

Undergraduate Curriculum Manual
for the
Bachelor of Science Degree in Civil Engineering

University of Kansas

June 2014

THE UNIVERSITY OF KANSAS
DEPARTMENT OF CIVIL, ENVIRONMENTAL AND ARCHITECTURAL ENGINEERING
UNDERGRADUATE CURRICULUM MANUAL FOR
THE B.S. DEGREE IN CIVIL ENGINEERING

DEPARTMENTAL MISSION AND OBJECTIVES

The mission of the Civil, Environmental, and Architectural Engineering (CEAE) Department is to provide students with an outstanding engineering education and for the department to be a leader in research and service. The CEAE Department plans to achieve its mission by meeting the following three strategic objectives:

- 1) Prepare students for productive engineering careers
- 2) Maintain and grow strong research programs
- 3) Serve the profession

The civil engineering undergraduate degree program objective is:

To prepare students for professional engineering practice in the analysis, design, construction, and management of civil engineering systems and to prepare them for life-long learning.

OVERVIEW

The CEAE Department offers two bachelor's degrees. One is in civil engineering and the other is in architectural engineering. This document presents the requirements of the bachelor's degree in civil engineering. The requirements for the architectural engineering degree are available on the department web page www.ceae.ku.edu and from the department office (2150 Learned Hall).

The civil engineering degree has two areas of emphasis or concentration. The first is the general civil engineering concentration and the second is the environmental engineering concentration. The requirements for each concentration are presented in this document.

Civil engineering is a diverse field. Our curriculum provides all students with a solid foundation in a broad spectrum of civil and environmental engineering topics. Students who have a special interest in a certain area of civil engineering can pursue that interest by taking appropriate electives.

In planning your course schedule, there is need for careful analysis of your preparation and interests. The curriculum schedules in this manual are to be considered as guides only. Periodic consultation with an advisor is recommended. Here are several guidelines that should be followed in formulating class schedules:

- a) Pay attention to prerequisite sequencing to assure maximum freedom of choice of design and elective courses in subsequent semesters.
- b) Try to limit the number of courses per semester to no more than five.
- c) Avoid scheduling more than four engineering courses in any semester.

Typical semester-by-semester schedules are shown on pages 10 through 14. The first schedule is for the general civil engineering concentration and the second schedule shown is for the environmental engineering concentration. These two schedules are for those students who complete all eight semesters in the civil

engineering program at the University of Kansas (KU) and qualify to take MATH 121 in their first semester at KU. The third semester-by-semester schedule is for the general civil engineering concentration student who must take MATH 104 during their first semester at KU.

The fourth and fifth semester-by-semester schedules are for students who take the first four semesters at a community college or another university before transferring to KU. These schedules merely show one way in which the required and elective courses in the curriculum may be completed. Only a few students will follow one of these schedules exactly.

Civil engineering degree requirements are presented under the headings of (I) mathematics and basic sciences, (II) general education, (III) engineering sciences and introduction to design, and (IV) engineering analysis and design. These areas are established in accordance with the national requirements of the Accreditation Board for Engineering and Technology (ABET). The civil engineering curriculum is fully accredited so that graduates will meet the requirements for their license as a professional engineer. The following paragraphs show how these requirements are met. Each student must satisfy the degree requirements stated in the KU Undergraduate Catalog, which is accessible online at www.catalogs.ku.edu.

KU CORE REQUIREMENTS

The civil engineering curriculum and the semester-by-semester schedules shown in pages 10 to 14 satisfy the Core requirements established by KU. Information about the KU Core and Core approved courses can be found at kucore.ku.edu. The KU Core comprises three general education (GE) goals and three advanced education (AE) goals, with a corresponding set of learning outcomes associated with each of the six goals. In order to satisfy the requirements of the KU core a student must complete a total of 12 units. A KU Core unit is defined as an approved course, and approved educational experience, or an approved combination of course work and experiences.

