

BACHELOR OF SCIENCE: CIVIL ENGINEERING

ABET Program Educational Objectives

Within a few years of graduation, graduates of the Civil Engineering program are expected to:

1. Approach projects from a holistic perspective with curiosity, technical rigor, ethics, cultural, social, health, environmental, and economic factors.
2. Successfully apply technical knowledge to create innovational and transformational change for the metropolitan, regional, and global well-being.
3. Effectively and accurately communicate with technical and non-technical audiences.
4. Achieve professional licensure and/or advanced study and certifications relevant to the career path chosen.

ABET Student Outcomes

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to 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.
- An ability to communicate effectively with a range of audiences.
- An ability to 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.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

University Requirements

General Education

UMKC Essentials is the university-wide curriculum that all undergraduate students will complete. The 30-credit hour program includes a First Year Experience course; three critical thinking courses in the areas of Arts & Humanities, Natural & Physical Sciences, and Social & Behavioral Sciences; a Culture and Diversity course; a Civic & Urban Engagement course; two courses in Written Composition and one course in Oral Communication; and a Math Pathway course. Transfer students entering UMKC will elect from the UMKC Essentials General Education Program or the Missouri Core 42 General Education Curriculum. Academic advisors will meet with incoming transfer students to determine which option best serves the student's educational needs. More information about General Education may be found here: <https://catalog.umkc.edu/undergraduate-academic-regulations-information/general-education-requirements/> (<http://catalog.umkc.edu/undergraduate-academic-regulations-information/general-education-requirements/>)

Constitution Course

Every undergraduate student must take a course covering the United States Constitution and the Missouri State Constitution before graduation. Course options are included in the program requirements section below.

Exit Examinations

Information on exit examinations is available in the Undergraduate Academic Regulations and Information (<http://catalog.umkc.edu/undergraduate-academic-regulations-information/graduation/exitexams/>) section of the catalog.

Missouri Higher Education Civics Achievement Examination

In accordance with Missouri Senate Bill 807 (section 170.013.1), 'any student entering a public institution of higher education for the first time after July 2019 who is pursuing an associate's or bachelor's degree from such institution shall successfully pass an examination on the provisions and principles of American civics with a score of seventy percent or greater as a condition of graduation from such institution'. To satisfy this requirement at UMKC, students access the exam through the Canvas site. This requirement will be listed in the degree audit system as, 'Take State Mandated Missouri Higher Education Civics Achievement Examination', and listed on the transcript as 'Missouri Civics Examination'.

Student Learning Outcomes

Students graduating from this program will:

- Use mathematical methods to make design decisions.
- Analyze applied loads and material characteristics to design structures meeting code requirements.
- Use engineering software to help create design solutions.
- Perform strength and durability tests on construction materials.

- Write technical documents communicating engineering analysis and design solutions.
- Design an engineering solution reflecting current engineering industry standard of care for a community problem.

Admissions

High school students planning to apply to this degree program are strongly encouraged to take a college preparatory program that emphasizes mathematics, science and communication skills.

First-time college student applicants to the undergraduate program in civil engineering will be automatically admitted if they obtain:

1. An ACT mathematics score of at least 25 and
2. An ACT composite score of at least 24 and
3. A 3.0 Core High School GPA.

First-time college student applicants who do not meet the above criteria but do meet UMKC general admission requirements will have their applications reviewed for admission. Applicants who are not admitted to this degree program but do meet UMKC general admission requirements may be admitted to University College.

Students without the prerequisite preparation must take the needed coursework before enrolling in courses required for the bachelor's degree. Students seeking re-admission must have been in good academic standing when last enrolled. Otherwise, re-admission requires a formal review by the undergraduate program committee.

Transfer applicants must have at least 24 credits of transferable college credit, an overall 2.0 GPA on a 4.0 scale in all coursework, which includes repeated coursework, attempted at previous institutions. Transfer applicants without a 2.0 or higher college GPA must submit a petition for admission.

