

CHEMISTRY

- Master of Science, Chemistry (p. 1)

Gary Crosson, Department Chairperson

The Department of Chemistry offers graduate programs leading to the Master of Science in chemistry.

The purpose of the master's program in chemistry is to present a rigorous approach to modern chemical theories and research.

The student and advisor determine the composition of the program of study with the approval of the graduate committee. All candidates for the Master of Science are required to submit proof of their ability to do independent work. Normally, this proof takes the form of a research thesis. Additional coursework may be substituted if the student has previously demonstrated research proficiency commensurate with a master's degree as judged by the graduate committee.

Assistantships

Teaching assistantships requiring a maximum of nine hours of laboratory instruction per week are available. The stipend for a 9 to 12 month appointment is supplemented by tuition remission for graduate coursework. Appointment as a teaching assistant requires fluency in spoken English. Research assistantships in selected areas are sometimes available.

Master of Science in Chemistry (CHM)

A minimum of 30 semester hours of graduate coursework is required for the Master of Science. This includes 21-24 semester hours of coursework and 6-9 hours of research. The student and advisor determine the composition of the program of study with the approval of the graduate committee. All candidates for the Master of Science are required to submit proof of their ability to do independent work. Normally, this proof takes the form of a research thesis. Additional coursework may be substituted if the student has previously demonstrated research proficiency commensurate with a Master's degree as judged by the graduate committee.

Non-Thesis Option

CHM 541	Topics in Physical Chemistry	3
CHM 515 & 515L	Analytical Chemistry and Analytical Chemistry Laboratory	4
CHM 512	Intermediate Organic Chemistry	3
CHM 517	Inorganic Chemistry	3
Select four courses from:		12
CHM 550	Special Topics in Organic Chemistry	
CHM 544	Coordination Chemistry	
CHM 546	Special Topics in Modern Analytical Chemistry	
CHM 539	Special Topics in Physical Chemistry	
CHM 552	General Biochemistry II	
Electives		6
Total Hours		31

Courses

CHM 512. Intermediate Organic Chemistry. 3 Hours

Modern theory of organic chemistry and reaction mechanisms. Prerequisite(s): CHM 314 or equivalent.

CHM 515. Analytical Chemistry. 2 Hours

Methods of analysis based on modern instrumentation including chemical, electrical, and spectral methods. Prerequisite(s): CHM 201 or CHM 302 or CHM 304.

CHM 515L. Analytical Chemistry Laboratory. 2 Hours

Laboratory course to accompany CHM 515.

CHM 517. Inorganic Chemistry. 3 Hours

An introductory course. The fundamentals of modern inorganic chemistry including atomic structure, principles of structure and bonding, acid-based chemistry, periodicity, coordination compounds, nonaqueous solvents, electrochemistry, molecular symmetry, and the chemistry of representative elements.

CHM 525. Principles of Organic Chemistry. 3 Hours

An introduction to the fundamentals of organic chemistry. Prerequisite(s): CHM 124.

CHM 526. Principles of Organic Chemistry. 3 Hours

An introduction to the fundamentals of organic chemistry. Prerequisite(s): CHM 124.

CHM 528. Theoretical Principles of Chemistry. 3 Hours

No description available. Prerequisite(s): MTH 218.

CHM 528L. Theoretical Principles of Chemistry Laboratory. 1 Hour

Laboratory course to accompany CHM 527 - CHM 528. One three-hour laboratory per week.

CHM 536. Biosynthetic Organic Chemistry. 3 Hours

Mechanistic fundamentals of the biosynthesis and transformation of organic natural products, with special emphasis on medicinal compounds, toxins, pheromones and other secondary metabolite structures. Prerequisite(s): CHM 314, CHM 314L or equivalent.