Of the total 12 units required by the KU Core, eight are satisfied by required courses in mathematics and basic sciences, general education, and engineering analysis and design. These eight courses (and outcomes) are PHSX 210 General Physics I (GE1.1), MATH 121 Calculus I (GE1.2), ENGL 101 Composition (GE2.1), ENGL 102 Critical Reading and Writing (GE2.1), COMS 130 Speaker-Audience Communications (GE2.2), CHEM 150 Chemistry for

CIVIL ENGINEERING KU CORE DISTRIBUTION	
	<p><u>CRITICAL THINKING & QUANTITATIVE LITERACY</u> CRITICAL THINKING: PHSX 211 QUANTITATIVE LITERACY: MATH 121</p>
	<p><u>COMMUNICATION</u> WRITTEN COMMUNICATION: SIX HOURS OF ENGLISH COURSES ORAL COMMUNICATION: COMS 130 OR ENGR 515</p>
	<p><u>BREADTH OF KNOWLEDGE</u> ARTS & HUMANITIES: MEET VIA KU CORE REQUIREMENTS NATURAL SCIENCES: CHEM 150 OR 130 SOCIAL SCIENCES: ECON 104, 142 OR 144</p>
	<p><u>CULTURE & DIVERSITY</u> DIVERSITY IN UNITED STATES: MEET VIA KU CORE COURSES GLOBAL AWARENESS: MEET VIA KU CORE COURSES</p>
	<p><u>SOCIAL RESPONSIBILITY & ETHICS</u> ETHICS & SOCIAL RESPONSIBILITY: MEET VIA KU CORE REQUIREMENTS, OR ONLINE MODULE</p>
	<p><u>INTEGRATION & CREATIVITY</u> CAPSTONE: CE 562 OR 576</p>
<p>CIVIL ENGINEERING SPECIFIC GENERAL EDUCATION REQUIREMENTS: Must complete 6 hours of English courses. Visit kucore.ku.edu/courses for approved courses and activities.</p>	

Engineers (GE3N), ECON 104 Introductory Economics (GE3S), and CE 562 Design of Steel Structures (AE6.1). For students following the curriculum with environmental emphasis the advanced education goal 6 may be fulfilled by either CE 562 Design of Steel Structures or CE 576 Municipal Water/Wastewater.

The remaining four units of the KU Core curriculum can be completed through elective courses in the Arts and Humanities (GE3A&H), Human Diversity (AE4.1), Global Awareness (AE4.2), and Ethics and Social Responsibility (AE5.1). While students are allowed to pursue approved educational experiences to satisfy the requirements of the KU Core curriculum, they must be aware that educational experiences will not fulfill the CEAE curriculum requirements for general education.

CURRICULUM REQUIREMENTS

I) MATHEMATICS AND BASIC SCIENCES

A minimum of 34 hours of courses in mathematics and basic sciences is required. These courses must include 18 hours of mathematics, starting with the first course in calculus, eight hours of physics, five hours of chemistry, and a three-hour basic science elective.

The mathematics and basic sciences requirement is met as follows:

MATH 121, 122, 220, 290, and 526	18 hours
PHSX 210, 216 & 212, 236 Physics I, Ph. I Lab, Physics II, Ph. II Lab	8 hours
CHEM 150 Chemistry for Engineers	5 hours
Basic Science Elective	3 hours

If a probability and statistics course other than MATH 526 is taken, it must require calculus as a prerequisite and the course must be approved by a petition. The basic science elective must be a course listed with a course code of NE (earth sciences), NP (physical science), or NB (biological sciences). A course in geology is recommended for students in the general civil engineering concentration. Students in the environmental engineering concentration should select a basic science elective in consultation with an academic advisor in environmental engineering.

The chemistry requirement may be satisfied by taking both CHEM 130 and CHEM 135 instead of CHEM 150. The additional 5 credit hours of chemistry may be counted as general elective hours but shall not be counted as fulfilling the basic science elective requirement.

II) GENERAL EDUCATION

Civil engineers, more than the professionals in any other engineering field, often work on projects that have wide public interest. Their designs are often large-scale and one-of-a-kind. Many civil engineering projects are constructed with public funds and subjected to public review and approval. Examples of such projects are highways, bridges, large buildings, water-supply and wastewater systems, and flood-control systems. A civil engineer needs an education that will not only provide technical proficiency but will also enhance appreciation for differing societal values and improve one's ability to explain complex technical concepts to the public. Electives in the humanities and social sciences allow you to select general education courses that meet specific needs or interests.

