Bachelor of Science in Civil Engineering

B.S. in Civil Engineering Program

Civil engineering, the oldest and broadest of the divisions of engineering, implements a range of public and private projects for improving society’s physical infrastructure and the environment. The civil engineer integrates scientific principles with engineering experience to plan, design, and construct networks of highways and railroads, airports, bridges and dams, environmental pollution control systems, industrial structures, water purification and distribution systems, and urban transportation systems that maintain, protect, and enhance the quality of life. Civil engineers are trained to consider the social effects as well as the physical and environmental factors that constrain the planning, design, construction, and operation of their projects. Environmental engineering, a technical specialization with its origins in civil engineering, is a growing discipline dedicated to the protection of the environment.

The undergraduate program gives students the theoretical background, instruction in engineering application of scientific principles, and professional attitude to serve the public. It typically leads to entry-level positions or to graduate work in technical specialties (e.g., environmental, geotechnical, structural, and transportation), business administration, or other professions.

Courses that address the behavior and design of steel and reinforced concrete structures, environmental pollution, control systems, water resources systems, foundations, and surface transportation systems are integrated into the curriculum, culminating in a series of senior-level professional design courses. These simulate the design processes used in the major areas of civil engineering and prepare students for entry-level positions. Most faculty members are licensed professional engineers. KU graduates have successful records in professional practice, research in academic institutions, government and private laboratories, and in managing firms and corporations of all sizes.

Educational Objective

Graduates who pursue a career in civil engineering will successfully engage in professional engineering practice or graduate studies in the analysis, design, construction, and operation of public and private infrastructure systems.

Combined Civil Engineering and Business Program

A student who wants to combine business with engineering may enroll in a program leading to a B.S. degree in both fields. Full-time enrollment enables the student to earn the 2 degrees in 5 years. During the first 2 years, the student enrolls in the School of Engineering. After that, the student enrolls simultaneously in the schools of Business (http://www.business.ku.edu) and of Engineering (http://www.engr.ku.edu).

Careers

Professional Registration and Licensing

Engineers are involved in projects that directly affect the health and safety of the public. Graduates are strongly encouraged to become registered Professional Engineers. This involves completing a B.S. degree in civil engineering, completing the Fundamentals of Engineering (FE) and Professional Engineering (PE) examinations, and obtaining 4 years of satisfactory engineering experience under the supervision of a professional engineer. Students in civil engineering must take the FE examination before graduation.

Professional Opportunities

Civil engineers plan, design, construct, and oversee public and private infrastructure systems as well as maintain essential structures such as bridges, buildings, tunnels, roads, and water supply and sewage systems. Civil engineers typically work for major industrial and commercial centers, construction industry, state departments of transportation, manufacturing companies, oil or electrical companies, aerospace industries, or consulting firms.

Undergraduate Admission to the School of Engineering

First-year undergraduate students may be admitted, but all admissions, both in-state and out-of-state, are selective. Visit the Office of Admissions (http://admissions.ku.edu/whyku/index.shtml) for admission requirements. Visit the Office of International Student and Scholar Services (http://www.iss.ku.edu) for information about international admissions.

Applications are judged on several factors, including but not limited to high school record, scores on national tests, academic record at college or university level, and trend of grades. High school transcripts and ACT scores are required. Equivalent SAT scores may be substituted.

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:

- 3.0 grade-point average on a 4.0 scale on the Kansas Board of Regents Qualified Admissions (http://admissions.ku.edu/apply/regents_curriculum.shtml) college-preparatory curriculum.
- Top 50 percent of the graduating class of an accredited high school or the equivalent.
- Mathematics ACT score of 22 (or mathematics SAT score of 540). Some engineering degree programs may require a higher mathematics ACT score.

These minimum admission standards apply to all departments. Meeting minimum requirements does not guarantee admission.

Transfer Admission Standards

Applications from all transfer students, whether from other institutions or from other KU units, are evaluated on a case-by-case basis. In general, students with grade-point averages under 2.5 are not considered. Students must submit mathematics ACT or SAT scores or proof of competence in calculus (grade of C or higher). No upper-level engineering credits from non-ABET-accredited engineering programs are acceptable as transfer credit for engineering programs. Admission is selective, and meeting the minimum requirements does not guarantee admission.

Civil Engineering (general emphasis) 4-Year Graduation Plan

The following are recommended enrollments:
### Bachelor of Science in Civil Engineering

Students take required courses and select electives that best fulfill their personal goals from the following general areas of study. A total of 132 credit hours is required for graduation.

