BACHELOR OF SCIENCE: COMPUTER SCIENCE

ABET Program Educational Objectives

Within a few years of graduation, graduates of the Computer Science program are expected to:

1. Successfully apply their problem solving skills to advance software development in a variety of domains.
2. Successfully apply technical knowledge to innovate and bring forth transformational change for metropolitan, regional, and global well-being.
3. Demonstrate responsible leadership in the development of software/computing technologies to solve real-world problems in diverse communities.
4. Demonstrate lifelong learning and professional growth via advanced study, career advancement, or social contributions.

ABET Student Outcomes

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

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:

- Be able to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Be able to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Be able to communicate effectively in a variety of professional contexts.
- Be able to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

- Be able to function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Be able to apply computer science theory and software development fundamentals to produce computing-based solutions.

Program Description

The Bachelor of Science in Computer Science is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org. (http://www.abet.org/)

Please note that accreditation for the Bachelor of Arts in Computer Science (BACS), which we also offer, has not been requested.

This degree program serves to give the student excellent preparation for careers in computer science, for graduate study, or for fields where CS is an important ingredient. Students receive a strong technical background in computer science, which is coupled with a broad, general education. The BS degree prepares for a career path where the student contributes to the continued development of technology infrastructure (operating systems, browsers, applications, softwares, networking, etc). A BS/MS Option for completing both a BS in CS and a MS in CS in five years is available, (see below) (http://www.umkc.edu/umkc/catalog/html/sce/cs-ee/cs-fast-track.html). Furthermore, a minor in Computer Science is available as well. Please contact the SS&C Student Services Center for more information at (816)235-2399 or sce@umkc.edu.

Educational Objectives

The undergraduate degree in CS is designed so that graduates will attain employment and advance their careers in industry, government and academia. BS graduates will find employment in CS related fields. Some graduates will achieve appropriate certifications and/or pursue advanced study in computer science or other graduate fields. Graduates will be engaged in lifelong learning and thereby advance in their careers.

Career Implications

Computers and processors of all sizes and descriptions appear in every area of the public and private sectors. Consequently, employment prospects for computer science degree holders remain steady. Current projections have the demand for computer science graduates exceeding the supply for many years to come. The range of opportunities open to the new graduate in computer science is impressive.

Computer science graduates are employed as members of technical staff, software engineers, programming or systems analysts, and scientific or application programmers by some of the nation's largest companies. These companies include internet based commerce and software based hi-tech industries, insurance, banks and financial institutions, computer and electronics manufacturers, the communications industry, the biomedical industry, the defense industry, and engineering firms.

Admission Requirements

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 computer science 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

Curriculum requirements for both of the Computer Science degrees are categorized into several areas totaling at least 120 hours of study.

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:		3
CJC 364	The Supreme Court And The Criminal Process	
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

A minimum grade of C is required in all Computer Science, Info Tech, Math, Stat, and Physics coursework.

Code	Title	Credits
Mathematics (satisfies Math Pathway)		
MATH 120 (Precalculus; Typically not required due to ACT Admission Requirement)		
MATH 210	Calculus I [2]	4
MATH 220	Calculus II	4
MATH 300	Linear Algebra I	3
STAT 235	Elementary Statistics [2]	3
or STAT 115	Statistical Reasoning	
or MOTRMATH 110	MOTR Statistical Reasoning	
Life and Physical Sciences		
PHYSICS 240	Physics For Scientists and Engineers I	5
One Life or Physical Science Course (from the following)		3
BIOLOGY 108	General Biology I	

