

# Bachelor of Science in Mechanical Engineering

The 128-hour Bachelor of Science degree in mechanical engineering is offered by the Department of Mechanical Engineering. Students typically take four years to complete the program. The mechanical engineering curriculum builds on the foundation of mathematics and physical sciences learned in the first three semesters and then focuses on engineering design and analysis in mechanical systems, thermal-fluids, and energy systems. First-year students are quickly immersed in hands-on design/build team projects as part of the cornerstone mechanical engineering courses. Engineering science, analysis, and design are integrated throughout the curriculum, culminating in a senior capstone design project where students complete a team-based, two-semester, hands-on design, analyze, build and validate experience in one of three areas:

- Industry sponsored topics,
- Research sponsored topics, and
- Formula SAE vehicle design,

The industrial and/or research projects may include alternative energy topics, biomechanics topics, or general mechanical engineering topics.

Students interested in biomedical engineering after graduation may elect to complete an undergraduate minor in Bioengineering (see the School of Engineering or Bioengineering program for requirements).

## Professional Licensing

Formal study in an accredited engineering program is the principal means of becoming licensed to practice engineering in Kansas and other states. During the junior or senior year, students are strongly encouraged to take the national Fundamentals of Engineering examination. After 4 or more years of practice satisfactory to the State Board (licensing regulations vary among states), engineering graduates may take the examination to become registered professional engineers.

## Student Organizations

Students are encouraged to be active with the different engineering societies, including American Society of Mechanical Engineers, Society of Automotive Engineers, Engineers Without Borders, Biomedical Engineering Society, Society of Women Engineers, National Society of Black Engineers, Society of Hispanic Engineers, and American Indian Science and Engineering Society. KU also has active chapters of Tau Beta Pi, the national engineering society, and Pi Tau Sigma, the national mechanical engineering honor society. Such activities can enrich the undergraduate experience. Students can visit the Mechanical Engineering office for more information about such activities.

## Undergraduate Research

Undergraduate students interested in research or graduate study are encouraged to get involved in a research lab in their focus area. This may be developed through a specific faculty member or through the KU Center for Undergraduate Research (<http://ugresearch.ku.edu/>). Undergraduate researchers may be voluntary (minimal responsibilities) or paid positions (with expectations and responsibilities defined). Students should contact the Center for Undergraduate Research or individual faculty to inquire. KU Mechanical Engineering offers ample opportunities for undergraduates to get involved in research, even as underclassmen.

Participating in research as an undergraduate can provide you with insight and experiences not found in the classroom and can help prepare you to be successful in whichever direction your career takes you.

## Study Abroad

Study abroad opportunities are available for mechanical engineering students. The study abroad programs range from a concentrated week-long spring break to semester-long programs. Students should visit the study abroad office to determine viable programs, then work with the department on developing a course schedule. Generally, study abroad does not delay students' graduation plan with proper planning since they will be taking a mix of pre-approved engineering and general education classes abroad.

## Job Search Assistance

The Engineering Career Center (<http://ecc.ku.edu/>) offers a comprehensive array of services to students seeking permanent employment, career-related summer internships, and/or co-op employment. These include on-campus interviewing; two career fairs each year; individual advising and group workshops on résumés; interviewing, and job search strategies; online interviewing sign-up; online job postings from many employers not interviewing on campus; a library of employer and career literature; and an online résumé book searchable by employers.

The Engineering Career Center offers services to all engineering students. Students are encouraged to pursue summer internships, summer research programs or co-ops early in their undergraduate studies. Students should begin the process by visiting the Engineering Career Center. Many employers actively seek KU engineering and computer science students. Some prefer to hire students as early as the first-year level for internships. The Career Center is in 1410 LEEP2; additional information is available from 785-864-3891.

## Undergraduate Regulations

The Mechanical Engineering program follows the undergraduate regulations of the university and school. The program has adopted a more limiting transfer policy regarding upper-level mechanical engineering courses. The program also has required minimum grades in select classes for progression in the degree.

## Transfer of Credit

In general, engineering course number equivalents greater than KU Mechanical Engineering's ME 399 **cannot** be transferred to count towards the 128-credit hour BS in mechanical engineering curriculum. For a non-KU course that might be related to a KU Mechanical Engineering course greater than ME 399 courses:

1. The KU Mechanical Engineering program may consider a one-time petition for transfer.
2. To be considered for transfer, the petitioned course must have been taken from an accredited program.
3. Study Abroad courses will be handled on a case-by-case basis.

