

# Department of Chemistry and Biochemistry

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## Professional accreditation by American Chemical Society

**FACULTY** Professors Field (chair), Taylor, Cummings (emeritus), Glover (emeritus) K. Kolb (emeritus); Associate Professors Andersh, Bosma, Campbell, Flint, Gayhart, Helenek; Assistant Professors Fry, McQuade; Lecturers Kell, Moroz; Lab Coordinator Will.

The objectives of the chemistry department are: to develop a scientific attitude toward problem solving; to graduate well-qualified chemistry and biochemistry majors for immediate professional employment or entrance to graduate study in chemistry, biochemistry or allied fields; to graduate chemistry majors with background for entrance to professional schools, e.g. medicine or dentistry; to graduate students with a good knowledge of both chemistry and business or chemistry and computer.

To achieve these professional objectives, the Department of Chemistry offers six curricular programs leading to a bachelor's degree. The programs are:

1. **Chemistry-Professional** for students wishing to make a career in chemistry or allied fields.
2. **Chemistry-Biochemistry** for students wishing to prepare for a career in biochemistry or related areas.
3. **Chemistry-Premedical** for students who wish to make a career in chemistry with the ultimate goal of entering medical, dental, or veterinary school.
4. **Chemistry-Teaching** for students wishing to teach science in secondary schools.
5. **Chemistry-Business** for students wishing to combine chemistry with a basic knowledge of business.
6. **Chemistry-Computer** for students who wish to major in chemistry but also include courses in computer science.

For all students majoring in any chemistry program the general departmental requirements are: A minimum of 32 semester hours of chemistry, one year of college-level physics, and a year of calculus. A third semester of calculus is highly recommended. A grade of C or higher must be earned in CHM 110, 111, 116, 117, 250, and 351 before continuing on to the next course in this sequence.

Advanced placement students earning a 5 on the AP exam will receive credit for CHM 110, 111, and 112. Those

who earn a 4 on the AP exam will receive credit for CHM 110 and 111. Those who earn a score of 3 will receive credit for CHM 100.

## Chemistry-Professional

For those who elect this program the specific chemistry courses required are: CHM 110, 111, 116, 117, 191, 250, 320, 351, 360, 380, 392, 461, 462, 463, 480, 509, and 530. For those who desire certification, CHM 464, 510, 551, and 356 are required.

## Chemistry-Biochemistry

The required chemistry courses for the Biochemistry program are: CHM 110, 111, 116, 117, 191, 250, 320, 351, 362, 363, 366, 380, 392, 461, 463, 480, and 530. The required biology courses for this program are: BIO 123, 124, 224, and 365. Either BIO 224 or BIO 365 must be taken with laboratory (for 4 credit hours). One year of college-level physics is required. Two semesters of calculus are required. Four hours of electives, chosen from the following list, are also required: CHM 319, 367, 460, 462, 464, 491, 568, BIO 396, or PHY 345. The total number of required credit hours is 76.

## Chemistry-Premedical

This program is for the student who wishes to major in chemistry and prepare for entrance to medical, dental, or veterinary school. The required chemistry courses are: CHM 110, 111, 116, 117, 191, 250, 320, 351, 362, 363, 366, 380, 392, 461, and 480 plus 4 hours of chemistry electives, chosen from the following: CHM 319, 356, 367, 460, 463, 509, 530, and 551. The required biology courses for this program are BIO 123 and 124 plus seven hours of biology electives, chosen from the following: BIO 224, 323, 365, 381, 395, and 396.

## Professional Chemistry - Secondary Teaching

The required chemistry courses for this program are identical to those of professional chemistry. The appropriate certification courses as specified by the College of Education and Health Sciences are required.

## Chemistry-Business

This program is for the student who wishes to combine a background in both chemistry and business for the goal of immediate employment in technical or developmental chemistry or entrance to an MBA program. The required

chemistry courses are: CHM 110, 111, 116, 117, 191, 250, 315, 320, 345, 351, 360, 380, 392, 461, 463, 480, 530, and 550. The required business administration courses are: ATG 157, BMA 352, ECO 221 or ECO 100, FIN 322, MTG 315, and QM 262 plus 3 additional hours from the following list: ATG 158, BMA 342, ECO 222, or QM 263.

### Chemistry-Computer

This is a program designed for students who wish to combine a basic knowledge of chemistry and other sciences with courses in computer technology. The required chemistry courses are: CHM 110, 111, 116, 117, 191, 250, 320, 351, 392, 461, and 463 plus 9 additional hours of chemistry electives. Approved computer-related courses are required.