or MOTRBIOL 150LB	MOTR Biology with Lab	
BIOLOGY 109	General Biology II	
CHEM 211	General Chemistry I	
or MOTRCHEM 150	MOTR Chemistry I	
GEOLOGY 220	General Geology	
or MOTRGEOL 100L	MOTR Geology with Lab	
ENV-SCI 110R	Understanding the Earth: Introduction to Environmental Science and Laboratory	
or MOTRPHYS 110ES	MOTR Essentials in Physical Sciences	
PHYSICS 250	Physics For Scientists and Engineers II	
Synthesis Courses		
COMP-SCI 449	Foundations of Software Engineering	3
COMP-SCI 451R	Software Engineering Capstone	3
Computer Science Requirements		
COMP-SCI 101 & 101L	Problem Solving and Programming I and Problem Solving & Programming I Lab	4
COMP-SCI 191	Discrete Structures I	3
COMP-SCI 201R & COMP-SCI 201L	Problem Solving and Programming II and Problem Solving and Programming II - Lab	4
COMP-SCI 281R	Introduction to Computer Architecture and Organization (satisfies GECRT-SC course requirement)	3
COMP-SCI 291	Discrete Structures II	3
COMP-SCI 303	Data Structures	3
COMP-SCI 304	Ethics and Professionalism (satisfies GECUE requirement)	3
COMP-SCI 320	Data Communications and Networking	3
COMP-SCI 394R	Applied Probability	3
COMP-SCI 404	Introduction to Algorithms and Complexity	3
COMP-SCI 431	Introduction to Operating Systems	3
COMP-SCI 441	Programming Languages: Design and Implementation	3
COMP-SCI 461	Introduction to Artificial Intelligence	3
or COMP-SCI 465R	Introduction to Statistical Learning	
COMP-SCI 470	Introduction to Database Management Systems	3
or COMP-SCI 371	Database Design, Implementation and Validation	
Major Electives		
COMP-SCI Electives (300 or 400 level) [1]		12
Any 300- or 400- level elective not completed above		
COMP-SCI 353	Functional Programming	
COMP-SCI 361	Introduction to Cybersecurity	
COMP-SCI 426	Network Security	
COMP-SCI 436	Digital Forensics	
COMP-SCI 446	Distributed Computing Systems	
COMP-SCI 473	Data Compression	
COMP-SCI 476	Blockchain Technologies	
COMP-SCI 483	Software Security	
COMP-SCI, E&C-ENGR, INFO-TEC Elective (400 level) [1]		3
Any 400-level elective not completed above.		
COMP-SCI 491	Internship (by petition)	
COMP-SCI 497	Directed Readings (by petition)	
COMP-SCI 498	Research Seminar (by petition)	
COMP-SCI 499	Undergraduate Research (by petition)	
Total Credits		87

1 See academic advisor for additional course options.

2 Math Placement Assessment may be required.

Code	Title	Credits
General Electives		**9**

Minimum GPA: 2.0

Total Credit Hours: 120

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 the Registrar) 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 the Registrar) 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 210[CC]	4	MATH 220[CC]	4
COMP-SCI 101 & 101L[CC]	4	COMP-SCI 191[CC]	3
GEFSE 101	3	COMP-SCI 201R & COMP-SCI 201L	4
ENGLISH 110	3	GECRT-SS 101, 102, 104, 105, 106, 107, 108, or 111	3
	14		14

Second Year

Fall Semester	Credits	Spring Semester	Credits
COMP-SCI 291	3	COMP-SCI 281R (Satisfies GECRT-SC)	3
COMP-SCI 303	3	MATH 300	3
PHYSICS 240	5	COMM-ST 110, 140, or 277	3
STAT 235	3	GECRT-AH 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 112, or 113	3

ENGLISH 225		3	HISTORY 101, 102, or POL-SCI 210		3
		17			15

Third Year

Fall Semester	Credits		Spring Semester	Credits	
COMP-SCI 304		3	COMP-SCI 371 or 470		3
COMP-SCI 320		3	COMP-SCI 404		3
COMP-SCI 394R		3	COMP-SCI 3XX/4XX Major Elective		3
COMP-SCI 431		3	Life or Physical Science Elective		3
General Elective		3	GECDV 201, 202, 203, 204, 205, 206, 207, 208, 209, or 210		3
		15			15

Fourth Year

Fall Semester	Credits		Spring Semester	Credits	
COMP-SCI 441		3	COMP-SCI 451R		3
COMP-SCI 449		3	COMP-SCI 461 or 465R		3
COMP-SCI 3XX/4XX Major Elective		3	COMP-SCI 3XX/4XX Major Elective		3
COMP-SCI 3XX/4XX Major Elective		3	COMP-SCI 4XX Major Elective		3
General Elective		3	General Elective		3
		15			15

Total Credits: 120

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..

Roo Advising (http://catalog.umkc.edu/roo-advising/)

Email: rooadvising@umkc.edu

Phone: 816-235-1148