## Grades of C- or Better

While a D may be considered a passing grade in MATH 125, MATH 126, ME 211 (CE 201 and ME 210) and ME 212, it does **not** meet the mechanical engineering program's requirements for satisfying pre-requisites for subsequent classes. The mechanical engineering program

requires a C- or better in MATH 125, MATH 126, ME 211 (or CE201 and ME 210), and ME 212 for progression in the degree.

## 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 (<https://enr.ku.edu/admission-requirements/>) 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 are required.

## Freshman Admission Standards to the School of Engineering

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

- Must be admissible (<https://admissions.ku.edu/major-specific-requirements/>) to the University of Kansas by assured admissions or individual review, **AND**
- Have a 3.0+ high school GPA, **AND**
- Demonstrate mathematics preparedness by:
  - Obtaining a mathematics ACT score of 22+ (or math SAT score of 540+), OR
  - Achieving a B or better in college algebra or a more advanced mathematics course, OR
  - Achieving a C or better in a high school calculus course; OR
  - Earning credit via IB or AP credit for the above-mentioned courses in accordance with KU placement credit requirements; OR
  - Achieving at minimum a qualifying score for MATH 104 on the ALEKS mathematics placement exam.

### Pre-Engineering

Students not admitted directly to the School of Engineering and their department 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 current students at KU.

## Transfer Student Admission Standards to the School of Engineering

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**
- Earn a cumulative college transferable grade-point average of 2.5+, **AND**
- Earn a grade of C or better in MATH 125 (Calculus I, or its direct equivalent), **AND**

- Earn grades of C or better in math, science, and engineering courses applicable to the engineering degree.

Students must also complete their last 30 hours of credit at KU (<http://policy.ku.edu/governance/FSRR/#art4sect5>). For more information on transfer credits, see KU Undergraduate Admissions (<https://admissions.ku.edu/i-am/transfer/>).

## Current Student Admission Standards to the School of Engineering

Students who are currently enrolled at KU, need to meet the following:

- Earn a 2.5+ KU GPA, **AND**
- Earn a grade of C or better in MATH 125 (Calculus I, or its direct equivalent), **AND**
- Earn a grade of C or better in all math, science, and engineering courses.

Current KU Students admitted to other academic units may apply to the School of Engineering by completing a Change of School form (<https://inowformsprivate.ku.edu/imagenowforms/fs/?form=OUR%20Change%20of%20School%20Form>). Per University Registrar deadlines for processing, Change of School applications each semester are processed up until the 20th day of classes. If received and processed after the 20th day of classes, students will be active in the new program the following semester.

## 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](mailto:studyengineering@ku.edu)), 785-864-3881, if you have any difficulty.

## Application Deadlines For New Freshman and Transfer Applicants

November 1	Priority scholarship deadline for incoming freshmen.
December 1	Deadline to apply for the Self Engineering Leadership Fellows Program for incoming freshmen.
May 1	Enrollment Deposit due.
Last Friday in October	Deadline to submit Change of School applications for fall semester admission.

Last Friday in March Deadline to submit Change of School applications for spring semester admission.

## Bachelor of Science in Mechanical Engineering Degree Requirements

Code	Title	Hours
<b>Core 34 General Education</b>		
Select courses to meet Core 34 General Education requirements.		21
Core 34 courses that also meet Mechanical Engineering Degree Requirements:		
ECON 142	Principles of Microeconomics (Core 34: Social and Behavior Science (SGE)) <sup>050</sup>	3
or ECON 143	Principles of Microeconomics, Honors	
or ECON 144	Principles of Macroeconomics	
or ECON 145	Principles of Macroeconomics, Honors	
or ECON 104	Introductory Economics	
or ECON 105	Introductory Economics, Honors	
PHIL 160	Introduction to Ethics (Core 34: Arts and Humanities (SGE)) <sup>060</sup>	3
or PHIL 161	Introduction to Ethics Honors	
<b>MATHEMATICS AND BASIC SCIENCES</b>		
<b>Mathematics</b>		
MATH 125	Calculus I (Core 34: Math and Statistics (SGE)) <sup>030</sup>	4
or MATH 145	Calculus I, Honors	
MATH 126	Calculus II	4
or MATH 146	Calculus II, Honors	
MATH 127	Calculus III	4
or MATH 147	Calculus III, Honors	
MATH 220	Applied Differential Equations	3
or MATH 221	Applied Differential Equations, Honors	
or MATH 320	Elementary Differential Equations	
MATH 365	Elementary Statistics	3
or MATH 526	Applied Mathematical Statistics I	
or CE 525	Applied Probability and Statistics	
ME 508	Numerical Analysis of Mechanical Engineering Problems	4
<b>Basic Sciences</b>		
CHEM 150	Chemistry for Engineers	5
or CHEM 130	General Chemistry I	
& CHEM 149	and Chemistry for Engineers Supplement	
or CHEM 130	General Chemistry I	
& CHEM 135	and General Chemistry II	
or CHEM 170	Chemistry for the Chemical Sciences I	
& CHEM 149	and Chemistry for Engineers Supplement	
or CHEM 170	Chemistry for the Chemical Sciences I	
& CHEM 175	and Chemistry for the Chemical Sciences II	
or CHEM 190	Foundations of Chemistry I, Honors	
& CHEM 191	and Foundations of Chemistry I Laboratory, Honors	
& CHEM 149	and Chemistry for Engineers Supplement	
or CHEM 190	Foundations of Chemistry I, Honors	
& CHEM 191	and Foundations of Chemistry I Laboratory, Honors	
& CHEM 195	and Foundations of Chemistry II, Honors	