Program Requirements

The Bachelor of Science in Civil Engineering prepares students with a breadth and depth in the technical knowledge so that they can work immediately in most areas of the profession including geo technical engineering; water and environmental engineering; construction; and structural engineering.

Engineering programs must demonstrate that their students attain the outcomes listed above.

An approved Machine Shop Safety course must be completed prior to using tools in university sponsored activities and facilities.

Students must obtain OSHA safety certification prior to degree conferral.

A grade of "C" or higher must be earned in all major required coursework.

All UMKC students must take HEIghTen after completing 90 credit hours and before applying for graduation (<http://www.umkc.edu/exitexams/>).

UMKC Essentials

Code	Title	Credits
First Semester Experience Course (GEFSE)		3
Written Communication:		
ENGLISH 110	Introduction to Academic Prose	3
ENGLISH 225	English II: Intermediate Academic Prose	3
Oral Communication (choose one of the following):		3
COMM-ST 110	Fundamentals of Effective Speaking and Listening	
COMM-ST 140	Introduction to Communication	
COMM-ST 212	Argumentation And Debate	
COMM-ST 277	Interpersonal Communication	
Math Pathway (Satisfied in program requirements below)		
Critical Thinking in Arts & Humanities (GECRT-AH)		3
Critical Thinking in Natural & Physical Sciences (GECRT-SC; Satisfied in program requirements below)		
Critical Thinking in Social & Behavioral Sciences (GECRT-SS)		3
Culture & Diversity Course (GECDV)		3
Civic & Urban Engagement Course (GECUE; Satisfied in program requirements below)		
Total Credits		21

Constitution Course Requirement

Section 170.011.1 of the Missouri Revised Statutes, 2015, states that all candidates for a degree issued by a college or university in the state of Missouri must have “satisfactorily passed an examination on the provisions and principles of the Constitution of the United States and of the state of Missouri, and in American history and American institutions.”

Courses at UMKC that satisfy this state requirement are:

Code	Title	Credits
Choose one of the following:		
CJC 364	The Supreme Court And The Criminal Process	3
HISTORY 101	U.S. History to 1877	
HISTORY 102	U.S. History Since 1877	
HONORS 230	Honors American Government	
POL-SCI 210	American Government	
Total Credits		3

There are a few other ways this requirement can be satisfied for students transferring to UMKC:

- Take an equivalent course from the list above at a regionally accredited institution.
- Earn credit for one of the above courses through AP, IB, or CLEP.
- Take a course that directly satisfies the Missouri Constitution Requirement at another Missouri institution.
- Have a previous bachelors degree (or higher) from a regionally accredited institution.
- Have an Associate of Arts degree from a regionally accredited institution.
- Complete the 42 Hour Core at a Missouri institution and have it listed on the official transcript.

Major Requirements

Code	Title	Credits
Math and Science Requirements (satisfies Math Pathway)		
CHEM 211 & 211L	General Chemistry I and Experimental General Chemistry I	5
MATH 266	Accelerated Calculus I ¹	4
MATH 268	Accelerated Calculus II	3
MATH 250	Calculus III	4
MATH 345	Ordinary Differential Equations	3
MATH 345L	Ordinary Differential Equations Lab	1
STAT 235	Elementary Statistics	3
PHYSICS 240	Physics For Scientists and Engineers I	5
PHYSICS 250	Physics For Scientists and Engineers II	5
BIOLOGY 108 or GEOLOGY 220	General Biology I General Geology	3
Engineering Fundamental Course Requirements		
CIV-ENGR 275	Engineering Statics (satisfies GECRT-SC course requirement)	3
CIV-ENGR 276	Strength Of Materials	3
CIV-ENGR 351	Fluid Mechanics	3
E&C-ENGR 216	Engineering Computation	4
MEC-ENGR 130	Engineering Graphics	3
Civil Engineering Fundamental Course Requirements		
CIV-ENGR 111	First Year Cornerstone	1
CIV-ENGR 113	Engineering Measurements	1
CIV-ENGR 190	Special Topics	1
CIV-ENGR 321	Structural Analysis	4
CIV-ENGR 323	Structural Steel Design	3
CIV-ENGR 335	Soil Mechanics	3
CIV-ENGR 342	Introduction to Environmental Engineering	3
CIV-ENGR 378WI	Civil Engineering Materials	3