### Chemistry Minor

The minor in chemistry consists of CHM 110, 111, 116, 117, 250, 320, 351, 392, 461, and 463. One year of college-level physics and one semester of calculus are also required.

### Medical Technology

In cooperation with the Department of Biology, a degree program is offered in medical technology. See the listing under Medical Technology in this catalog for information.

### Course Descriptions

#### **CHM 100 Fundamentals of General Chemistry 3 hrs.** (Gen. Ed. FS)

Basic chemical concepts

#### **CHM 101 Fundamentals of General Chemistry Lab 1 hr.** Laboratory for CHM 100. Corequisite: CHM 100.

#### **CHM 110 General Chemistry I 3 hrs.** (Gen. Ed. FS)

Chemical principles and applications; For majors in chemistry, engineering, biological sciences, and other physical sciences. Prerequisites: high school chemistry or CHM 100.

#### **CHM 111 General Chemistry I Laboratory 1 hr.** Laboratory for CHM 110. Prerequisites: CHM 110 or concurrent enrollment.

#### **CHM 112 Engineering Chemistry 3 hrs.** (Gen. Ed. FS)

For students of engineering and related disciplines. Prerequisite: CHM 110 or equivalent.

#### **CHM 116 General Chemistry II 4 hrs.** Continuation of CHM 110. Required for students who are preparing for further study in chemistry. Prerequisite: CHM 110.

#### **CHM 117 General Chemistry II Laboratory 1 hr.** Laboratory for CHM 116. Prerequisites: CHM 110, 111; Corequisite: CHM 116.

#### **CHM 141 Introduction to Medical Technology 1 hr.** Profession and function of a medical technologist: job opportunities, current issues. Tour of a large hospital laboratory. Cross listed as BIO 141.

#### **CHM 150 Fundamentals of Organic-Biochemistry 3 hrs.** (Gen. Ed. FS)

Various organic compounds: synthesis, reactions, and uses; emphasis on those occurring in living organisms. Prerequisite: one semester of college chemistry or consent of department. Not open to students with credit in CHM 151 or 152.

#### **CHM 151 Fundamentals of Organic Chemistry 2 hrs.** (Gen. Ed. FS)

Synthesis, reactions, and uses of organic compounds utilized by man. Prerequisite: one semester of college chemistry or departmental approval. Not open to students with credit in CHM 150.

#### **CHM 152 Fundamentals of Biochemistry 2 hrs.** (Gen. Ed. FS)

Clinical chemistry and its health related applications. Prerequisite: CHM 151 or one semester of organic chemistry. Not open to students with credit in CHM 150.

#### **CHM 153 Organic - Biochemistry Laboratory 1 hr.**

Introduction to techniques of isolation, purification, synthesis, and identification of organic compounds with emphasis on biologically important compounds. Prerequisites: CHM 151 and 152 or concurrent enrollment.

#### **CHM 191 Computer Applications in Chemistry 1 hr.**

Introduction to computer software relevant to the discipline of chemistry. Prerequisites: CHM 100 or 161 or concurrent enrollment.

#### **CHM 250 Organic Chemistry 4 hrs.**

Aliphatic and aromatic compounds; emphasis on class reactions. Prerequisite: one year of college chemistry.

#### **CHM 299 Directed Studies in Chemistry 1-4 hrs.**

Studies undertaken by freshman or sophomore students under the guidance of staff members. Prerequisites: consent of instructor and Department Chair.

#### **CHM 300 Chemistry and Civilization 3 hrs.** (Gen. Ed. TS)

For non-science majors: broad survey of the science of chemistry and its overall effect on civilization. Prerequisites: junior standing; major other than science or engineering.

#### **CHM 306 Intermediate Analysis 3 hrs.**

Quantitative analytical procedures; basic instrumental techniques. Prerequisites: CHM 116, 117, 250.

#### **CHM 315 Environmental Chemistry 3 hrs.**

Chemical principles applied to environmental systems; water, air, soils, conventional and hazardous wastes, thermodynamic principles, acid/base and redox chemistry, interfacial chemistry, analytical techniques. Prerequisite: CHM 162 or 116, 117 or consent of instructor.

#### **CHM 319 Inorganic Chemistry 3 hrs.**

Preparation, properties, reactions, and uses of the elements and their compounds. Prerequisites: CHM 110, 111, 116, 117, 250.

