

# CHEMISTRY

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*The Interdisciplinary Ph.D. program is no longer accepting applications. The Civil Engineering, Computer Science, Economics, Education, Electrical and Computer Engineering, Humanities, Mechanical Engineering, and Natural Sciences Ph.D. programs are now open for applications. Please inquire to [umkcs@umkc.edu](mailto:umkcs@umkc.edu) with any questions.*

## Discipline Coordinator

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### Chemistry faculty who are members of the doctoral faculty.

Chemistry is a discipline in the Interdisciplinary Ph.D. (<https://catalog.umkc.edu/colleges-schools/graduate-studies/interdisciplinary-phd-program/>) Program administered by the [School of Graduate Studies](#).

**Note:** The discipline-specific requirements listed here are *in addition* to the requirements listed in [Interdisciplinary Ph.D. Application Procedure and Minimum Criteria for Admission](#) and [Minimum Interdisciplinary Ph.D. Academic Regulations and Degree Requirements](#).

## Discipline-specific Admission Requirements

### Chemistry as a Primary Discipline

Normally, only applications to full-time academic status will be considered. To qualify for full admission (Note: full admission is unrelated to full-time academic status), applicants are expected to have the equivalent of an American Chemical Society-approved bachelor's degree in chemistry, which includes coursework in general chemistry, analytical chemistry, one year of organic chemistry, inorganic chemistry and one year of physical chemistry requiring calculus and physics as prerequisites. (For example, see UMKC's B.S. program in the Chemistry section in this catalog.) Applicants will be admitted as provisional students with a limited number of undergraduate deficiencies. They will be notified, at the time admission is offered, of any requirements to be met for reclassification as fully admitted. Undergraduate courses included in these requirements must be completed with grades of "C" or higher.

Applicants should take particular note of the physical chemistry requirement.

Applications are only accepted through the online system, and include:

1. Official, confidentially transmitted transcripts.
2. Statement of purpose.
3. Three confidentially transmitted letters of recommendation (academic and/or professional).
4. English language proficiency requirement.

### Suggested Compatible Co-disciplines

Curriculum and Instruction (<https://catalog.umkc.edu/colleges-schools/graduate-studies/curriculum-instruction/>), Engineering (<https://catalog.umkc.edu/colleges-schools/graduate-studies/engineering/>), Geosciences (<https://catalog.umkc.edu/colleges-schools/graduate-studies/geosciences/>), Pharmaceutical Sciences (<https://catalog.umkc.edu/colleges-schools/graduate-studies/pharmaceutical-sciences/>), Pharmacology (<https://catalog.umkc.edu/colleges-schools/graduate-studies/pharmacology/>), Physics (<https://catalog.umkc.edu/colleges-schools/graduate-studies/physics/>)

### Chemistry as a Co-discipline

Applicants are expected to have undergraduate coursework in general chemistry and organic chemistry. Applicants accepted as provisional students will be notified, at the time admission is offered, of any requirements to be met for reclassification as fully admitted. Undergraduate courses included in these requirements must be completed with grades of "C" or higher.

## Core Program Requirements

### Chemistry as a Primary Discipline

#### Coursework Requirements

Students are to see the principal graduate advisor, or their research advisor, for advising and signature prior to registering each semester.

Students must successfully complete a minimum of fifteen credit hours and a maximum of eighteen credit hours of didactic chemistry graduate coursework, among which one course must be from Group A, one course from Group B, and a minimum of two additional courses (six credit hours) from any graduate chemistry course numbered 5500 to 5589, excluding CHEM 5520R, CHEM 5530, and CHEM 5540R. The remaining required chemistry credit hours may be satisfied with directed studies (CHEM 5590). In addition, students must complete one credit hour of chemistry seminar (CHEM 5611). A grade of C+ (2.3) or less in more than two chemistry courses applicable to the Ph.D. program will result in termination from Ph.D. candidacy.

Code	Title	Credits
<b>Group A</b>		
CHEM 5530	Systematic Physical Chemistry	3
CHEM 5531	Classical Thermodynamics	3
CHEM 5532	Chemical Kinetics	3
CHEM 5533	Quantum Chemistry	3
CHEM 5534	Molecular Spectroscopy	3
CHEM 5535	Statistical Thermodynamics	3
<b>Group B</b>		
CHEM 5520R	Survey Of Organic Chemistry	3
CHEM 5521R	Mechanisms Of Organic Reactions	3
CHEM 5522	Synthetic Organic Chemistry	3

In addition, students must successfully complete twelve (12) to fifteen (15) credit hours of 400-level or above coursework in other disciplines, among which a minimum of nine (9) credit hours must be in their co-discipline(s). A minimum of three (3) credit hours in the codiscipline must be at the 5500+ level. Students may be required to take additional courses as outlined by their plan of study.

Any of the above chemistry courses will be credited toward the Ph.D. coursework requirement if taken as part of any previous graduate program at UMKC and a grade of B- (2.7) or better is received. Also, students who have received a grade of B- (2.7) or better in graduate chemistry coursework taken as part of a degree program at another institution may have up to six credit hours of equivalent required coursework waived upon approval of a majority of the supervisory committee. A written request for this waiver is to be submitted and approved before submission of the student's plan of study.

### Courses/Experiences Providing Instruction in Research Methodology

Expertise in research methodology will be acquired under the mentorship of the research advisor and supervisory committee. The student's progress will be assessed annually by his/her supervisory committee and the results will be forwarded to the School of Graduate Studies.

### Number of Credit Hours Required beyond Bachelor's Degree

A total of 46 credit hours are required, among which 30 credit hours are from didactic courses, 15 credit hours from dissertation research and 1 credit hour of chemistry seminar. Among the 30 didactic hours, a minimum of 15 credit hours and a maximum of 18 credit hours are from chemistry, and a minimum of 9 credit hours are from the co-discipline. Up to six credit hours of chemistry courses may be waived, as described above under Coursework Requirements.