#### Mathematics (20)
- **MATH 125**  Calculus I (KU Core GE 1.2)  4
- **MATH 126**  Calculus II  4

#### Basic Sciences (16)
- **PHSX 210**  General Physics I for Engineers (KU Core GE 1.1)  3
- **PHSX 216**  General Physics I Laboratory  1
- **PHSX 212**  General Physics II  3
- **PHSX 236**  General Physics II Laboratory  1
- **CHEM 150**  Chemistry for Engineers (KU Core GE 3N)  5

Science elective (minimum of 3 hours). Select one of the following:  3

- General Civil Engineering students select from:
  - GEOL 101  The Way The Earth Works
  - GEOL 105  History of the Earth
  - GEOL 351  Environmental Geology
  - GEOL 551  Engineering Geology
  - Or an approved physics or chemistry elective

- Environmental Engineering students select from:
  - ATMO 105  Introductory Meteorology
  - ATMO 521  Microclimatology
  - BIOL 100  Principles of Biology
  - BIOL 400  Fundamentals of Microbiology
  - BIOL 414  Principles of Ecology
  - BIOL 661  Ecology of Rivers and Lakes
  - CHEM 310  Fundamentals of Organic Chemistry
  - CHEM 530  Physical Chemistry I
  - GEOG 358  Principles of Geographic Information Systems
  - GEOG 521  Microclimatology
  - GEOL 101  The Way The Earth Works
  - GEOL 302  Oceanography
  - GEOL 351  Environmental Geology
  - GEOL 551  Engineering Geology

#### KU Core Component (24-25)
- Written Communication (KU Core GE 2.1)  6
- KU Core GE 2.2 Oral Communication  3

Economics electives, Select one of the following:  3-4
- **ECON 104**  Introductory Economics (KU Core GE 3S)
- **ECON 142**  Principles of Microeconomics (KU Core GE 3S)
- **ECON 144**  Principles of Macroeconomics (KU Core GE 3S)

**KU Core GE 4.1 Human Diversity**  3
- **KU Core GE 4.2 Global Awareness**  3
- **KU Core GE 5 Ethics & Social Responsibility**  3

### Basic Engineering Sciences (19)
Select one of the following:  5
- **CE 301**  Statics and Dynamics
- **CE 201**  Statics & CE 300 and Dynamics
- **CE 310**  Strength of Materials  4
- **CE 330**  Fluid Mechanics  4
- **CMGT 357**  Engineering Economics  3
- **CE 192**  Civil Engineering Graphics  3
### Computer Programming Elective (3)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EECS 138</td>
<td>Introduction to Computing: _____ (C++, Fortran, or Matlab)</td>
<td>3</td>
</tr>
<tr>
<td>or EECS 137</td>
<td>Visual Basic for Engineers</td>
<td></td>
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</tbody>
</table>

*EECS 137 is preferred; EECS 138 Web option is not allowed.

### Engineering Science (select one of the following) (3)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>ME 312</td>
<td>Basic Engineering Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>or C&amp;PE 221</td>
<td>Chemical Engineering Thermodynamics</td>
<td></td>
</tr>
<tr>
<td>ME 306</td>
<td>Science of Materials</td>
<td></td>
</tr>
<tr>
<td>or ARCE 350</td>
<td>Building Materials Science</td>
<td></td>
</tr>
<tr>
<td>EEC 315</td>
<td>Electric Circuits and Machines</td>
<td></td>
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<tr>
<td>or EEC 316</td>
<td>Circuits, Electronics and Instrumentation</td>
<td></td>
</tr>
</tbody>
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### Undergraduate Concentrations

Students may identify broad concentrations in either general civil engineering or environmental engineering. Within these, students may choose elective courses to permit additional exposure to selected areas of civil or environmental engineering such as transportation, structural, geotechnical, environmental, and water resources engineering. In environmental engineering, electives may be selected to focus on water quality and treatment, bioremediation, solid and hazardous wastes, air quality, and air pollution control.

### Civil and Environmental Engineering Sciences and Introduction to Design

#### General Civil Engineering Option (23)

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<tbody>
<tr>
<td>CE 240</td>
<td>Geomatics</td>
<td>3</td>
</tr>
<tr>
<td>CE 455</td>
<td>Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CE 461</td>
<td>Structural Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CE 477</td>
<td>Introduction to Environmental Engineering and Science</td>
<td>3</td>
</tr>
<tr>
<td>CE 487</td>
<td>Soil Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>CE 480</td>
<td>Introduction to Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CE 484/684</td>
<td>Material for Transportation Facilities</td>
<td>3</td>
</tr>
<tr>
<td>or CE 412</td>
<td>Structural Engineering Materials</td>
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#### Environmental Engineering Option (20)

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### Engineering Analysis and Design

#### General Civil Engineering Concentration (16 hours)

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<tbody>
<tr>
<td>CE 552</td>
<td>Design of Steel Structures (KU Core AE 6)</td>
<td>3</td>
</tr>
<tr>
<td>CE 563</td>
<td>Design of Reinforced Concrete Structures</td>
<td>3</td>
</tr>
</tbody>
</table>