A minimum of 24 hours is required in this area. The requirement is met as follows:

	ENGL 101	Composition	3 hours
	ENGL 102	Critical Reading and Writing	3 hours
	COMS 130	Speaker-Audience Communication	3 hours
ECON Elective			
	ECON 104	Introductory Economics (recommended)*	4 hours
or	ECON 142	Principles of Microeconomics	3 hours
or	ECON 144	Principles of Macroeconomics	3 hours
	Humanities elective course meeting KU Core objective GE3H		3 hours
	Human diversity elective course meeting KU Core objective AE41		3 hours
	Global awareness elective meeting KU Core objective AE42		3 hours
	Ethics elective course meeting KU Core objective AE51		3 hours

Credits for English composition at a foreign institution of higher education are not acceptable for the required English courses. Civil Engineering students are required to complete six credit-hours of English, and for most students this will be through completion of ENGL 101 and ENGL 102. Students that have advanced placement into ENGL 102 or 105 still need to complete another three credit-hour English course. While any course that has ENGL 102 as a prerequisite is acceptable, ENGL 362 Technical Writing is suggested as a second English course for students with advanced placement.

*ECON 104 (Introductory Economics) is the recommended economics elective, because it provides an introduction to both microeconomics and macroeconomics.

III) ENGINEERING SCIENCES AND INTRODUCTION TO DESIGN

The Engineering Sciences area is divided into two sub-areas: Basic Engineering Sciences (III-A) and Civil Engineering Sciences and Introduction to Design (III-B):

A) Basic Engineering Sciences

A total of 28 hours is required in the Basic Engineering Sciences sub-area. The required courses are:

	CE 201	Statics	2 hours
and	CE 300	Dynamics	3 hours
or	CE 301	Statics and Dynamics	5 hours
	CE 310	Strength of Materials	4 hours
	CE 330	Fluid Mechanics	4 hours
	CMGT 357	Engineering Economics	3 hours
	CE 192	Civil Engineering Graphics	3 hours
	EECS 137	Visual Basic for Engineers (recommended)	3 hours
or	EECS 138	Introduction to Computing (Topic: C++, Fortran, or Matlab) (Topic: Web is does not meet requirement)	3 hours

In addition to the above courses, the curriculum requires a course in two of the following areas (circuits, thermodynamics, and science of materials). This requirement can be satisfied by taking two of the following courses:

	EECS 315	Electric Circuits and Machines (Preferred circuits elective)	3 hours
or	EECS 316	Circuits, Electronics, and Instrumentation	3 hours
	C&PE 221	Basic Engineering Thermodynamics	3 hours
or	ME 312	Basic Engineering Thermodynamics	3 hours
	ME 306	Science of Materials	3 hours
or	ARCE 350	Building Materials Science	3 hours

The requirements in areas I, II, and III A are the same for the general civil concentration and environmental concentration. The requirements for the area IIIB (Civil Engineering Sciences and Introduction to Design) and area IV (Engineering Analysis and Design) are different for the general civil concentration and the environmental concentration. The requirements for each concentration are stated below.

B) Civil Engineering Sciences and Introduction to Design – General Civil Concentration

The general civil concentration requires 23 hours in this sub-area. Many of these courses are prerequisites to the engineering analysis and design courses. The required courses are:

	CE 240	Surveying	3 hours
	CE 412	Structural Engineering Materials	3 hours
or	CE 484	Material for Transportation Facilities	3 hours
	CE 455	Hydrology	3 hours
	CE 461	Structural Analysis	4 hours
	CE 477	Introduction to Environmental Engineering & Science	3 hours
	CE 487	Soil Mechanics	4 hours
	CE 480	Introduction to Transportation Engineering	3 hours

B) Civil Engineering Sciences and Introduction to Design – Environmental Concentration

The environmental concentration requires 20 hours in this sub-area. The required courses are the same as for the general civil concentration except the environmental concentration does not require the transportation engineering course – CE 480. Many of these courses are prerequisites to the engineering analysis and design courses. The required courses are:

	CE 240	Surveying	3 hours
	CE 412	Structural Engineering Materials	3 hours
or	CE 484	Material for Transportation Facilities	3 hours

