DEPARTMENT OF CHEMISTRY

Contacts: Dr. Derrick Kolling, Chair
Website: http://www.marshall.edu/chemistry (http://www.marshall.edu/chemistry/)

chemistry@marshall.edu

Courses offered by the Department of Chemistry provide programs of study that allow the individual to:

1. Obtain high quality instruction in chemistry as a scientific discipline.
2. Obtain a sound background in preparation for advanced studies.
3. Meet the qualifications of professional chemists and accrediting agencies.
4. Prepare for a professional career in chemistry, medicine, dentistry, pharmacy, medical technology, engineering, nursing and other fields.

High school students planning to major in chemistry are advised to take one year of high school chemistry, one year of high school physics, and at least three years of high school mathematics (including geometry, algebra, and trigonometry).

The curriculum and facilities of the department have been approved by the Committee on Professional Training of the American Chemical Society.

Grade Point Average

A Grade Point Average of 2.0 in

1. all required Chemistry courses;
2. all Chemistry courses; and
3. all required Chemistry courses taken at Marshall will be required for all degrees.

Honors, Research, and Special Programs in Chemistry

The department offers a number of unique enrichment programs outside the above curricula that are open to students in either degree program. All entering students in chemistry should contact either the department office or their advisor for full details.

Minors

The Department of Chemistry does not require a minor with any of its majors.

Double Majors

Double majors within the Department of Chemistry may include any majors other than the B.S., Major in Chemical Sciences. A double major of Forensic Chemistry with Biochemistry is also currently not permitted. Double majors that include majors outside the Department of Chemistry may include any Department of Chemistry majors. For example, the B.S. Major in Chemical Sciences could be used as a double major with any Biological Sciences major.

Programs

- Biochemistry, B.S. (http://catalog.marshall.edu/undergraduate/programs-az/science/chemistry/biochemistry-bs/)
- Chemical Sciences, B.S. (http://catalog.marshall.edu/undergraduate/programs-az/science/chemistry/chemical-sciences-bs/)
- Chemistry, B.S. ACS Certified (http://catalog.marshall.edu/undergraduate/programs-az/science/chemistry/chemistry-bs-acs-certified/)
- Chemistry, Minor (http://catalog.marshall.edu/undergraduate/programs-az/science/chemistry/chemistry-minor/)
- Environmental Chemistry, B.S. (http://catalog.marshall.edu/undergraduate/programs-az/science/chemistry/environmental-chemistry-bs/)
- Forensic Chemistry, B.S. (http://catalog.marshall.edu/undergraduate/programs-az/science/chemistry/forensic-chemistry-bs/)

Courses

- General Education Course

CHM 109 Chemistry in the Home **4 Credit hours**
An introduction to basic concepts of chemical science as it applies to materials commonly found within the household. Students will be expected to learn to evaluate potential hazards of such materials.
Pre-req: MTH 121 or MTH 121B or MTH 121H or MTH 125 or MTH 127 or MTH 130 or MTH 130H or MTH 131 or MTH 132 or MTH 140 or MTH 190 or MTH 203 or MTH 220 or STA 225 or MTH 225 or MTH 229 or MTH 229H.
Attributes: Core II Natural Sciences
Grade Mode: Normal Grading Mode

CHM 111 Foundations of Chemistry **3 Credit hours**
This course will introduce students to basic chemical facts and concepts. Topics will include units, dimensional analysis, nomenclature, solutions, atomic structure, and stoichiometry.
Pre-req: MTH 127 with a minimum grade of C or ACT Math with a score of 21 or SAT Mathematics Before Mar. 16 with a score of 500 or SAT MATH SECTION SCORE with a score of 530 or MTH 130 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 205 General, Organic, and Biochem **3 Credit hours**
Introductory course for health professions students and non-science majors covering basic chemical principles with applications in organic chemistry and biochemistry.
Grade Mode: Normal Grading Mode

CHM 211 Principles of Chemistry I **3 Credit hours**
A study of the properties of materials and their interactions with each other. Development of theories and applications of the principles of energetics, dynamics and structure. Intended primarily for science majors and preprofessional students. 3 lec.
Pre-req: (ACT Math with a score of 23 or SAT Mathematics Before Mar. 16 with a score of 540 or SAT MATH SECTION SCORE with a score of 570 or Placement Chemistry with a score of 211 or CHM 111 with a minimum grade of C) and CHM 217 (may be taken concurrently).
Concurrent PR: CHM 217
Attributes: Natural Sciences, Core II Natural Sciences
Grade Mode: Normal Grading Mode

CHM 212 Principles Chemistry II **3 Credit hours**
A continuation of chemistry 211 with emphasis on the inorganic chemistry of the representative elements and transition metals. 3 lec.
Pre-req: (CHM 211 with a minimum grade of C and (CHM 218 (may be taken concurrently) with a minimum grade of D or CHM 218H (may be taken concurrently) with a minimum grade of D).
Concurrent PR: CHM 218 or CHM 218H
Attributes: Natural Sciences, Core II Natural Sciences
Grade Mode: Normal Grading Mode

