 450 and any course from any other engineering department numbered 200 or above, except AE 211, ENGR 300, ENGR 490, ENGR 504, ME 208, and ME 228.  
  - Natural science: Any course designated GE3N, except PHSX 111, PHSX 112, PHSX 114, PHSX 115, PHSX 212, PHSX 236, and CHEM 110.  
  - Mathematics: Any MATH course numbered 500 or above, except MATH 701.  
  - Business: Any course from the School of Business that applies toward a business major or minor except for statistics and computing.  
  - ROTC Courses: Up to 6 hours of ROTC may be petitioned to count toward the professional elective requirement.  

Communications (9)
- Satisfy KU Core GE 2.1  
- Satisfy KU Core GE 2.2  

Arts/Humanities/Social Science (9)
- Economics elective:  
  - Select one of the following:  
    - ECON 142 Principles of Microeconomics (KU Core GE 3S, preferred)  
    - ECON 144 Principles of Macroeconomics (KU Core GE 3S)  
  - Satisfy KU Core GE 3H or GE 3S lists  
  - Additional Arts, Humanities, and Social Sciences (from KU Core GE 3H or GE 3S lists)  
  - Satisfy KU Core AE 4.1 and AE 4.2 (6)  

1 Means of satisfying KU Core Goals are chosen from a variety of options (see kucore.ku.edu). Hours listed are assuming the goals are satisfied with course work.

Course Prerequisites and Corequisites

Students must pass (at the appropriate grade level) all prerequisite courses for a given course before taking the subsequent course. If Course A is a Corequisite for Course B, Course A must be taken in the same semester as Course B or be completed prior to taking Course B.

Upper Level Eligibility

In addition to prerequisites and co-requisites, EECS undergraduates are required to earn Upper Level Course Eligibility by attaining grades of C or better in each of the following 15 courses:

- GE 21 (both)  
- PHSX 210 & 216  
- MATH 125, 126, 127, 220, 290  
- EECS 101, 140, 168, 211, 212, 221  
- CHEM 130 or 150  

If students earn less than a C in any of the above listed courses, they must repeat the course at the next available opportunity and must not take a course for which that course is a prerequisite. It is the students' responsibility to contact their advisors before beginning the new semester regarding any required repetitions and the associated enrollment adjustments (drops and adds).

To enroll in any upper-level EECS course (numbered 300 and above), students must have fulfilled the Upper Level Eligibility Requirements detailed above. Exceptions: EECS 312, EECS 360, EECS 368 and EECS 388 may be taken in the same semester as students are completing their upper level eligibility. Students may also petition for a Partial Waiver of Upper Level Eligibility Requirements by completing the appropriate petition, found in the EECS office or at www.eecs.ku.edu.

Double Major

If students wish to double-major (earn two degrees), they must fulfill all the requirements for the degrees in question. They must also consult the Engineering Dean's office and the department and/or school of the second major to find out if there are any additional requirements. If they wish to obtain two degrees offered by the EECS department, the following rule applies: a course that is required for one EECS degree program may not be used to satisfy a Senior Elective or General Elective requirement of another EECS degree program.

Electrical Engineering 4-Year Graduation Plan

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECS 101 (Part of KU Core AE 5.1)</td>
<td>1 EECS 168 or 140</td>
<td>4</td>
</tr>
<tr>
<td>EECS 140 or 168</td>
<td>4 KU Core GE 2.1 (second)</td>
<td>3</td>
</tr>
<tr>
<td>KU Core GE 2.1 (first)</td>
<td>3 MATH 126</td>
<td>4</td>
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</tbody>
</table>
Bachelor of Science in Electrical Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125 (KU Core GE 1.2)</td>
<td>4 PHSX 210 (KU Core GE 1.1)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 142 or 144 (KU Core GE 3S)</td>
<td>3 PHSX 216 (Part of KU Core AE 5.1)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sophomore</strong></td>
<td><strong>Junior</strong></td>
<td><strong>Senior</strong></td>
</tr>
<tr>
<td>Fall</td>
<td>Hours</td>
<td>Spring</td>
</tr>
<tr>
<td>EECS 211</td>
<td>3 EECS 212</td>
<td>4</td>
</tr>
<tr>
<td>MATH 127</td>
<td>4 EECS 221</td>
<td>3</td>
</tr>
<tr>
<td>MATH 220</td>
<td>3 KU Core GE 3H</td>
<td>3</td>
</tr>
<tr>
<td>MATH 290</td>
<td>2 EECS 388</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 130 or 150</td>
<td>5 Additional Arts/ Humanities/ Social Science (from KU Core GE 3H or GE 3S lists)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Hours:</strong></td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

1 Means of satisfying KU Core Goals are chosen from a variety of options (see kucore.ku.edu). Hours listed are assuming the goals are satisfied with course work.

Departmental Honors

An undergraduate student may graduate with departmental honors in electrical engineering, computer engineering, computer science, or interdisciplinary computing by graduating with a minimum grade-point average requirement while maintaining full-time status. In addition, students must enroll in EECS 498 Honors Research for their last 2 semesters and must complete an independent research project paper and oral presentation to a panel of 3 judges. See the EECS Undergraduate Handbook for full details.