- CHM 320 Analytical Chemistry** 4 hrs.  
Introduction to modern analytical chemistry involving classical gravimetric and volumetric procedures combined with modern instrumental techniques. Lecture and laboratory. Prerequisites: CHM 116, 117, 250.
- CHM 345 Materials Chemistry** 1 hr.  
Survey of topics in materials chemistry. Prerequisite: CHM 319 or consent of instructor.
- CHM 351 Organic Chemistry** 4 or 5 hrs.  
Emphasis on theoretical and instrumental aspects. Prerequisite: CHM 250.
- CHM 356 Organic Spectroscopy** 3 hrs.  
Characterization/identification of compounds using spectrometric methods.
- CHM 360 Biological Chemistry** 3 hrs.  
Introduction to biological macromolecules, enzymatic processes, bioenergetics, and metabolism. Prerequisites: CHM 351, CHM 320. Not open to students with credit in CHM 362 and CHM 366.
- CHM 362 Biochemistry I: Macromolecular Structure and Function** 3 hrs.  
Structure and function of biological macromolecules. Prerequisite: CHM 351, BIO 123, BIO 124.
- CHM 363 Biochemistry I Laboratory** 1 hr.  
Structure and function of biological macromolecules. Prerequisite: CHM 362 or concurrent enrollment.
- CHM 366 Biochemistry II: Metabolism** 3 hrs.  
Energetics, regulation, and integration of metabolic processes. Prerequisite: CHM 351, CHM 362 or consent of instructor.
- CHM 367 Biochemistry II Laboratory** 1 hr.  
Investigation of enzymes and metabolism. Prerequisite: CHM 363; CHM 366 or concurrent enrollment.
- CHM 380 Junior Seminar in Chemistry** 0 hrs.  
Weekly seminars presented by a variety of speakers pertaining to all aspects of Chemistry. Course may be repeated a maximum of three times. Pass/Fail. Prerequisites: Junior standing or consent of instructor.
- CHM 391 Medical Terminology** 1 hr.  
Terminology used in all areas of medical and paramedical specialties. Emphasis on word building, technique, and understanding of typical medical reports. Cross listed as NUR 391. Prerequisites: one year each of college biology and chemistry.
- CHM 392 Chemical Literature** 1 hr.  
Use of chemical literature. Prerequisite: CHM 250; CHM 351 or concurrent enrollment.
- CHM 460 Advanced Biochemistry** 3 hrs.  
Applications of organic, inorganic, and physical chemistry to biological systems. Prerequisite: CHM 366.
- CHM 461, 462 Physical Chemistry** 3 hrs. each  
Mathematical treatment of laws governing chemical and physical changes. Prerequisites: CHM 250, 320; one year each of college physics and calculus.
- CHM 463, 464 Physical Chemistry Laboratory** 1 hr. each  
Corequisite: CHM 461 or 462.
- CHM 480 Senior Seminar in Chemistry** 1 hr.  
Weekly seminars presented by a variety of speakers pertaining to all aspects of Chemistry. Each student will present a seminar under the supervision of a faculty member. Prerequisites: two semesters of CHM 380.
- CHM 491 Independent Studies in Chemistry** 1-3 hrs.  
Studies undertaken by well qualified advanced students under the guidance of staff members, with approval of the Department Chair. May be repeated for a maximum of 6 hrs. credit.
- CHM 500 Chemical Topics** 1-3 hrs.  
Topics of special interest which may vary each time course is offered. Topic stated in current Schedule of Classes. Prerequisites: CHM 351 and 461.
- CHM 509 Advanced Inorganic Chemistry** 3 hrs.  
Theoretical-descriptive approach to inorganic chemistry. Emphasis on dependence of selected chemical and physical characteristics of elements and compounds on extranuclear structure. Prerequisites: CHM 320, 461.
- CHM 510 Advanced Inorganic Chemistry Laboratory** 1 hr.  
Laboratory work in inorganic chemistry. Prerequisite: CHM 509 or concurrent enrollment.
- CHM 530 Advanced Analytical Chemistry** 4 hrs.  
Theory and applications of modern qualitative, quantitative, and instrumental methods. Prerequisites: CHM 320, 462.
- CHM 550 Industrial Organic Chemistry** 1 hr.  
Survey of modern industrial organic chemistry; emphasis on petroleum derivatives. Prerequisite: one year of organic chemistry.
- CHM 551 Advanced Organic Chemistry** 3 hrs.  
Organic reactions and reaction mechanisms. Prerequisite: CHM 351.
- CHM 556 Organic Spectroscopy** 3 hrs.  
Characterization/identification of compounds using spectrometric methods. Prerequisites: CHM 351 or equivalent. Not open to students with credit in CHM 356 or equivalent.
- CHM 568 Selected Topics in Biochemistry** 1-3 hrs.  
Content and credit will vary as indicated in current schedule of classes. May be repeated for up to eight credits, with no more than two credits counting towards the major. Prerequisite: CHM 366.