EPHX 210	General Physics I for Engineers (Core 34: Natural and Physical Sciences (SGE)) <sup>040</sup>	3
or PHSX 211	General Physics I	
or PHSX 213	General Physics I Honors	
PHSX 216	General Physics I Laboratory (Core 34: Natural and Physical Sciences (SGE)) <sup>040</sup>	1
or PHSX 213	General Physics I Honors	
or PHSX 114	College Physics I	
PHSX 212	General Physics II	3
or PHSX 214	General Physics II Honors	
PHSX 236	General Physics II Laboratory	1
or PHSX 214	General Physics II Honors	
or PHSX 115	College Physics II	
<b>MECHANICAL ENGINEERING</b>		
<b>General Engineering</b>		
EECS 316	Circuits, Electronics and Instrumentation	3
EECS 318	Circuits and Electronics Lab	1
ME 101	Mechanical Engineering Freshman Seminar	1
ME 208	Introduction to Digital Computational Methods in Mechanical Engineering	3
or EECS 138	Introduction to Computing: _____	
or EECS 168	Programming I	
or EECS 169	Programming I: Honors	
or AE 211	Computing for Engineers	
ME 228	Computer Graphics	3
or ARCE 217	Computer-Assisted Building Design	
or AE 421	Aerospace Computer Graphics	
ME 301	Mechanical Engineering in a Global Market	3
ME 455	Mechanical Engineering Measurements and Experimentation	4
ME 661	The Finite Element Method	3
<b>Mechanics</b>		
ME 211	Statics and Introduction to Mechanics	3
or CE 201	Statics	
& ME 210	and Introduction to Mechanics	
or CE 260	Statics and Dynamics	
& ME 210	and Introduction to Mechanics	
ME 311	Mechanics of Materials	3
or CE 310	Strength of Materials	
& ME 309	and Introduction to Mechanical Design	
or CE 312	Strength of Materials, Honors	
& ME 309	and Introduction to Mechanical Design	
<b>Dynamics and Controls</b>		
ME 320	Dynamics	3
or CE 250	Dynamics	
or CE 260	Statics and Dynamics	
ME 321	Dynamics Simulations	1
ME 682	System Dynamics and Control Systems	3
<b>Materials</b>		
ME 306	Science of Materials	3
ME 307	Engineering Materials Laboratory	2
<b>Thermal Fluids</b>		
ME 212	Basic Engineering Thermodynamics	3

ME 510	Fluid Mechanics	3
ME 612	Heat Transfer	3
<b>Advanced Engineering Electives</b>		
Any 500-, 600-, or 700-level ME course not required in the curriculum		3
Any 500-, 600-, or 700-level ME course not required in the curriculum		3
ME 627 (Capstone Option B); or ME 633 (Capstone Option C); or Any 500-, 600-, or 700-level ME course not required in the curriculum		3
<b>Mechanical Engineering Design</b>		
ME 501	Mechanical Engineering Design Process	2
ME 628	Mechanical Design	3
<b>Select Capstone Option A, B, or C:</b>		<b>4</b>
Capstone Option A (Satisfies KU Capstone)		
ME 640	Design Project (Taken first semester)	
ME 641	Design Project Option A (Taken second semester after successfully completing ME 640.)	
Capstone Option B (Satisfies KU Capstone)		
ME 617	Research for Design Project Option B	
ME 642	Design Project Option B (Taken after successfully completing ME 627. ME 627 counts as an Advanced Engineering Elective.)	
Capstone Option C (Satisfies KU Capstone)		
ME 640	Design Project (Taken first semester)	
ME 643	Design Project Option C (Taken second semester after successfully completing ME 640 and ME 633. ME 633 counts as an Advanced Engineering Elective.)	
<b>Total Hours</b>		<b>128</b>

## Capstone Options

The mechanical engineering program offers three options for the capstone experience (KU Capstone). The capstone project is the culminating design experience in which students draw from their learned skills and methods across their undergraduate curriculum from mathematics, science, and mechanical engineering concepts to consideration of public health, safety, and welfare including global, cultural, social, environmental, and economic factors. The crux of the experience is making ethically- and professionally-responsible decisions based on the above concepts, considerations, and factors. All projects are team-based, two-semester projects where students design/analyze/build/validate a real-world project albeit industry sponsored, research focused, or international design competition.