CHM 217 Principles of Chem Lab I **2 Credit hours**
A laboratory course that demonstrates the application of concepts introduced in Chemistry 211.
Pre-req: CHM 211 (may be taken concurrently).
Concurrent PR: CHM 211
Attributes: Natural Sciences, Core II Natural Sciences
Grade Mode: Normal Grading Mode

CHM 218 Principles of Chem Lab II **2 Credit hours**
A laboratory course that demonstrates the application of concepts introduced in Chemistry 212.
Pre-req: CHM 212 (may be taken concurrently).
Concurrent PR: CHM 212
Attributes: Natural Sciences, Core II Natural Sciences
Grade Mode: Normal Grading Mode

CHM 218H Prin Chem Honor Lab II **2 Credit hours**
An advanced laboratory class designed for Principles of Chemistry II students. This lab will introduce students to concepts and/or techniques important to later laboratory classes and research.
Pre-req: Admitted Honors College with a score of 1.
Co-req: CHM 212
Attributes: Honors, Natural Sciences
Grade Mode: Normal Grading Mode

CHM 280 Special Topics **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 281 Special Topics **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 282 Special Topics **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 283 Special Topics **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 291H Honors in Chemistry **1-4 Credit hours**
Independent study or undergraduate research project for outstanding students.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 305 Research Methods Chem **1 Credit hour**
A course concerning the searching and use of the chemical literature, ethical issues relating to the conduct of scientific research, proposal writing, scientific presentations, and proper scientific laboaratory conduct.
Pre-req: CHM 356 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 327 Intro Organic Chemistry **3 Credit hours**
A one semester introduction to organic chemistry emphasizing structure, nomenclature, and reactivity. (Cannot fulfill an upper division chemistry elective.)
Pre-req: CHM 212 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 331 Chemistry Seminar **0 Credit hours**
Students attend lectures presented by internal and external speakers to learn about the nature and variety of chemical research.
Attributes: Natural Sciences
Grade Mode: Credit/No Credit Grade Only

CHM 332 Chemistry Seminar **0 Credit hours**
Students attend lectures presented by internal and external speakers to learn about the nature and variety of chemical research.
Attributes: No Textbook Required, Natural Sciences
Grade Mode: Credit/No Credit Grade Only

CHM 345 Intro to Analytical Chem **4 Credit hours**
An introduction to basic techniques of analytical chemistry and data analysis through statistical procedures. Traditional wet and contemporary instrumental methods are covered with an emphasis on experimental care and craftsmanship.
Pre-req: CHM 212 with a minimum grade of C and (CHM 218 with a minimum grade of C or CHM 218H with a minimum grade of C).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 355 Organic Chemistry I **3 Credit hours**
A systematic study of organic chemistry including modern structural theory, spectroscopy, and stereochemistry; application of these topics to the study of reactions and their mechanisms and applications to synthesis. 3 lec. No individual may make more than 3 attempts at CHM 355 (i.e., any combination of three W, D, F or NC grades will preclude the individual from future registration).
Pre-req: CHM 212 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 356 Organic Chemistry II **3 Credit hours**
Continuation of Chemistry 355. 3 lec.
Pre-req: CHM 355 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 357 Physical Chemistry: Quantum **4 Credit hours**
A study of quantum mechanics applied to atomic structure, chemical bonding, and spectroscopy. 3 lec.-2 lab.
Pre-req: CHM 212 with a minimum grade of C and (MTH 229 with a minimum grade of C or MTH 229H with a minimum grade of C) and (PHY 211 with a minimum grade of C or PHY 201 with a minimum grade of C).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 358 Physical Chemistry: Thermo. **4 Credit hours**
A study of chemical thermodynamics, equilibrium, and kinetics. 3 lec.-2 lab.
Pre-req: CHM 212 with a minimum grade of C and (MTH 229 with a minimum grade of C or MTH 229H with a minimum grade of C) and (PHY 211 with a minimum grade of C or PHY 201 with a minimum grade of C).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 361 Intro Organic Chm Lab **3 Credit hours**
An introduction to of experimental organic chemistry with emphasis on fundamental techniques and their application to the preparation and identification of organic compounds. 6 lab.
Pre-req: CHM 356 (may be taken concurrently).
Concurrent PR: CHM 356
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 361H Intro Honors Organic Chem Lab **3 Credit hours**
This laboratory will introduce students to advanced concepts and techniques in organic synthesis and spectroscopy. It requires students to engage in an independent synthetic project from the chemical literature.
Pre-req: CHM 356 (may be taken concurrently) and Admitted Honors College with a score of 1.
Concurrent PR: CHM 356
Attributes: Honors
Grade Mode: Normal Grading Mode