CE 455	Hydrology	3 hours
CE 461	Structural Analysis	4 hours
CE 477	Introduction to Environmental Engineering & Science	3 hours
CE 487	Soil Mechanics	4 hours

IV) ENGINEERING ANALYSIS AND DESIGN

General Civil Engineering Concentration – Engineering Analysis & Design Requirements

The general civil concentration requires a minimum of 16 hours of senior design courses. The required courses are:

Structural Engineering Design – 6 hours

CE 562	Design of Steel Structures	3 hours
CE 563	Design of Reinforced Concrete Structures	3 hours

Water Resources and Environmental Design – 4 hours

CE 552	Water Resources Engineering Design	4 hours
or CE 576	Municipal Water Supply and Wastewater Treatment	4 hours

In addition to the above three required design courses, at least two more **Civil Engineering Design Elective** courses (six hours) must be taken from the following list:

Construction

CMGT 500	Construction Engineering	3 hours
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Transportation

CE 582	Highway Engineering	3 hours
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Geotechnical

CE 588	Foundation Engineering	3 hours
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Water Resources and Environmental Design

CE 552	Water Resources Engineering Design	4 hours
or CE 576	Municipal Water Supply and Wastewater Treatment	4 hours
	(the course not taken to meet the minimum requirement)	

Environmental Engineering Concentration – Engineering Analysis & Design Requirements

The environmental concentration requires a minimum of 20 hours of senior design courses. The required courses are:

Water Resources and Environmental Design – 8 hours

CE 552	Water Resources Engineering Design	4 hours
CE 576	Municipal Water Supply and Wastewater Treatment	4 hours

Structural Design Elective – 3 hours			
	CE 562	Design of Steel Structures	3 hours
or	CE 563	Design of Reinforced Concrete Structures	3 hours
Civil Engineering Design Elective – 3 hours			
	CMGT 500	Construction Engineering	3 hours
or	CE 582	Highway Engineering	3 hours
or	CE 588	Foundation Engineering	3 hours
Environmental Principles Elective – 3 hours			
	CE 570 and CE 571	Concepts of Environmental Chemistry & Environmental Chemical Analysis	3 hours
or	CE 573	Biological Principles of Environmental Engineering	3 hours
Environmental Design Elective – 3 hours			
	CE 574	Design of Air Pollution Control Systems	3 hours
or	CE 755	Free Surface Flow I	3 hours
or	CE 757	Pipe-Flow Systems	3 hours

Sequence of Courses

Each of the senior design courses is the last course in a sequence of prerequisite courses. Therefore, in planning each semester's schedule, you should be sure to include the proper courses in the sequence of prerequisites. Because mathematics, physics, English, statics and dynamics are prerequisites for all of the design courses, you should complete these curriculum requirements as early as possible in your undergraduate career.

V) ELECTIVES IN SELECTED AREAS OF CONCENTRATION

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.

Area V is included in the curriculum to allow students to earn hours in technical subjects which would not apply in the four other curricular areas but which would contribute to their educational and/or professional goals. The following paragraphs indicate courses that may be applied to area V, along with several courses or areas of study that may not be counted in that area.

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

Mathematics and Basic Sciences: students may take elective courses designated as natural sciences and mathematics (N). Elective courses in mathematics must require MATH 122 as a prerequisite. Physics courses numbered below 211 and chemistry courses numbered below 130 are not accepted as general electives

General Education: 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.

Foreign Language. Up to six hours of foreign language courses listed as U (Undesignated Elective) in the Undergraduate Catalog will count as a general elective if you are not a native speaker of that language. Foreign language courses listed as H and S will count as general electives.

Architectural Engineering. Any course number above 300 is acceptable.

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

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

Civil & 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.

Introduction to Engineering. Students who start in the civil engineering program as freshmen normally will complete CE 191, Introduction to Civil Engineering, in their first semester. Credits for CE 191 are counted in area V. Students who transfer to civil engineering after the freshman year may have completed an introductory course in another engineering discipline. Those credits are also counted in area V. However, the credit hours from only one introduction-to-the-profession course may be applied toward graduation.

Engineering. Any course offered by the various departments of the School of Engineering is acceptable except:

AE 241	Private Flight Course
AE 242	Private Flight Aeronautics

Honors: courses with the honors program designation (HNRS) will be accepted as general electives.