- Option A – General mechanical engineering projects ranging from mechanical systems to thermal-fluids. Teams are formed and projects are assigned early in ME 640. This sequence can begin in either the fall or spring semester. (ME 640/ME 641)
- Option B – Formula SAE vehicle design. This option is focused on designing/analyzing/building/racing a vehicle to compete in the Formula SAE series, either a combustion vehicle or elective vehicle. Students take a one-hour research class during the summer semester, ME 617, a three-hour Advanced Engineering Elective in the fall semester, ME 627, and the culminating three-hour capstone class in the spring semester, ME 642. (ME 617/ME 627/ME 642)
- Option C – Biomechanics. This option focuses on projects involving biological systems. Students enroll in the same ME 640 course as Option A students, and subsequently enroll in ME 643 for the culminating experience. This sequence can begin in either the fall

or spring semester. The Basic Biomechanics course, ME 633, is taken during the fall semester and counts as a three-hour Advanced Engineering Elective. (ME 640/ME 633/ME 643).

## Approved Advanced Engineering Electives (9 credit hours)

**Advanced Engineering Electives** can be applied toward the B.S.M.E. degree and are designed to provide students with additional technical depth in the discipline. These electives are usually taken by seniors in the program and consist of advanced topics in the field of mechanical engineering. These courses tend to be 500-, 600- and 700-level ME courses not explicitly required in the curriculum. Capstone Option B and Capstone Option C require ME 627 and ME 633 respectively; both classes count as an Advanced Engineering Elective. If a student is in the KU MBA and undergraduate engineering bridge program, one MBA class can count as one Advanced Engineering Elective. A complete list of current approved Advanced Engineering Electives can be found on the KUME website. <https://me.ku.edu/>

## KU Core 34 and Kansas Board of Regents Systemwide General Education

The University of Kansas and Kansas Board of Regents (KBOR) require that all students, starting Fall 2024, meet the KU Core 34 and Kansas Board of Regents Systemwide General Education (SGE) requirements. The Mechanical Engineering curriculum meets these requirements. By KBOR rule, a degree program cannot require program-specific courses to meet these criteria without special exception. Implementation of the SGE Math requirement is waived until the 2026-27 academic year. Exceptions were granted for mechanical engineering for science, economics, and ethics. They are as follows:

- Core 34: Natural and Physical Science NPS (SGE Bucket #4), mechanical engineering requires Engineering (calculus-based) Physics I (lecture and laboratory) with a grade of "C-" or better.
- Core 34: Social and Behavior Science SBS (SGE Bucket #5), mechanical engineering requires ECON 104, ECON 105, ECON 142, ECON 143, ECON 144, or ECON 145 for 3 credit hours of the 6 credit hours required.
- Core 34: Arts and Humanities AH (SGE Bucket #6), mechanical engineering requires PHIL 160 or PHIL 161 for 3 credit hours of the 6 credit hours required.

### Mechanical Engineering - Mechanics

The ME Program requires ME 211 (3 CR) or its equivalent such as CE 201 (2 CR) and ME 210 (1 CR) or CE 260 (5 CR) and ME 210 (1 CR). The additional 3 CR of CE 260 is equivalent to ME 320.

The ME Program requires ME 311 (3 CR) or its equivalent such as CE 310 (4 CR) and ME 309 (1 CR). Students would not receive credit for the additional 2 CR.

Students can also take a CE 201/CE 310/ME 309 sequence which would fulfill the ME 211/ME 311 requirement. Another option would be CE 260/CE 310/ME 309 which would fulfill ME 211/ME 311/ME 320.

### Basic Science - Chemistry

The ME Program requires CHEM 150 Chemistry for Engineers. It will accept either a course sequence in general chemistry or the Honors equivalent, or the first general chemistry course and CHEM 149, which is

a supplemental course covering selected elements of second-semester general chemistry.