## Chemistry as a Co-discipline

### Coursework Requirements

Students are required to complete a minimum of three courses (nine credit hours) at the 400-level or above from classes offered by the Department of Chemistry or in conjunction with other units as approved in the student's plan of study. At least three of these credit hours must be at the 5500+ level and taken from courses offered by the Department of Chemistry. The systematic courses CHEM 5520R and CHEM 5530 may be used to satisfy the "400-level or above" requirement, but not the "5500+ level" requirement. CHEM 5590, CHEM 5599 and CHEM 5699 may not be used to satisfy these requirements.

Any of the above chemistry courses will be credited toward the Ph.D. coursework requirement if taken as part of any previous graduate program at UMKC and if a grade of B- (2.7) or better is received. Transfer credit from another institution cannot be applied to Chemistry's co-discipline requirement.

## Special Requirements

### Chemistry as a Primary Discipline

#### Placement Examinations

Incoming students take placement examinations in analytical inorganic, organic and physical chemistry. Placement examinations are typically administered the week preceding the first week of classes of the fall and spring semesters. Students scoring below the 50th percentile in the organic and/or physical chemistry exams are required to enroll in CHEM 5520R and/or CHEM 5530, respectively. Enrollment in other graduate organic or physical chemistry courses is not permitted until CHEM 5520R and/or CHEM 5530, respectively, is(are) successfully completed. These courses may not be counted toward the coursework requirements above. Students must complete all additional coursework required as a result of the placement exam scores by the end of their first three regular semesters.

#### Research Advisor

Full-time students are to select a research advisor from the doctoral faculty of the Department of Chemistry and a supervisory committee by the end of their first regular (e.g. fall or spring) semester on campus. For chemistry as the primary discipline, the student's supervisory committee shall consist

of the research advisor in chemistry and two additional chemistry doctoral faculty as well as at least one doctoral faculty member from each co-discipline.

### **Seminar**

Students are required to attend and participate in all regularly scheduled and special Chemistry Department seminars and colloquia. Students are required to present a one-hour chemistry seminar (CHEM 5611) during their second year following full admission to the Ph.D. program, based on their dissertation research project. This seminar will include a thorough review of the literature pertinent to their project and a description of the objectives, the proposed methodology and the significance of this research. An abstract is to be posted and distributed one week prior to the presentation date.

### **Time Constraints and Financial Support**

Students must complete all requirements for their degree within seven years from the date of full admission to the Ph.D. program. Under compelling circumstances and on the written recommendation of a majority of the supervisory committee, a single extension for up to one year may be requested for approval by the dean of the School of Graduate Studies. Full-time (as defined in the current UMKC catalog) Ph.D. students may receive financial support (in the form of fellowships or teaching assistantships) for a maximum of five years. Students from countries not having English as their first language, and who are to be supported as GTAs, must meet the UMKC standards for international students to become certified as GTAs. Full information on that process can be found here: Policy on Award of Teaching Assistantships (<https://catalog.umkc.edu/general-graduate-academic-regulations-information/international-graduate-student-academic-regulations/>).

### **Dissertation**

All supervisory committee members are to receive a final draft of the dissertation for approval of form and content at least two weeks before submission to the dean of the School of Graduate Studies for certification. Candidates should submit preliminary drafts well in advance of this deadline. After the dissertation is certified for acceptance, the student must present an oral defense of his/her research in the form of a dissertation seminar. The supervisory committee will make a final determination of the acceptability of the dissertation immediately following this presentation. Only minor changes may be made to the dissertation at this point.

## **Expectations for Interdisciplinary Work**

### **Chemistry as a Primary Discipline**

Students develop and pursue a plan of study that includes coursework from the primary discipline and co-discipline(s). The interdisciplinary nature of the student's program is emphasized in the comprehensive examination, which includes material from all disciplines in the plan of study.

### **Chemistry as a Co-discipline**

The Department of Chemistry will cooperate with the student's primary discipline in assessing the interdisciplinary nature of the student's progress.

## **Comprehensive Examination Guidelines**

### **Chemistry as Primary Discipline**

All students are required to prepare a research proposal describing a research project. An abstract is to be posted and distributed, and a written copy of this proposal (in standard NSF or NIH format) given to all members of the examination committee (consisting of the student's supervisory committee and others selected by the Dean of the School of Graduate Studies) at least one week prior to presentation in a proposal seminar. This seminar must be presented to all members of the examination committee by the end of the second year following full admission to the Ph.D. program.

A written comprehensive examination will be prepared and administered by the examination committee before completion of the student's third year following full admission to the Ph.D. program. This examination will be based on the student's coursework and on general knowledge in all areas of his/her specialization. All efforts will be made to emphasize the multidisciplinary nature of the student's program in this examination. If the student fails the written portion of the comprehensive examination, he/she may petition the examination committee to allow for a single opportunity to retake it. This second examination must be completed no earlier than 12 weeks and no later than six months from the date of completion of the first examination.

The research proposal and the written comprehensive exam constitute parts of the comprehensive exam. An IPhD student may elect to enroll in 3 credit hours of CHEM 5590, the grade for which will be CR/NC-only and will be based on the outcome of the comprehensive exam; retroactive enrollment is allowed. An Interdisciplinary PhD student with chemistry as the primary discipline, who has passed the comprehensive exam can have up to 9 credit hours of CHEM 5590/CHEM 5599/ CHEM 5699 counted towards a non-thesis MS degree in Chemistry.

### **Chemistry as a Co-discipline**

The comprehensive examination will be determined by the student's primary discipline in cooperation with the co-discipline(s).