### Elective Courses (6)

Select two of the following:

- CMGT 500 Construction Engineering
- CE 582 Highway Engineering
- CE 588 Foundation Engineering
- CE 576 Municipal Water Supply and Wastewater Treatment (if not taken as Water Resources and Environmental Elective)
- CE 552 Water Resources Engineering Design (if not taken as Water Resources and Environmental Elective)

### Environmental Engineering Concentration (20 hours)

#### Water Resources and Environmental Engineering (8)

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<th>Credits</th>
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<tr>
<td>CE 552</td>
<td>Water Resources Engineering Design</td>
<td>4</td>
</tr>
<tr>
<td>CE 576</td>
<td>Municipal Water Supply and Wastewater Treatment (KU Core AE 6)</td>
<td>4</td>
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</tbody>
</table>

#### Structural Design Elective (3)

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<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CE 562</td>
<td>Design of Steel Structures (KU Core AE 6)</td>
<td>3</td>
</tr>
<tr>
<td>or CE 563</td>
<td>Design of Reinforced Concrete Structures</td>
<td></td>
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</table>

#### Civil Engineering Design Elective (3)

Select one of the following:

- CMGT 500 Construction Engineering
- CE 582 Highway Engineering
- CE 588 Foundation Engineering

#### Environmental Engineering Principles Elective (3)

Select one of the following:

- CE 570 Concepts of Environmental Chemistry & CE 571 Environmental Chemical Analysis
- CE 573 Biological Principles of Environmental Engineering

#### Environmental Design Elective (3)

Select one of the following:

- CE 574 Design of Air Pollution Control Systems
- CE 755 Free Surface Flow I
- CE 757 Pipe-Flow Systems
- CE 791 Waste Facility Siting and Design

### Electives in Selected Areas of Emphasis

A student who completes the minimum requirements in each of the four areas of the curriculum will have earned 125-126 hours in the general civil concentration and 126-127 hours in the environmental concentration (depending on the ECON choice). Both concentrations require a total of 132 hours for graduation. The remaining hours may be any courses that qualify for inclusion in one or more of the four curricular areas in accordance to the restrictions outlined below.

The content of an elective course must differ substantially from the content of any course taken to fulfill a degree requirement.

### Suggested Electives (5)

<table>
<thead>
<tr>
<th>Course</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CE 191</td>
<td>Introduction to Civil Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ENGL 362</td>
<td>Foundations of Technical Writing</td>
<td>3</td>
</tr>
</tbody>
</table>
Introductory Courses

CE 191 Introduction to Civil Engineering, ENGR 108 Introduction to Engineering, or an introduction to engineering course from another engineering department will count as an elective course. Credit hours from only one introduction-to-the-profession course may be applied toward graduation.

Mathematics and Basic Sciences

Students may take elective courses designated as natural sciences and mathematics (N). Elective courses in mathematics must require MATH 126 as a prerequisite. Physics courses numbered below 211 and chemistry courses numbered below 130 are not accepted as general electives.

General Education Courses

Students may take elective courses designated as humanities (H) and social sciences (S). The humanities and social sciences courses are identified in the online timetable and in the Undergraduate Catalog with the letters H for humanities and S for social science courses. Western Civilization courses count as general electives. English courses taken as general electives must have ENGL 102 as a prerequisite. Any communication studies course (COMS) may be taken as a general elective.

Architectural Engineering Courses

Any course number above 300 is acceptable.

Architecture Courses

Up to five credit-hours of building technology and site planning courses numbered 250 or above may be used.

Business Courses

Any course offered by the KU School of Business is acceptable. Business courses offered at other colleges or universities will be accepted only if the courses are substantially equivalent to business courses taught at KU.

Urban Planning Courses

Any course offered by the KU Department of Urban Planning is acceptable.

Graduate Courses in Civil and Environmental Engineering

A student who wishes to study a particular civil engineering area in greater depth can take courses at the 600 or 700 level. The 700-level courses are primarily for graduate students but are open to seniors who have completed the prerequisites. The 700-level courses are not recommended for students with low grade point averages. A student not wishing to specialize can attain a broader background in civil engineering design by taking additional courses beyond the minimum requirements in area IV.

Engineering Courses

Any course offered by the various departments of the School of Engineering is acceptable except AE 241 Private Flight Course and AE 242 Private Flight Aeronautics

Honors Courses

Courses with the honors program designation (HNRS) will be accepted as general electives.

ROTC Courses

Students completing the ROTC program may count a maximum of 6 hours of ROTC courses as general electives. A maximum of six hours of ROTC courses in social sciences or humanities may be counted in excess of the 24 hrs required in the general education area. Up to six hours of ROTC courses may be counted as general electives if related to the physical sciences or engineering, and up to 3 credit hours may be used as electives in engineering technology and design.