BACHELOR OF SCIENCE IN ENGINEERING PHYSICS

Engineering Physics Undergraduate Program

The engineering physics program is designed for undergraduates with an interest in both science and engineering. The program is focused on those students who wish to work in areas of rapid technological change, where a good background in the underlying science is an important ingredient to success in their careers. The curriculum includes classical and modern physics, mathematics, and their applications to one or more areas of engineering. The student learns the physical science and engineering principles underlying modern technology. Four design concentrations are offered:

- Aerospace systems
- Chemical systems
- Digital electronic systems
- Electromechanical control systems

Each option incorporates a significant design component and provides a strong base in one or more engineering disciplines. The degree is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

For programs in physics, see Physics and Astronomy (http://catalog.ku.edu/liberal-arts-sciences/physics-astronomy) in the College of Liberal Arts and Sciences section of the online catalog.

Educational Objectives

Engineering physics graduates will be capable of

- Completing or successfully progressing toward completion of an advanced degree in graduate or professional school,
- Using their analytical, problem-solving, and communications skills to conduct research or contribute to technology development projects, individually or as a team member,
- Using their background knowledge in physics and engineering fundamentals as a foundation for developing new knowledge and experience in their chosen disciplines.

Careers

Professional Opportunities

Engineering physics enables graduates to combine an extensive background in physics, the science that underlies modern technology, with an engineering degree. Their broad training and technical breadth provide a unique flexibility. They have the science background to pursue pure research opportunities, the engineering degree and design concentration to solve practical problems in industry or a variety of other settings, and the understanding to act as a communication link between highly diversified divisions of an organization. Engineering physics graduates typically work in aerospace and avionic industries, electronics industries, research and development laboratories, telecommunications, design and consulting firms, and government agencies, and as defense contractors. Many engineering physics graduates attend graduate or professional school before entering the work force.

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://engr.ku.edu/sites/engr.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/#undergraduatetext) 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/#undergraduatetext) 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>Semester</th>
<th>Applicants</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 15</td>
<td>Priority deadline for current KU students to apply for spring admission to Engineering.</td>
<td></td>
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<tr>
<td>November 1</td>
<td>Final deadline for scholarship consideration for incoming freshmen planning to enter in fall or summer semesters.</td>
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<tr>
<td>December 1</td>
<td>Final deadline to apply for the Self Engineering Leadership Fellows Program for incoming freshmen</td>
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<table>
<thead>
<tr>
<th>Semester</th>
<th>Applicants</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 1</td>
<td>Final deadline for scholarship consideration for transfer students planning to enter in fall or summer semesters.</td>
<td></td>
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<tr>
<td>February 15</td>
<td>Priority deadline for current KU students to apply for summer or fall admission to Engineering.</td>
<td></td>
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<tr>
<td>May 1</td>
<td>Enrollment Deposit due.</td>
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**First- and Second-Year Preparation**

Recommended enrollments for the first 2 years vary with the design concentration selected (see below). Consult a departmental advisor as early as possible. Courses common to all concentrations are

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 150, 130, 170, or 190</td>
<td>5 KU Core Goal 2.1</td>
<td>3</td>
</tr>
<tr>
<td>KU Core Goal 2.1</td>
<td>3 PHSX 211, and PHSX 216, or PHSX 213</td>
<td>5</td>
</tr>
<tr>
<td>PHSX 150</td>
<td>0.5 MATH 126</td>
<td>4</td>
</tr>
<tr>
<td>MATH 125</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>12.5</td>
<td>12</td>
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<table>
<thead>
<tr>
<th>Sophomore</th>
<th>Fall</th>
<th>Hours Spring</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 127</td>
<td>4 PHSX 313</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 290</td>
<td>2 PHSX 316</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PHSX 212, and PHSX 236, or PHSX 214</td>
<td>4 MATH 220 or 320</td>
<td>3</td>
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<td></td>
<td>10</td>
<td>7</td>
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</tbody>
</table>

Total Hours: 41.5

**Bachelor of Science in Engineering Physics Degree Requirements**

Each student takes a common core of courses and selects 1 of 4 design concentrations.

**Common Core**

<table>
<thead>
<tr>
<th>Physics</th>
<th>Seminar in Physics, Astronomy and Engineering Physics</th>
<th>0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 150</td>
<td>General Physics I and General Physics I Laboratory or PHSX 213</td>
<td>5</td>
</tr>
<tr>
<td>PHSX 211</td>
<td>General Physics I Honors</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 212</td>
<td>General Physics II and General Physics II Laboratory or PHSX 214</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 313</td>
<td>General Physics III</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 316</td>
<td>Intermediate Physics Laboratory I</td>
<td>1</td>
</tr>
</tbody>
</table>
PHSX 516    Physical Measurements    4
or EPHX 516    Physical Measurements
PHSX 521    Mechanics I
or EPHX 521    Mechanics I
PHSX 531    Electricity and Magnetism
or EPHX 531    Electricity and Magnetism
EPHX 601    Design of Physical and Electronic Systems

