

CHEMISTRY

Chemistry

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Chemistry offers programs of study leading to the bachelor of arts, bachelor of science and master of science degrees, and participates in UMKC's Natural Sciences Ph.D. program. To the extent that each program is flexible (see degree requirements), it is possible to specialize at the graduate level in the areas of analytical, inorganic, organic, physical or polymer chemistry.

Research facilities and Laboratories

Major Instrumentation

- Varian Inova 400 MHz NMR spectrometer.
- Bruker 250 MHz NMR spectrometer with solid state probe.
- IBM 200 Electron Spin Resonance Spectrometer.
- AA and ICP-AA spectrophotometers.
- CARY-1 UV-Visible dual beam spectrophotometer.
- Cambridge Structural Database Subscription (Van Horn).
- Raman and Infrared Spectroscopy Lab (Durig).
- Positron Annihilation and Gamma-ray Spectroscopy Lab (Van Horn).
- ABI Pioneer peptide synthesizer.
- Sprint BioCad liquid chromatography system.
- Finnigan MAT Double Focusing mass spectrometer.

Research Instrumentation

- Ocean Optics UV-Vis-NIR and other UV-Visible spectrophotometers.
- Metrohm Titrando system with "PC Control" software.
- BAS Epsilon electrochemistry apparatus (Peng).
- Shimadzu HPLC (Van Horn).
- Shimadzu RF-5301PC Fluorescence spectrophotometer.
- Perkin Elmer Polarimeter (Buszek).

Support Facilities

- Chemical Stores.

On Campus Resources

- Jasco J-710 Circular Dichroism Spectropolarimeter.
- Varian 600 MHz NMR Spectrometer (Laity).
- ESI-mass spectrometer and Triple-Quad LC-ESI MS with nanospray adaptor (School of Pharmaceutical Sciences).
- Machine Shop (Department of Physics).

Computer facilities include UMKC's Academic Research servers using HP's Itanium technology and numerous personal computers located in Spencer Hall and Flarsheim Hall for teaching and research purposes. A computational research laboratory is also housed in the department with a number of high-speed workstations and modern software.

Faculty

Paul M. Barron; associate teaching professor of chemistry and faculty mentor; Ph.D. (University of Nebraska).

Keith R. Buszek²; professor of chemistry; B.S. (University of California, Irvine); Ph.D. (University of California, Los Angeles).

Xiaobo Chen^{2,3}; professor of chemistry and graduate program coordinator; B.S. (Peking University, China); M.S. (Chinese Academy of Sciences); Ph.D. (Case Western Reserve University).

Amy Christiansen^{2,3}; assistant professor of chemistry; B.A. (Gustavus Adolphus College); Ph.D. (University of California, Irvine).

Andrea Drew Hutchison; teaching professor of chemistry, undergraduate program coordinator, coordinator of organic laboratories and faculty mentor; B.S. Ph.D. (University of South Carolina).

Todor K. Gounev; teaching professor of chemistry and coordinator of general chemistry laboratories; B.S., M.S. (University of Sofia, Bulgaria); Ph.D. (University of South Carolina).

Lena Hoober-Burkhardt; associate teaching professor of chemistry, coordinator of advanced chemistry laboratories and faculty mentor; B.A. (Princeton University); Ph.D. (University of Southern California).

Kathleen V. Kilway^{2,3}; curators' teaching professor of chemistry and associate dean for faculty affairs; B.S. (St. Mary's College); M.S., Ph.D. (University of California-San Diego).

Mohammad Momeni^{2,3}; assistant professor of chemistry; B.S. (University of Kashan, Iran); M.S. (Tarbiat Modares University, Iran); Ph.D. (University of Alberta, Canada).

Nathan A. Oyler^{2,3}; associate professor of chemistry; B.S. (University of Arizona); Ph.D. (University of Washington).

Zhonghua Peng^{2,3}; curators' professor of chemistry and associate director of energy, matter and systems (EMS) division; B.S. (University of Science and Technology of China); M.S. (Chinese Academy of Sciences); Ph.D. (University of Chicago).

Mohammad Rafiee^{2,3}; assistant professor of chemistry; B.S., Ph.D. (Bu-Ali Sina University, Iran).

J. David Van Horn^{2,3}; associate professor of chemistry; B.A. (Point Loma Nazarene College); Ph.D. (University of Utah).

Emeritus Faculty

Jerry R. Dias (Curators' Professor Emeritus of Chemistry), Peter Groner, Andrew Holder, Y.C. Jerry Jean (Curator's Professor Emeritus), Thomas C. Sandreczki, Kenneth S. Schmitz, Charles J. Wurrey (Curator's Distinguished Teaching Professor Emeritus and James C. Olson's Professor of Chemistry)

- ¹ Associate or Adjunct Graduate Faculty
- ² Members of UMKC Graduate Faculty
- ³ Members of UMKC Doctoral Faculty

Undergraduate Undergraduate Programs:

- Minor in Chemistry
- Bachelor of Arts: Chemistry
- Bachelor of Science: Chemistry

General Information about Undergraduate Programs

Admission Requirements

Other than University of Missouri admission requirements, there are no special prerequisites for beginning either the bachelor of arts or the bachelor of science program. High school chemistry and a good working knowledge of algebra and arithmetic are desirable for entering the bachelor of science program. It should be noted that much of the bachelor of science program, and some of the bachelor of arts program, are highly structured in the order which chemistry courses must be taken. It is assumed that transfer students, Associates degree students, and community college students should have begun the appropriate course sequence in their previous schools. All students are required to consult with an undergraduate advisor before their registration at UMKC.

