

BACHELOR OF SCIENCE: CHEMISTRY

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'.

Mission

The BS in Chemistry is designed to offer comprehensive preparation in all major areas of chemistry (including general, organic, analytical, physical, inorganic and biochemistry). Graduates with a BS in Chemistry will have the core chemistry knowledge, analytical capacity, and laboratory skills necessary for collaborative work in hard science environments. This is achieved through hands-on laboratory and instrumentation training and rigorous coursework. The degree provides a foundation for those interested in pursuing careers in the pharmaceutical, government, industrial and academic sectors, as well as for those who wish to pursue studies towards advanced degrees (MS or Ph.D.) in various areas of chemistry and molecular sciences.

Program Goals

The goals of the Chemistry BS program are to produce graduates who:

- Demonstrate an in-depth knowledge of the basic areas of chemistry and a set of problem-solving skills sufficient to allow students to pursue advanced chemistry degrees or succeed as chemists in an industrial setting.
- Demonstrate a breadth of knowledge of experimental techniques, instrumentation, and laboratory safety.
- Demonstrate professionalism, including the ability to work in teams, communicate effectively, and apply basic ethical principles.

Student Learning Outcomes

Students graduating from this program will:

- Apply chemical concepts to solving theoretical and practical problems.
- Follow general laboratory practice guidelines and demonstrate proper laboratory safety measures.
- Read, analyze, interpret, and cite the chemical literature, and clearly and accurately communicate scientific information in an ethical manner.
- Analyze and solve scientific problems, both individually and as part of a team.

Students graduating with a baccalaureate degree in chemistry will be prepared for entry into professional schools (e.g., medical, dental, pharmaceutical, or veterinary), graduate programs, or chemical industries.

Program Requirements

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 (offered via dual credit only)	
COMM-ST 277	Interpersonal Communication	
Math Pathway (satisfied in major requirements below)		
Critical Thinking in Arts & Humanities (GECRT-AH)		3
Critical Thinking in Natural & Physical Sciences (GECRT-SC)		3
Critical Thinking in Social & Behavioral Sciences (GECRT-SS)		3
Culture & Diversity Course (GECDV)		3
Civic & Urban Engagement Course (GECUE)		3
Total Credits		27

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

The Chemistry Department bachelor of science degree is certified by the American Chemical Society (ACS) and requires the 44 credit hours in chemistry listed below, specifically the 2 credit hours of CHEM 382, 3 credit hours of CHEM 367 or LS-BIOC 341, CHEM 471, and an upper division elective which may be chosen from selected departments¹.

Students must successfully complete the major requirements below with at least 12 hours of the noted upper division (300+) course requirements completed at UMKC.

- All majors must receive a C- or better in all chemistry courses with an overall chemistry GPA of 2.0 for graduation.
- A minimum grade of C- is required for all prerequisite courses (including physics and mathematics courses). In exceptional cases, students may receive written consent by submitting a petition to the Chemistry Undergraduate Curriculum Committee which has to be approved to waive this requirement.
- Each chemistry major must be advised by an Advisor every semester.
- Students must maintain academic standing as determined by the academic unit. Please see <https://catalog.umkc.edu/colleges-schools/sbc/chemistry/#undergraduatetext> for more information.

Code	Title	Credits
General Chemistry		
CHEM 211 or MOTRCHEM 150	General Chemistry I MOTR Chemistry I	4
CHEM 211L	Experimental General Chemistry I	1
CHEM 212R & CHEM 212LR	General Chemistry II and Experimental General Chemistry II	5
Organic Chemistry		
CHEM 321 & 321L	Organic Chemistry I and Organic Chemistry Laboratory I	4
CHEM 322R & CHEM 322L	Organic Chemistry II and Organic Chemistry Laboratory II	4
Analytical Chemistry		
CHEM 341WI or CHEM 341	Analytical Chemistry I: Quantitative Analysis Analytical Chemistry I: Quantitative Analysis	4
CHEM 442R	Analytical Chemistry II: Instrumental Analysis	3
Physical Chemistry		
CHEM 431	Physical Chemistry I	3
CHEM 432	Physical Chemistry II	3
CHEM 437WI or CHEM 437	Experimental Physical Chemistry I Experimental Physical Chemistry I	3
Chemical Literature		
CHEM 410	Chemical Literature	1
Inorganic Chemistry		
CHEM 451R	Inorganic Chemistry	3
Advanced Work		
One of the following: ¹		3
CHEM 387, CHEM 392, CHEM 399, or any 400-level CHEM course		
MATH course higher than 250 with 220 as a prerequisite		
300- or 400- level BIOLOGY Course		
300- or 400- level PHYSICS Course		
400- level STAT Course		
Math		
MATH 120	Precalculus (satisfies Math Pathway)	5
MATH 210	Calculus I	4
MATH 220	Calculus II	4
MATH 250	Calculus III	4
Engineering Physics		
PHYSICS 240 or PHYSICS 210	Physics For Scientists and Engineers I General Physics I	5
PHYSICS 250 or PHYSICS 220	Physics For Scientists and Engineers II General Physics II	5
ACS Requirements ¹		
CHEM 382	Inorganic And Organic Synthesis	2
CHEM 367 or BIOLOGY 441	Bioorganic Chemistry Biochemistry	3

CHEM 471	Introduction To Polymer Chemistry	3
Total Credits		76

- ¹ On rare occasions, a student may need more flexibility than the ACS-certified B.S. degree allows. In this case, course substitutions may be selected and approved by a chemistry advisor so that the student may still complete the bachelor of science degree in chemistry as a non-ACS-certified degree.

General Electives

Students must take elective credit hours to meet the minimum credit hour requirement for their degree, including at least 36 credit hours of coursework at the 300-level or above. The minimum required by the university is 120 credit hours, of which at least 30 credit hours must be taken at UMKC, but some degree programs require more.

Code	Title	Credits
General Electives		14

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/transfer/transfer-credit/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
CHEM 211 & 211L ^{CC}		5 CHEM 212R & CHEM 212LR ^{CC}	5
MATH 120 ^{CC}		5 MATH 210 ^{CC}	4
GEFSE 101		3 ENGLISH 225	3
ENGLISH 110		3 GECRT-SC 101, 102, or 103	3
		BIOLOGY 250 or LIFE-SCI 201 (recommended elective)	1

Second Year

Fall Semester	Credits	Spring Semester	Credits
CHEM 321 & 321L ^{CC}		4 CHEM 322R & CHEM 322L ^{CC}	4
PHYSICS 240 ^{CC}		5 PHYSICS 250 ^{CC}	5
MATH 220		4 MATH 250	4
COMM-ST 110, 140, or 277		3 GECRT-SS 101, 102, 104, 105, 106, 107, 108, or 111	3
		16	16

Third Year

Fall Semester	Credits	Spring Semester	Credits
CHEM 431		3 CHEM 432	3
CHEM 341WI		4 CHEM 437WI	3
CHEM 410		1 GECRT-AH 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 112, 113, or 114	3
BIOLOGY 251 (recommended elective; or LIFE-SCI 202 in Spring)		1 GECUE 201, 203, 204, 205, 206, or 272	3
GECDV 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, or 211		3 General Elective	3
HISTORY 101, 102, or POL-SCI 210		3	
		15	15

Fourth Year

Fall Semester	Credits	Spring Semester	Credits
CHEM 382		2 CHEM 442R	3
CHEM 367 or BIOLOGY 441		3 CHEM 451R	3
CHEM 471		3 CHEM/Biol/PHYSICS/MATH 3XX/4XX Major Elective	3
General Elective		3 General Elective	3
General Elective		3	
		14	12

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 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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