CHM 365 Introductory Biochemistry **3 Credit hours**
A survey course including introduction to basic biochemical concepts, metabolic pathways, and bioenergetics. 3 lec.
Pre-req: CHM 327 with a minimum grade of C or CHM 356 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 366 Intro Biochemistry Lab **2 Credit hours**
Introduction to basic biochemical laboratory techniques including chromatography, electrophoresis, and enzyme kinetics; methods for identification and characterization of biochemical systems. 4 lab.
Pre-req: CHM 365 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 390H Honors in Chemistry **1-4 Credit hours**
Independent study or undergraduate research project for outstanding students.
Pre-req: Admitted Honors College with a score of 1.
Attributes: Honors, Natural Sciences
Grade Mode: Normal Grading Mode

CHM 391H Honors in Chemistry **1-4 Credit hours**
Independent study or undergraduate research project for outstanding students.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 401 Research for Undergrad **1-4 Credit hours**
Students engage in research project in collaboration with a faculty member.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 411 Modern Instrument Methods **4 Credit hours**
This course investigates the theory and functional aspects of modern analytical instrumentation. Emphasis is placed on the components of instruments and the applicability of various techniques to specific analytical problems.
Pre-req: CHM 356 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 423 Environ Analytical Chemistry **4 Credit hours**
Sampling and modern instrumental analysis of water, air and sediments according to EPA methodology. May be used to fulfill the American Chemical Society Environmental Chemistry certification. (PR: C or better in CHM 345).
Pre-req: CHM 345 with a minimum grade of C and CHM 307 or CHM 358.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 428 Intro Forensic Methods **3 Credit hours**
Introduction to crime scene investigation, physical evidence collection, serology and DNA technologies (PCR, RFLP). Discussion of statistical analysis of DNA and managing a DNA database, using CODIS as an example.
Pre-req: CHM 365 and (BSC 322 or BSC 324).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 431 Chemistry Seminar **0 Credit hours**
Students attend lectures presented by internal and external speakers to learn about the nature and variety of chemical research.
Attributes: Natural Sciences
Grade Mode: Credit/No Credit Grade Only

CHM 432 Chemistry Seminar **0 Credit hours**
Students attend lectures presented by internal and external speakers to learn about the nature and variety of chemical research. Students also present an oral and written presentation of their capstone experience.
Pre-req: CHM 490 or CHM 491.
Attributes: Natural Sciences
Grade Mode: Credit/No Credit Grade Only

CHM 443 Protein Biotechnology **3 Credit hours**
Discussion covers basics of protein structure and function, post-translational modification and transport simple immunology. Laboratories include protein quantitation, enzyme kinetics, protein purification and dialysis protein gel electrophoresis and staining.
Pre-req: BSC 120 with a minimum grade of D.
Grade Mode: Normal Grading Mode

CHM 448 Adv Inorganic Chemistry I **4 Credit hours**
Study of physical properties and periodic relationships of inorganic materials. 3 lec, 2 lab.
Pre-req: CHM 356 with a minimum grade of C and (CHM 357 with a minimum grade of C or CHM 358 with a minimum grade of C).
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 451 Biological Mass Spectrometry **4 Credit hours**
This course investigates the theory and applications of mass spectrometry. It includes a laboratory component in which you will learn to run the mass spectrometers and interpret mass spectral results.
Pre-req: CHM 356 with a minimum grade of C.
Grade Mode: Normal Grading Mode

CHM 465 Adv Organic Chemistry I **3 Credit hours**
Studies of the dynamics of organic reactions with emphasis on mechanisms and stereochemistry. 3 lec.
Pre-req: CHM 356 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 466 Adv Organic Chemistry II **3 Credit hours**
A continuation of Chemistry 465 with emphasis on synthetic methods. 3 lec.
Pre-req: CHM 356 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 467 Intermediate Biochemistry **3 Credit hours**
An intermediate level discussion of the biochemistry of mammalian cells.
Pre-req: CHM 365 with a minimum grade of C or BSC 365 with a minimum grade of C.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 478 Appl Microscopy in Research **4 Credit hours**
A combined lecture/lab/self-motivated research course that results in a microscopy based project to be presented by each student in a public forum (may augment capstone).
Grade Mode: Normal Grading Mode

CHM 480 Special Topics **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 481 Special Topics **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 482 Special Topics **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 483 Special Topics **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 485 Independent Study **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 486 Independent Study **1-4 Credit hours**
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

CHM 490 Internship **1-6 Credit hours**
Students engage in supervised chemical laboratory work in a professional setting.
Pre-req: CHM 305.
Attributes: Capstone Course, Natural Sciences
Grade Mode: Normal Grading Mode

CHM 491 Capstone Experience **2-4 Credit hours**
Students engage in a collaborative research project with a faculty member.
Pre-req: CHM 305.
Attributes: Capstone Course, Natural Sciences
Grade Mode: Normal Grading Mode

CHM 495H Honors in Chemistry **3-4 Credit hours**
Open only to chemistry majors of outstanding ability.
Attributes: Natural Sciences
Grade Mode: Normal Grading Mode

Faculty

Professors
Castellani, Cohenford, Day, Frost, Kolling, McCunn, Norton, Wang

Associate Professors
Jo. Markiewicz, Morgan, Price, Quiñones

Assistant Professor
Moteki, Kim

Term Faculty
Je. Markiewicz