Technical Writing. ENGL 362 (Foundations of Technical Writing) is a recommended elective course.

ROTC CREDITS

Students completing the ROTC program may count up to six hours of ROTC courses in the general education area (if related to the social sciences or humanities and in excess of the minimum 24 hours required) or as electives (if related to the physical sciences or engineering).

HONORS COURSES

Several departments offer honors versions of courses required in the civil engineering curriculum. Students who are eligible to take the honors courses are encouraged to do so.

<u>Required Course</u>		<u>Honors Equivalent</u>	
ENGL 102	Critical Reading and Writing	ENGL 105	Freshman Honors English
MATH 121	Calculus I	MATH 141	Calculus I: Honors
MATH 122	Calculus II	MATH 142	Calculus II: Honors
MATH 220	Applied Differential Equations	MATH 221	Applied Differential Equations, Honors
MATH 290	Elementary Linear Algebra	MATH 291	Elementary Linear Algebra, Honors
PHSX 211	General Physics I	PHSX 213	General Physics I Honors
PHSX 212	General Physics II	PHSX 214	General Physics II Honors

Honors versions of certain elective courses in humanities, social sciences, and basic sciences are also offered. Eligible students are encouraged to take honors versions of elective courses.

TRANSFER STUDENTS

Some KU civil engineers attend a community college or another university during their freshman and sophomore years followed by two years at KU to complete the BSCE degree. This document presents recommended courses to be taken during the first two years. It is a university-wide policy that a maximum of 64 hours can be transferred from a community college. If a student has completed more than 64 hours at a community college, any 64 hours may be applied towards the civil engineering degree. The remaining 68 hours needed to complete the civil engineering degree must be earned at a four-year college or university, and a minimum of 30 must be completed at the University of Kansas.

DUAL ENROLLMENT

Some students desire to pursue two degrees at the same time. The University of Kansas makes dual enrollment possible by allowing the student to enroll in two separate academic divisions simultaneously. For example: students who wish to earn bachelor degrees in civil engineering and business may enroll in both the School of Engineering and the School of Business; or students who desire to attain degrees in civil engineering and in geology may enroll in both the School of Engineering and the College of Liberal Arts and Sciences.

FUNDAMENTALS OF ENGINEERING (FE) EXAM

All students in both the General Civil and the Environmental options are required to take the Fundamental of Engineering (FE) Exam prior to graduation. It is typically taken following the completion of the basic engineering science electives.

STUDENT CURRICULUM POLICY

As a student in Civil Engineering, you are required to meet the curriculum requirements in effect at the time you are admitted to the program. This manual provides guidance for completion of the degree based on the requirements as of the date listed on the cover. You may petition to meet the requirements of a curriculum adopted after you were admitted to the program, but you must satisfy all the requirements of the new program.