CIV-ENGR 411	Civil Engineering Systems Design I	2
CIV-ENGR 412	Civil Engineering Systems Design II (satisfies GECUE course requirement)	3
CIV-ENGR 422WI	Reinforced Concrete Design	3
CIV-ENGR 432	Foundation Engineering	3
CIV-ENGR 467	Introduction to Construction Management	3
CIV-ENGR 481	Introduction to Transportation	3
CIV-ENGR 497	Engineering Hydrology	3

Civil Engineering Electives

Take 12 hours of civil engineering electives. 12

CHEM 431	Physical Chemistry I	
CIV-ENGR 357	Engineering Hydraulics	
CIV-ENGR 404	Project Management of Integrated Design and Construction	
CIV-ENGR 405	Capital Project Delivery Methods	
CIV-ENGR 406	Construction Project Risk Management	
CIV-ENGR 417	Advanced Structural Analysis	
CIV-ENGR 421	Matrix Methods of Structural Analysis	
CIV-ENGR 423	Advanced Structural Steel Design	
CIV-ENGR 425	Prestressed Concrete	
CIV-ENGR 427	Advanced Reinforced Concrete Design	
CIV-ENGR 429	Design of Structures for Blast and Fire	
CIV-ENGR 431	Fundamentals of Geomaterial Characterization	
CIV-ENGR 436	Advanced Soil Mechanics	
CIV-ENGR 442	Hydraulic Structures	
CIV-ENGR 443	Hazardous Waste Management	
CIV-ENGR 447	Legal Topics for Engineers	
CIV-ENGR 449	Environmental Compliance, Auditing and Permitting	
CIV-ENGR 452	Hydraulics of Open Channels	
CIV-ENGR 453	Hydraulics and Variability of Rivers	
CIV-ENGR 454	River Stability and Scour	
CIV-ENGR 456	Urban Hydrology	
CIV-ENGR 463	Construction Law	
CIV-ENGR 468	Construction Planning and Scheduling	
CIV-ENGR 466	Green Building and Sustainable Infrastructure	
CIV-ENGR 469	Construction Methods and Equipment	
CIV-ENGR 470	Corrosion Engineering	
CIV-ENGR 471	Advanced Portland Cement Concrete	
CIV-ENGR 473	Durability of Civil Engineering Materials	
CIV-ENGR 475	Seismic Design of Structures	
CIV-ENGR 484	Pavement Materials Design, Maintenance, and Rehabilitation	
MEC-ENGR 285	Engineering Dynamics	
MEC-ENGR 299	Engineering Thermodynamics	
MGT 360	Groups and Teams	
UPD 403	GIS for Urban Planning	

Total Credits

103

¹ Students not meeting the MATH 266 prerequisite requirements will have 3-8 additional hours (MATH 110 and MATH 125, or MATH 120) with a minimum grade of 'B'.

Minimum GPA: 2.0

Total Credit Hours: 127

Tools for Planning and Fulfilling Academic Requirements

UMKC's Major Maps are detailed, semester by semester plans that lead a student to complete all degree requirements within four years. Plans include benchmarks and critical courses by term that assist a student's evaluation of progress and major "fit". In order to ensure that the appropriate courses are taken, students are encouraged to consult with the undergraduate advisor for this major. Please see the tab above to view the major map for this program.

UMKC's Transfer Guides (<https://www.umkc.edu/admissions/transfer-guides.html>) provide detailed guidance on recommended transfer coursework, plans of study, transfer timelines, and transfer contact information. To ensure a seamless transfer experience, students are encouraged to work with both their community college advisor and a UMKC advisor when planning their coursework.