CHM 538. Sustainability and Chemistry. 3 Hours

Chemical industrial practices drive many sustainability challenges in the near and long term. Many chemical technologies can address the sustainability of these practices as long as the costs (monetary and environmental) of such innovations are accurately presented and evaluated. Sustainability and Chemistry is an advanced one semester course describing chemical concepts and principles that underlie the foundations for a more sustainable world. This course analyzes the root chemical and societal causes of unsustainable practices in chemical transformations in our everyday life, and explores techniques to evaluate them. The core technologies discussed will be deeply integrated in the current environmental, economic, and social pillars of modern society. We will specifically address green chemistry principles with learning how to create and manage life cycle assessments (cradle to grave) with computational tools. We will also discuss molecular design to reduce hazards to the environment, and how we can establish practices to quantitatively evaluate the health and safety of core chemical technologies. Prerequisites: Undergraduates taking this course would need permission to enroll.

CHM 539. Special Topics in Physical Chemistry. 3 Hours

Topics of current interest in areas such as chemical instrumentation, electronics, physical biochemistry, macromolecular chemistry, and spectroscopy.

CHM 541. Topics in Physical Chemistry. 3 Hours

Modern aspects of physical chemistry, which may include the solid state, electrochemistry, or mathematical methods of physical chemistry.

CHM 544. Coordination Chemistry. 3 Hours

Properties of transition metal ions, reaction mechanisms in coordination compounds, bioinorganic systems, electron transfer mechanisms, and the experimental tools common to coordination chemistry.

Prerequisite(s): CHM 517 or equivalent.

CHM 545. Organometallic Chemistry. 3 Hours

An advanced one-semester course describing fundamental coordination chemistry to metal ions, the general properties and bonding in organometallic complexes, methods used for structural analysis of organometallic complexes, and core chemical mechanisms surrounding metathesis, polymerization in organic and bioorganometallic chemistry.

Prerequisites: CHM 314 or with instructor permission.

CHM 546. Special Topics in Modern Analytical Chemistry. 3 Hours

Modern analytical methods. Subject matter may include NMR, EPR, electroanalytical methods, GLC, mass spectrometry, IR and Raman spectroscopies, visible and ultraviolet spectrophotometric methods, X-ray techniques, ESCA and Auger spectroscopies, atomic absorption, and fluorescence.

CHM 550. Special Topics in Organic Chemistry. 3 Hours

Modern physical organic chemistry, spectroscopy, photochemistry, molecular rearrangements, stereochemistry, and natural products.

CHM 551. General Biochemistry I. 3 Hours

Discussion of the chemistry and biochemistry of carbohydrates, amino acids, proteins, and nucleic acids, including health-science and methodologic aspects. Descriptions of enzymology, protein purification, and carbohydrate metabolism related to such topics as bioenergetics, membranes, and disease processes. prerequisite(s): CHM 201, CHM 314.

CHM 552. General Biochemistry II. 3 Hours

Discussion of selected topics in bioenergetics, and metabolism of lipids, amino acids, porphyrins, nucleic acids, and proteins. Current aspects of nutrition, biochemical genetics, endocrinology, regulation, and genetic engineering are addressed and related to health-science topics as time permits. Prerequisite(s): CHM 551.

CHM 553. Topics in Biochemistry. 1-3 Hours

Topics of current interest in biochemistry. Prerequisite(s): (CHM 551 or CHM 552) or permission of instructor.

CHM 554. Directed Readings. 1-3 Hours

Readings in Chemistry.

CHM 555. Modern Trends in Chemistry. 3 Hours

An advanced topics course that offers an up-to-date treatment of new areas of research. Possible subjects to be offered in this course include, but are not limited to, synthetic chemistry of natural and medicinal products, nano-materials/polymer chemistry, and advanced biochemical topics. Prerequisite(s): Graduate standing.

CHM 557. Biophysical Chemistry. 3 Hours

No description available.

CHM 558. Metabolism and Human Disease. 3 Hours

This course provides a graduate-level understanding of the connections between metabolism, human disease and diet with an emphasis placed on current research related to these topics. Prerequisites: Undergraduate biochemistry course that covers metabolism CHM 420, CHM 452, HSS 307 or BIO 403. Corequisites: BIO 551 or BIO 552.

CHM 560. Research I. 0-9 Hours

Research.

CHM 561. Research II. 0-9 Hours

Research.