

Chemistry Course Descriptions

(Department of Chemistry and Biochemistry)

CHM 101. General Chemistry (4) Overview of the fundamental laws, principles and theories of chemistry; introduction to the techniques and equipment used in the chemical laboratory; interpretation of experimental results.

CHM 102. General Chemistry (4) Prerequisite: CHM 101. In depth study of the fundamental laws, principles and theories of chemistry. Introduction to techniques and equipment used in the chemical laboratory. Interpretation of experimental results.

CHM 105. Basic Concepts of Chemistry (3) Terminal, relatively non-mathematical course for the non-science major. Topics include atomic and molecular structure as a basis for a general understanding of chemical reactions, reaction dynamics, environmental problems, energy resources, food additives, and nuclear power. Three lecture hours each week. May not be taken for credit after earning credit for CHM 102.

CHM 211-212. Organic Chemistry (3-3) Prerequisite: CHM 102 and CHML 102. Introduction to the chemistry of carbon compounds, including structural theory, synthesis, and reaction mechanisms. Normally taken concurrently with CHML 211-212.

CHML 211-212. Organic Chemistry Laboratory (1,1) Prerequisite or corequisite: CHM 211-212. Three laboratory hours each week.

CHM 235. Quantitative Analysis (2) Prerequisite: CHM 101 and CHM 102. Date analysis and statistical methods; chemical equilibrium and analytical applications; volumetric analysis and spectrophotometry; acid-base chemistry; activities and other topics as time permits. Normally taken concurrently with CHML 235.

CHML 235. Quantitative Analysis Laboratory (2) Prerequisite or corequisite: CHM 235. Four laboratory hours each week.

CHM 250. Introduction to Chemical Research (1) Prerequisite: CHM 102. Introduction to chemical investigation, including use of the chemical literature, experimental design, proposal preparation and communication of findings. One hour each week.

CHM 291. Introductory Research (1-3) Prerequisite: Freshman or sophomore standing, and consent of instructor and department chair. Laboratory and computational research under faculty supervision beyond what is offered in existing courses. May be repeated up to a limit of 3 credit hours.

CHM 312. Advanced Techniques of Organic Chemistry (2) Prerequisite: CHM 212. Theory and practice of chromatographic methods of separation and spectroscopic methods of identification. Normally taken concurrently with CHML 312.

CHML 312. Advanced Techniques of Organic Chemistry Laboratory (2) Prerequisite or corequisite: CHM 312. Four laboratory hours each week.

CHM 321. Fundamentals of Physical Chemistry (4) Prerequisite: CHM 102, PHY 201, and MAT 161. An overview of topics in physical chemistry stressing fundamental concepts in thermodynamics and kinetics.

CHML 321. Physical Chemistry Laboratory (1) Prerequisite or corequisite: CHM 321. Three laboratory hours each week.

CHM 365. Biochemistry I (3) Prerequisite: BIO 201, CHM 212 and 321. The structures of macromolecules, amino acids and vitamins, and the chemical principles governing their actions. Solution properties of macromolecules, enzyme kinetics and mechanisms, and metabolic regulation, emphasizing organic/physical chemistry. Basics of nucleic acids and biological transfer information.

CHM 377. Environmental Chemistry (3) Prerequisite: CHM 102. Introduction to the chemistry of air, soil, and natural waters. Processes of environmental degradation, cleanup, and pollution prevention. Selected current topics.

CHML 377. Environmental Chemistry Laboratory (1) Corequisite: CHM 377. Laboratory analysis of environmental samples, including applications of standard EPA methods. Three laboratory hours each week.

CHM 380. Forensic Chemistry (4) Prerequisite: CHM 211, CHML 211, CHM 235, CHML 235. Theory and applications of trace organics and metals analyses, fiber and polymer analyses, toxicology, serology, drug and DNA chemistry, fingerprinting techniques and chain of custody procedures. Three lecture and three laboratory hours per week.

CHM 415. Physical Organic Chemistry (3) Prerequisite: CHM 212. Prerequisite or Corequisite: CHM 321 or permission of instructor. Theoretical and physical organic chemistry, including chemical bonding, stereochemistry and conformational analysis with applications to selected reaction mechanisms.

CHM 417. (517) Medicinal Chemistry (3) Prerequisite: CHM 212 and one of either CHM 365 or BIO 465. Study of the various principles involved in, and the multidisciplinary nature of, modern drug design. The course will focus on the chemical and biological principles that are fundamental to "medicinal chemistry" and upon the understanding of how and why certain chemicals interact at biological targets.

CHM 420. Quantum Mechanics (3) Prerequisite: CHM 321. The study of quantum mechanics, including the quantum mechanical description of chemical bonding, molecular orbital theory, and the quantum mechanical basis of microwave, IR and UV spectroscopies.