Career Implication of the Bachelor's Degree

Chemistry offers two bachelor of science degree programs. Both require a minimum of 43 credit hours of chemistry courses; they are designed for those who want to work in the field of chemistry. The American Chemical Society approved degree is based on the guidelines established by the

American Chemical Society (ACS) and specifically requires Organic and Inorganic Synthesis (CHEM 382) and a Biochemistry course (either CHEM 367 or BIOLOGY 441). Many of those receiving the bachelor of science degree have gone on to graduate work, professional schools, and advanced degrees. Others have gone directly into the chemical industry (laboratory assistants).

In contrast, the bachelor of arts degree is more flexible because it requires a minimum of 26 credit hours of chemistry. The bachelor of arts student is shown a minimum of what chemistry is about. By choosing suitable courses, this degree prepares the individual with the chemical background for work in other areas. Examples include technical librarian, medical technologist, business administration, public health, and sales or advertising in the chemical industry. The majority of students pursuing the bachelor of arts in chemistry do so in preparation for professional schools, such as medicine, dentistry, and pharmacy. The bachelor of arts can also provide a student with a background in chemistry equivalent to that of a bachelor of science, but tailored to the individual's desires.

Teacher Certification in Chemistry

Certification as a middle school (grades 5-9) science or secondary (grades 9-12) chemistry teacher in or Missouri requires that a student complete a teacher preparation program. Once you complete a bachelor's degree in chemistry, you can apply to the School of Education, Social Work and Psychological Sciences for the Master of Arts in Teaching program, which prepares you for the teaching profession and teacher certification. A separate application for the Master of Arts in Teaching program is required. For further information about the program, consult the School of Education, Social Work and Psychological Sciences section of this catalog or contact the Division of Teacher Education and Curriculum Studies at (816) 235-2245.

Honors Program

Students with outstanding records of achievement may be eligible to enroll in special honors courses. Such courses are designated by the letter H preceding the course number, or special arrangements can be made with instructors of regular courses. Students enrolled in the special courses should consult with their faculty advisor to arrange for optimal degree planning.

Prerequisites and Co-requisites

A minimum grade of C- or higher is required for all prerequisite and co-requisite courses for all students taking courses within Chemistry. Additionally, students must be concurrently enrolled in all co-requisite courses. In exceptional cases, students may receive written consent to waive one or both of these requirements from the Undergraduate Program Coordinator by completing and submitting a detailed petition form if approval of the petition is granted.

Academic Standing

The University tries to assure that students progress satisfactorily toward their goals and receive clear warning when they do not. The Chemistry program follows the university policy related to Academic Standing. However, if a student's UM cumulative GPA and/or UM chemistry GPA falls below the 2.0 minimum the student will no longer be in good standing.

Graduate

Graduate Programs:

- Master of Science: Chemistry
 - Emphasis areas:
 - Analytical
 - Inorganic
 - Organic
 - Physical
 - Polymer
 - Thesis-Based Option
 - Non-Thesis Option

Graduate Study in Chemistry Information

Both the Master of Science (MS) degree and Natural Sciences Ph.D. degree with chemistry as the primary discipline have the basic aim of training students to work independently in chemistry. Both programs train the student through a broad but flexible base of coursework for further education, but the Natural Sciences Ph.D. places a greater emphasis on original research.

Master of Science: Chemistry

Chemistry offers the master of science degree, with an emphasis in analytical, inorganic, organic, physical, or polymer chemistry. Students may complete a M.S. in Chemistry in a Thesis-Based (<https://catalog.umkc.edu/colleges-schools/science-engineering/chemistry/master-of-science-thesis-based/>) or in a Non-Thesis (<https://catalog.umkc.edu/colleges-schools/science-engineering/chemistry/master-of-science-non-thesis-based/>) Option. The non-thesis M.S. program has an emphasis on coursework, while the thesis-based degree has an emphasis on both coursework and

original research. Graduating chemistry M.S. students will be exposed to the most recent advances in chemical sciences. In addition, thesis-based M.S. students will experience the excitement of performing guided research.

Students, who have received a grade of B- (2.7) or better in graduate coursework taken as part of a degree program at another institution, may transfer up to 6 credit hours of this work on approval of a majority of the student's committee. A written request for this approval must be submitted within one year of full admission to the program.

Natural Sciences Doctor of Philosophy (Ph.D.) Program: Chemistry (<https://catalog.umkc.edu/colleges-schools/graduate-studies/chemistry/phd/>)

Students desiring to study chemistry at the doctoral level must apply to the School of Graduate Studies' Natural Sciences Ph.D. program and select chemistry as the primary discipline. Detailed information on the general and discipline-specific admission requirements for the doctoral degree may be found in the Graduate Academic Regulations and Information (<https://catalog.umkc.edu/general-graduate-academic-regulations-information/>) section of this catalog. The Natural Sciences Ph.D. with chemistry as the primary discipline has a research track only.

Students pursuing the Natural Sciences Ph.D. degree with a primary discipline other than chemistry may also have the option of selecting chemistry as a secondary discipline or may elect to pursue elective coursework in chemistry. These options should be chosen by students after consultation with their primary discipline coordinator or primary doctoral advisor, as appropriate. These students should also consult the School of Graduate Studies (<https://catalog.umkc.edu/colleges-schools/graduate-studies/>) section of this catalog for degree requirements, and other academic regulations applicable to their degree programs. (For further information on the Natural Sciences Ph.D. Program, see the chemistry (<https://catalog.umkc.edu/colleges-schools/graduate-studies/chemistry/phd/>) discipline within the School of Graduate Studies (<https://catalog.umkc.edu/colleges-schools/graduate-studies/>) section of this catalog.)