TYPICAL FOUR-YEAR SCHEDULE OF COURSES B.S. IN CIVIL ENGINEERING -- GENERAL CIVIL ENGINEERING CONCENTRATION

<u>Fall Semester</u>		<u>FRESHMAN YEAR</u>		<u>Spring Semester</u>	
CE 191*	Introduction to Civil Eng.	2	CE 192	Civil Engineering Graphics	3
ENGL 101	Composition (<i>KU Core: GE2.1</i>)	3	ENGL 102	Critical Reading & Writing (<i>GE2.1</i>)	3
MATH 121	Calculus I (<i>GE1.2</i>)	5	MATH 122	Calculus II	5
CHEM 150	Chemistry for Engineers (<i>GE3N</i>)	5	PHSX 210	General Physics I (<i>GE1.1</i>)	4
		15	PHSX 216	General Physics I Laboratory	1
			Arts and Humanities elective (<i>GE3A&H</i>) ¹		3
					18
			<u>SOPHOMORE YEAR</u>		
CE201&CE300/CE301	Statics & Dynam.	5	CE 310	Strength of Materials	4
PHSX 212	General Physics II	1	CE 240	Surveying	3
PHSX 236	General Physics II Laboratory	3	ECON 104	Introductory Economics (<i>GE3S</i>)	4
MATH 220	Applied Differential Equat.	3	EECS 137	Visual Basic for Engineers	3
MATH 290	Elementary Linear Algebra	2	Basic science elective		3
COMS 130	Speaker-Aud. Comm. (<i>GE2.2</i>)	3			17
		17			
			<u>JUNIOR YEAR</u>		
CE 330	Fluid Mechanics	4	CE 455	Hydrology	3
CE 412/484	Structural/transp. materials	3	CE 477	Intro. to Environ. Engr. & Sci.	3
CE 461	Structural Analysis	4	CE 480	Intro. to Transportation Eng.	3
MATH 526	Applied Mathematical Stat.	3	CE 487	Soil Mechanics	4
Diversity of the US	elective (<i>AE4.1</i>) ¹	3	Basic engineering science elective		3
		17			16
			<u>SENIOR YEAR</u>		
CE 562	Design of Steel Str. (<i>AE6.12</i>)	3	CE 563	Design of Concrete Str.	3
CE 552/576	Water design elective	4	Civil engineering design elective		3
CMGT 357	Engineering Economics	3	Global awareness elective (<i>AE4.2</i>) ¹		3
Civil engineering design elective		3	Ethics and Social Responsibility elective (<i>AE5.1</i>)		3
Basic engineering science elective		3	General electives		4
		16			16

TOTAL HOURS REQUIRED FOR DEGREE² = 132

* Recommended but not required.

¹ Courses may be found at kucore.ku.edu.

² The Fundamentals of Engineering (F.E.) Exam is also a requirement of this degree program.

TYPICAL FOUR-YEAR SCHEDULE OF COURSES
B.S. IN CIVIL ENGINEERING -- ENVIRONMENTAL ENGINEERING CONCENTRATION

<u>Fall Semester</u>		<u>FRESHMAN YEAR</u>		<u>Spring Semester</u>	
CE 191*	Introduction to Civil Eng.	2	CE 192	Civil Engineering Graphics	3
ENGL 101	Composition (<i>KU Core: GE2.1</i>)	3	ENGL 102	Critical Reading & Writing (<i>GE2.1</i>)	3
MATH 121	Calculus I (<i>GE1.2</i>)	5	MATH 122	Calculus II	5
CHEM 150	Chemistry for Engineers (<i>GE3N</i>)	5	PHSX 210	General Physics I (<i>GE1.1</i>)	3
		<u>15</u>	PHSX 216	General Physics I Laboratory	1
			Arts and Humanities elective (<i>GE3A&H</i>) ¹		<u>3</u>
					18
		<u>17</u>			
			<u>SOPHOMORE YEAR</u>		
CE 301	Statics & Dynamics	5	CE 310	Strength of Materials	4
PHSX 212	General Physics II	1	CE 240	Surveying	3
PHSX 236	General Physics II Laboratory	3	ECON 104	Introductory Economics (<i>GE3S</i>)	4
MATH 220	Applied Differential Equations	3	EECS 137	Visual Basic for Engineers	3
MATH 290	Elementary Linear Algebra	2	Basic science elective		<u>3</u>
COMS 130	Speaker-Aud. Comm. (<i>GE2.2</i>)	3			17
		<u>17</u>			
			<u>JUNIOR YEAR</u>		
CE 330	Fluid Mechanics	4	CE 455	Hydrology	3
CE 412/484	Structural/Transp. Materials	3	CE 477	Intro to Environ. Engr. & Sci.	3
CE 461	Structural Analysis	4	CE 487	Soil Mechanics	4
MATH 526	Applied Mathematical Stat.	3	CE 562/563	Structural design elective	3
Diversity of the US elective (<i>AE4.1</i>) ¹		3	Basic engineering science elective		<u>3</u>
		<u>17</u>			16
			<u>SENIOR YEAR</u>		
CE 552	Water Res. Engr. Design	4	CE 574/755/757	Environ. design elective	3
CE 570&571/573	Environ. principles elect.	3	CE 576	Mun. Water/Wastewater (<i>AE6.12</i>)	4
CMGT 357	Engineering Economics	3	CMGT 500/CE 582/588	CE design elective	3
Basic engineering science elective		3	Global awareness elective (<i>AE4.2</i>) ¹		3
Ethics and Social Resp. elective (<i>AE5.1</i>)		3	General elective		<u>3</u>
		<u>16</u>			16

TOTAL HOURS REQUIRED FOR DEGREE² = 132

* Recommended but not required.