CHML 420. Physical Chemistry Laboratory II (1) Prerequisite or corequisite: CHM 420. Three laboratory hours each week.

CHM 425. (525) Computational Chemistry (3) Prerequisite: CHM 321. Theory and practice of computational chemistry; including molecular mechanics, semi-empirical and ab initio molecular orbital theory, density functional theory, and molecular dynamics. Two lecture and two computer lab hours each week.

CHM 435. Analytical Chemistry (4) Prerequisite: CHM 235, CHML 235, CHM 312, CHML 312, CHM 321, and CHML 321. Theory and experimental applications of modern analytical instrumentation and techniques. Includes a laboratory that will meet for four hours each week.

CHM 445. Inorganic Chemistry (3) Prerequisite: CHM 321. Study of periodic relationships: crystal lattice theory; transition metals and ions; crystal field theory; organometallic structures and reactions; and reaction mechanisms.

CHML 445. Inorganic Synthesis (1) Prerequisite or corequisite: CHM 445. Synthesis and techniques in inorganic chemistry. Normally taken concurrently with CHM 445. Three laboratory hours each week.

CHM 466. (566) Biochemistry II (3) Prerequisite: CHM 365. Bio energetics, structure and function of biomembranes, biosynthesis, and degradation of fatty acids, amino acids, and nucleotides, integration of metabolism, signal transduction, and the action of hormones. Structure and enzymology of DNA and RNA, genetic information, protein biosynthesis, and gene regulation.

CHM 467. (567) Biochemical Techniques and Instrumentation (2) Prerequisite: CHM 365. Theory and practice of advanced biochemical techniques. Topics may include protein assays, protein purification, electrophoresis, enzyme kinetics, HPLC of proteins, buffers and pH, DNA isolation, and molecular visualization and modeling. Four hours each week.

CHM 475. Introduction to Chemical Oceanography (3) Prerequisite: CHM 235 and CHML 235 or GLY 350 or permission of instructor. Introduction to marine chemistry, including discussion of sources, distribution, forms of occurrence of chemical species in seawater; biological productivity; organic carbon; air-sea interactions; carbon dioxide system; sediments; estuarine chemistry; other relevant topics as time permits.

CHM 478. (578) Marine Ecotoxicology (3) Prerequisite: CHM 212. Topics in marine ecotoxicology, assessing the impact of anthropogenic substances on the marine environment. Performance of hazard risk assessments on regional aquatic ecosystems. Courses include two lectures and one three-hour laboratory per week.

CHM 485. (585) Industrial and Polymer Chemistry (3) Prerequisites: CHM 321 and 211-212. Properties, synthesis, and reactions of major industrial chemicals; synthetic plastics; soaps and detergents; petrochemicals; paints and pigments; dyes; pharmaceutical and nuclear industries; mechanism of polymerization; copolymerization; physical and chemical properties of polymers; polymer characterization; advances in polymer technology.

CHM 486. (586) Fundamentals of Heterocycles with Emphasis on Pharmaceuticals Prerequisites: 2 semesters of organic chemistry. Well over half of all known organic compounds and most pharmaceuticals are heterocycles (containing an atom other than C in the ring), yet their chemistry is hardly touched on in conventional courses. Topics include the nomenclature, properties, synthesis, and pharmaceutical applications of heterocycles.

CHM 490. (590) Special Topics in Chemistry (1-3) Prerequisite: Junior or senior standing and consent of instructor. Selected topics in chemistry that are beyond the scope of regular course offerings. May be repeated once under a different subtitle.

CHM 491. Directed Individual Study (1-3) Prerequisite: Overall GPA of at least 2.00, junior or senior standing, and consent of instructor, department chair and dean. Involves investigation under faculty supervision beyond what is offered in existing courses. For further information, consult the Directed Individual Studies section in this catalogue.

CHM 495. Senior Seminar (1) Prerequisite: 25 semester hours of chemistry courses. Discussion of selected topics. One hour each week.

CHM 498. Internship in Chemistry (3-12) Prerequisite: CHM 212, CHML 212, CHM 235 and CHML 235; junior or senior standing in chemistry; consent of instructor; and GPA of at least 2.80 in chemistry. Practical field experience and academic training related to the student's principal area of interest through a program of work and study within a business or agency. Student is supervised and evaluated jointly by a chemistry faculty member and an on-site supervisor. (Only three hours may count toward a major in chemistry.)

CHM 499. Honors work in Chemistry (2-3) Prerequisite: Second semester junior or senior standing. Independent study for honors students.

For 292 and 492; 294 and 494, see explanations on p. 184, 107.