Chemistry
CHEM 150    Chemistry for Engineers (Note: CHEM 170 required for Chemical Systems Concentration)
or CHEM 130    General Chemistry I
or CHEM 170    Chemistry for the Chemical Sciences I
or CHEM 190    Foundations of Chemistry I, Honors

Mathematics
MATH 125    Calculus I
MATH 126    Calculus II
MATH 127    Calculus III
MATH 290    Elementary Linear Algebra
MATH 220    Applied Differential Equations
or MATH 320    Elementary Differential Equations

KU Core Curriculum Goals 2.1, 2.2, 3H, 3S, 4.1, & 4.2 (21)

Design Concentrations

Aerospace Systems
AE 245    Introduction to Aerospace Engineering
AE 345    Fluid Mechanics
AE 421    Aerospace Computer Graphics
AE 445    Aircraft Aerodynamics and Performance
AE 507    Aerospace Structures I
AE 545    Fundamentals of Aerodynamics
AE 550    Dynamics of Flight I
AE 551    Dynamics of Flight II
AE 572    Fundamentals of Jet Propulsion
C&PE 121    Introduction to Computers in Engineering
C&PE 221    Chemical Engineering Thermodynamics
CE 301    Statics and Dynamics
CE 310    Strength of Materials
EPHX 536    Electronic Circuit Measurement and Design

Select one of the following tracks:

For the aircraft track
AE 508    Aerospace Structures II (3)
AE 521    Aerospace Systems Design I (4)

Or for the spacecraft track
AE 560    Spacecraft Systems (3)
AE 523    Space Systems Design (4)

Chemical Systems
C&PE 121    Introduction to Computers in Engineering
C&PE 211    Material and Energy Balances
C&PE 221    Chemical Engineering Thermodynamics
C&PE 511    Momentum Transfer
C&PE 512    Chemical Engineering Thermodynamics II
C&PE 521    Heat Transfer

C&PE 522    Economic Appraisal of Chemical and Petroleum Projects
C&PE 523    Mass Transfer
C&PE 524    Chemical Engineering Kinetics and Reactor Design
C&PE 613    Chemical Engineering Design I
C&PE 615    Introduction to Process Dynamics and Control
C&PE 616    Chemical Engineering Laboratory I
C&PE 623    Chemical Engineering Design II
CHEM 135    General Chemistry II
or CHEM 175    Chemistry for the Chemical Sciences II
CHEM 330    Organic Chemistry I
CHEM 530    Physical Chemistry I
EPHX 536    Electronic Circuit Measurement and Design
EPHX 511    Introductory Quantum Mechanics

Digital Electronic Systems
EECS 140    Introduction to Digital Logic Design
EECS 168    Programming I
EECS 268    Programming II
EECS 211    Circuits I
EECS 212    Circuits II
EECS 312    Electronic Circuits I
EECS 360    Signal and System Analysis
EECS 388    Embedded Systems
EECS 443    Digital Systems Design
EECS 448    Software Engineering I
EECS 461    Probability and Statistics
EECS 470    Electronic Devices and Properties of Materials
EECS 541    Computer Systems Design Laboratory I
EECS 542    Computer Systems Design Laboratory II
EECS 645    Computer Architecture
One EECS Elective (specific electives not required)
EPHX 511    Introductory Quantum Mechanics

Electromechanical Control Systems
EECS 140    Introduction to Digital Logic Design
EECS 168    Programming I
EECS 268    Programming II
EECS 211    Circuits I
EECS 212    Circuits II
EECS 312    Electronic Circuits I
EECS 360    Signal and System Analysis
EECS 444    Control Systems
EECS 682    System Dynamics and Control Systems
EPHX 511    Introductory Quantum Mechanics
ME 210    Introduction to Mechanics
ME 228    Computer Graphics
ME 311    Mechanics of Materials
ME 312    Basic Engineering Thermodynamics
ME 501    Mechanical Engineering Design Process
ME 628    Mechanical Design
ME 640    Design Project

Select one of the following:

Bachelor of Science in Engineering Physics
Bachelor of Science in Engineering Physics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Description</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ME 641</td>
<td>Design Project Option A</td>
<td></td>
</tr>
<tr>
<td>ME 642</td>
<td>Design Project Option B</td>
<td></td>
</tr>
<tr>
<td>ME 643</td>
<td>Design Project Option C</td>
<td></td>
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<tr>
<td></td>
<td>Additional engineering elective</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit for Foreign Language
Foreign language courses are not applicable to this degree program.

Graduation Plans
A suggested graduation plan for each of the design concentrations is available on the Engineering Physics website (http://ephx.engr.ku.edu/overview-engineering-physics-bs).

Departmental Honors
Engineering physics undergraduates may graduate with departmental honors by achieving a minimum grade-point average of 3.5 in major courses taken in residence and at other institutions, by completing at least 1 credit hour of undergraduate research with a grade of B or better in EPHX 501 or EPHX 503, and the results presented in a manner specified by the Department. Please see your advisor (https://ephx.engr.ku.edu/advising) for details.