### Basic Science - Physics

The ME Program requires two calculus-based general physics courses. The courses may be listed as Physics (PHSX) or Engineering Physics (EPHX) but are equivalent courses. For Physics I the physics department offers a 3 CR lecture EPHX 210, intended for engineering majors, and a 4 CR lecture PHSX 211 intended for physics majors. The ME program will accept either course.

If a student has credit for a non-calculus-based physics course(s), the ME program will accept the laboratory portion as fulfillment of PHSX 216 and/or PHSX 236. To upgrade the lecture content to calculus-level, students take the general lecture courses (EPHX 210 and/or EPHX 212/PHSX 212) with no additional credit given.

The Honors physics classes are offered as integrated lecture/lab classes. Thus students would take PHSX 213 in lieu of EPHX 210 and PHSX 216 and PHSX 214 in lieu of EPHX 212/PHSX 212 and PHSX 236.

### ME 508 - Numerical Analysis of Mechanical Engineering Problems

ME 508 Numerical Analysis prior to Fall 2024 was a 3-credit hour course; it is a 4-credit hour course in the mechanical engineering curriculum beginning Fall 2024. Students were required to take MATH 290 (2-credit hours) as a pre-requisite. MATH 290 is no longer required for the degree. Students who have taken MATH 290 should enroll in ME 508 for 3 credit hours. Students who have not taken MATH 290 should enroll in ME 508 for 4 credit hours.

### Grades of C- or Better

While a D may be considered a passing grade in MATH 125, MATH 126, ME 211 (CE 201 and ME 210) and ME 212, it does **not** meet the mechanical engineering program's requirements for satisfying pre-requisites for subsequent classes. The mechanical engineering program requires a C- or better in MATH 125, MATH 126, ME 211 (or CE 201 and ME 210), and ME 212 for progression in the degree.

### Mechanical Engineering 4-Year Graduation Plan

#### Freshman

Fall	Hours Spring	Hours
ME 101	1 ME 208	3
ME 228	3 MATH 126	4
MATH 125 (Core 34: Math and Statistics (SGE)) <sup>030***</sup>	4 MATH 365 or 526	3
CHEM 150	5 EPHX 210 or PHSX 211 (Core 34: Natural and Physical Sciences (SGE)) <sup>040***</sup>	3
Core 34: English (SGE) <sup>010</sup>	3 PHSX 216 (Core 34: Natural and Physical Sciences (SGE)) <sup>040***</sup>	1
	Core 34: English (SGE) <sup>010</sup>	3
	<b>16</b>	<b>17</b>

#### Sophomore

Fall	Hours Spring	Hours
ME 211	3 ME 311	3
ME 306	3 ME 212	3
MATH 127	4 MATH 220	3
PHSX 212	3 Core 34: Communications (SGE) <sup>020</sup>	3
PHSX 236	1 Core 34: Social and Behavior Science (SGE) <sup>050</sup>	3
PHIL 160 (Core 34: Arts and Humanities (SGE)) <sup>060***</sup>	3 ECON 142, 144, or 104 (Core 34: Social and Behavior Science (SGE)) <sup>050***</sup>	3
	<b>17</b>	<b>18</b>

#### Junior

Fall	Hours Spring	Hours
ME 301	3 EECS 316	3
ME 307	2 EECS 318	1
ME 320	3 ME 501	2
ME 321	1 ME 612	3
ME 508	4 ME 628	3
ME 510	3 ME 661	3
	<b>16</b>	<b>15</b>

#### Senior

Fall	Hours Spring	Hours
ME 455	4 Capstone Design Opt A, B, or C (KU Capstone)	2
ME 682	3 Advanced Engineering Elective	3
Capstone Design Opt A, B, or C (KU Capstone)	2 Advanced Engineering Elective	3
Advanced Engineering Elective	3 Core 34: Arts and Humanities (SGE) <sup>060</sup>	3
Core 34: Global Culture (SGE) <sup>070</sup>	3 Core 34: US Culture (SGE) <sup>070</sup>	3
	<b>15</b>	<b>14</b>

**Total Hours 128**

#### Notes:

\* - This course is a Required major course and is also part of Core 34: Systemwide General Education. If this course is not taken to fulfill the Core 34:SGE requirement, it must be taken in place of elective hours.

\*\* - This course is a Recommended Core 34: Systemwide General Education course. This specific course is not required but is recommended by the program's faculty.

\*\*\* - This course is a Required Core 34: Systemwide General Education course. This program is approved by the Kansas Board of Regents to require this specific Core 34: Systemwide General Education course. If a student did not take this course it must be taken in addition to other degree requirements.

At the completion of this program, students will be able to:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.