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² The Fundamentals of Engineering (F.E.) Exam is also a requirement of this degree program.

TYPICAL FOUR-YEAR SCHEDULE OF COURSES B.S. IN CIVIL ENGINEERING -- GENERAL CIVIL ENGINEERING CONCENTRATION

When Math 104 is required

<u>Fall Semester</u>					<u>Spring Semester</u>
FRESHMAN YEAR					
CE 191*	Introduction to Civil Eng.	2	EECS 137	Visual Basic for Engineers	3
ENGL 101	Composition (<i>KU Core: GE2.1</i>)	3	ENGL 102	Critical Reading & Writing (<i>GE2.1</i>)	3
MATH 104	Precalculus	5	MATH 121	Calculus I (<i>GE1.2</i>)	5
COMS 130	Speaker-Aud. Comm. (<i>GE2.2</i>)	3	ECON 104	Introductory Economics (<i>GE3S</i>)	4
Diversity of the US	elective (<i>AE4.1</i>) ¹	3	Arts and Humanities	elective (<i>GE3A&H</i>) ¹	3
		<u>16</u>			<u>18</u>
SOPHOMORE YEAR					
CE 240	Surveying	3	MATH 290	Elementary Linear Algebra	2
CE 192	Civil Engineering Graphics	3	MATH 220	Applied Differential Equations	3
PHSX 210	General Physics I	3	PHSX 212	General Physics II	3
PHSX 216	General Physics I Laboratory	1	PHSX 236	General Physics II Laboratory	1
Basic science	elective	3	Global awareness	elective (<i>AE4.2</i>) ¹	3
MATH 122	Calculus II	5	CE 301	Statics & Dynamics	5
		<u>18</u>			<u>17</u>
JUNIOR YEAR					
CE 330	Fluid Mechanics	4	CE 455	Hydrology	3
CE 310	Strength of Materials	4	CE 461	Structural Analysis	4
CHEM 150	Chemistry for Engineers (<i>GE3N</i>)	5	CE 477	Intro. to Environ. Engr. & Sci.	3
CE 480	Intro. to Transportation Eng.	3	CE 487	Soil Mechanics	4
		<u>16</u>	CE 412/484	Structural/Transp. Materials	3
					<u>17</u>
SENIOR YEAR					
CE 562	Design of Steel Str. (<i>AE6.12</i>)	3	CE 563	Design of Concrete Str.	3
CE 552/576	Water design elective	4	Civil engineering	design elective	3
MATH 526	Applied Mathematical Stat.	3	Civil engineering	design elective	3
Basic engineering	science elective	3	Ethics and Social	Responsibility elective (<i>AE5.1</i>)	3
General elective		4	CMGT 357	Engineering Economics	3
		<u>17</u>	Basic engineering	science elective	3
					<u>18</u>

TOTAL HOURS REQUIRED FOR DEGREE² = 132

* Recommended but not required.

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² **The Fundamentals of Engineering (F.E.) Exam is also a requirement of this degree program.**

TYPICAL SCHEDULE FOR TRANSFER STUDENTS

B.S. IN CIVIL ENGINEERING -- GENERAL CIVIL ENGINEERING CONCENTRATION

The following courses should be completed in the freshman and sophomore years by students who transfer to KU's Civil Engineering program from a community college. (Note: there is a 64-hour limit on transfer credits from a community college.) Also shown is a typical schedule of courses in the junior and senior years for transfer students. These schedules may also be used by students who transfer from a four-year college or university that does not offer an accredited program in civil engineering.