UMKC's PlanMyDegree 'Audit' (<https://www.umkc.edu/registrar/academic-programs/plan-my-degree.html>) degree audit system provides an individual evaluation of all degree requirements (General Education, Degree Specific, Major Specific, etc.) for students' officially recorded (Office of Registration and Records) and "what if" exploratory plans of study. This evaluation is used to certify all graduation requirements.

UMKC's PlanMyDegree 'Plans' (<https://www.umkc.edu/registrar/academic-programs/plan-my-degree.html>) degree planning tool enables students to develop a personalized semester by semester plan of study towards completion of degree requirements for student's officially recorded (Office of Registration and Records) and "what if" exploratory plans of study. Update and edit your full plan to degree completion each term and confirm accuracy each semester with your Academic Advisor(s).

Major Map

Four Year Graduation Plan - Courses & Critical Benchmarks for First Time College Students:

UMKC's Major Maps are detailed, undergraduate four-year course outlines that inform students on the classes they should take and when to take them. Outlines are updated yearly. Graduate students should visit their program's individual school for program outlines.

The following is a sample course of study. Your path to graduation may vary based on factors such as college credit you earned while in high school, transfer work from other institutions of higher learning, and placement in Mathematics. You are responsible for checking prerequisites to any courses. It is the Student's responsibility to ensure that all program requirements are met. This guide is not a substitute for academic advisement.

First Year

Fall Semester	Credits	Spring Semester	Credits
MATH 266 ^{CC}		4 MATH 268 ^{CC}	3
CHEM 211 & 211L ^{CC}		5 PHYSICS 240 ^{CC}	5
CIV-ENGR 111		1 MEC-ENGR 130	3
ENGLISH 110		3 ENGLISH 225	3
GEFSE 101		3 GECRT-SS 101	3
		16	17

Second Year

Fall Semester	Credits	Spring Semester	Credits
MATH 250 ^{CC}		4 MATH 345 & 345L ^{CC}	4
PHYSICS 250 ^{CC}		5 CIV-ENGR 276 ^{CC}	3
CIV-ENGR 113		1 CIV-ENGR 351	3
CIV-ENGR 275 ^{CC}		3 CIV-ENGR 190	1
E&C-ENGR 216		4 COMM-ST 110 or 277	3
		GECRT-AH 101	3
		17	17

Third Year

Fall Semester	Credits	Spring Semester	Credits
CIV-ENGR 321		4 CIV-ENGR 323 or 481	3
CIV-ENGR 335		3 CIV-ENGR 378WI or 342	3
CIV-ENGR 467		3 CIV-ENGR 497	3

STAT 235	3	GECDV 201	3
GEOLOGY 220 or BIOLOGY 108 (or other Basic Science course)	3	HISTORY 101, 102, or POL-SCI 210	3
		16	15
Fourth Year			
Fall Semester	Credits	Spring Semester	Credits
CIV-ENGR 411		2 CIV-ENGR 412	3
CIV-ENGR 422WI		3 CIV-ENGR 342 or 378WI	3
CIV-ENGR 432		3 CIV-ENGR 481 or 323	3
CIV-ENGR 3XX/4XX Major Elective		3 CIV-ENGR XXX Major Elective	3
CIV-ENGR 3XX/4XX Major Elective		3 CIV-ENGR XXX Major Elective	3
		14	15

Total Credits: 127

CC Critical Courses provide feedback regarding major fit and help indicate likelihood of successful completion of chosen academic program and degree.

Recommendations to Maintain Progress toward 4-Year Degree Completion

- Completion of the First Semester Experience (FSE) course in first term.
- Early completion of Written Communication, Oral Communication, and Math Pathway requirements.
- Maintain the minimum GPA required for academic Good Standing for your degree program.
- Completion of at least 15 credit hours toward degree each regular semester. (*Students may use the summer to ensure completion of 30 hours per academic year or to lighten Fall and Spring course loads.*)
- Enrollment in Critical Courses as listed on the Major Map is recommended in order to maintain timely progress and completion of prerequisite coursework.
- Regular consultation with Academic Advisor(s) for program(s) of study is strongly recommended and may be required for some degree programs..

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