SUGGESTED FRESHMAN AND SOPHOMORE COURSES

	Cr. Hr.
Calculus and Analytic Geometry	10
Differential Equations and Elementary Linear Algebra	5
College Physics (<u>Must</u> be Calculus-based Physics)	8
College Chemistry (<u>Must</u> be equivalent to KU's CHEM 150)	5
Basic Science Elective	3
Statics and Dynamics	5
Computer programming: Visual Basic (recommended), C++, or Fortran	3
English	6
Economics	3
Speech (Speaker-Audience Communication)	3
General Education Electives <i>GE3A&H, AE4.1, and AE4.2</i>	9
Civil Engineering Graphics (AutoCAD)*	3
Sub-Total First Two Years	63

Fall Semester

Spring Semester

JUNIOR YEAR

	Cr.Hr.			Cr.Hr.
MATH 526 Applied Mathematical Stat.	3	CE 412/484	Structural/transp. materials	3
CE 240 Surveying	3	CE 455	Hydrology	3
CE 310 Strength of Materials	4	CE 461	Structural Analysis	4
CE 330 Fluid Mechanics	4	CE 480	Intro. to Transportation Eng	3
CE 477 Intro Environmental Engr. & Sci.	3	CE 487	Soil Mechanics	4
	17			17

SENIOR YEAR

	Cr.Hr.			Cr.Hr.
CE 562/563 Structural design	3	CE 562/563	Structural design	3
CE 552/576 Water design course	4	CMGT 357	Engineering Economics	3
Civil engineering design elective	3		Civil engineering design elective	3
Basic engineering science elective	3		Basic engineering science elective	3
General elective	4		General electives	3
	17		Ethics and Social Resp. elective (<i>AE5.1</i>)	3
				18

TOTAL HOURS REQUIRED FOR DEGREE¹ = 132

* Students who complete an AutoCAD course at another college will need to complete the ArcGIS portion of CE 192 (one credit-hour) at KU by special arrangement with the instructor.

¹ **The Fundamentals of Engineering (F.E.) Exam is also a requirement of this degree program.**

TYPICAL SCHEDULE FOR TRANSFER STUDENTS

B.S. IN CIVIL ENGINEERING -- ENVIRONMENTAL ENGINEERING CONCENTRATION

The following courses should be completed in the freshman and sophomore years by students who transfer to KU's Civil Engineering program from a community college. (Note: there is a 64-hour limit on transfer credits from a community college.) Also shown is a typical schedule of courses in the junior and senior years for transfer students. These schedules may also be used by students who transfer from a four-year college or university that does not offer an accredited program in civil engineering.

SUGGESTED FRESHMAN AND SOPHOMORE COURSES

	Cr. Hr.
Calculus and Analytic Geometry	10
Differential Equations and Elementary Linear Algebra	5
College Physics (<u>Must</u> be Calculus-based Physics)	8
College Chemistry (<u>Must</u> be equivalent to KU's CHEM 150)	5
Basic Science Elective	3
Statics and Dynamics	5
Computer programming: Visual Basic (recommended), C++, or Fortran	3
English	6
Economics	3
Speech (Speaker-Audience Communication)	3
General Education Electives <i>GE3A&H, AE4.1, and AE4.2</i>	9
Civil Engineering Graphics (AutoCAD)*	3
Sub-Total First Two Years	63

Fall Semester

Spring Semester

JUNIOR YEAR

	Cr.Hr.		Cr.Hr.
MATH 526 Applied Mathematical Stat.	3	CE 412/484 Structural/transp. materials	3
CE 240 Surveying	3	CE 455 Hydrology	3
CE 310 Strength of Materials	4	CE 461 Structural Analysis	4
CE 330 Fluid Mechanics	4	CE 477 Intro Environmental Engr. & Sci.	3
Basic engineering science elective	3	CE 487 Soil Mechanics	4
	17		17

SENIOR YEAR

	Cr.Hr.		Cr.Hr.
CE 562/563 Structural design elective	3	CE 574/755/757 Envir. design elective	3
CE 552 Water Resources Eng. Design	4	CE 576 Municipal Water/Wastewater	4
CE 570&571/573 Envir. principles electiv.	3	CMGT 500/CE 582/588 CE design elective	3
Basic engineering science elective	3	CMGT 357 Engineering Economics	3
General elective	4	General electives	2
	17	Ethics and Social Resp. elective (<i>AE5.1</i>)	3
			18

TOTAL HOURS REQUIRED FOR DEGREE¹ = 132

* Students who complete an AutoCAD course at another college will need to complete the ArcGIS portion of CE 192 (one credit-hour) at KU by special arrangement with the instructor.

¹ **The Fundamentals of Engineering (F.E.) Exam is also a requirement of this degree program.**