CHEMISTRY

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Courses are offered by the department to meet the needs of those majoring in chemistry or allied sciences by rigorous training in the principles and appli-cations of modern chemistry. The department also aims to meet the needs of general education students who wish to learn and appreciate the atomic-molecular conception of matter as a background for understanding the scientific issues of importance to all in the modern world.

The department of chemistry is accredited by the American Chemical Society as offering a program of study which will lead to individual certifica-tion, upon graduation, by that society. Such a course of study will equip the chemistry major to (1) meet the entrance requirements for further study in chemistry graduate programs or medical or dental schools; or (2) enter governmental or industrial laboratories as a chemist. A major in chemistry can also lead to a wide variety of other occupations ranging from forensic laboratory science to chemical patent law to business management or to teaching.

The department, through the use of cooperative programs, grant funds, gifts, and its own funds, is constantly acquiring new instrumentation and expanding its library holdings to ensure a modern program in chemistry. All instrumentation and library materials are available for the direct use by the undergraduate student. Recent acquisitions include an FT-NMR, a scanning electron microscope, a GC-MS, and a HPLC. Students are encouraged to put their classroom learning into practice by participating in research programs directed by members of the department. Other opportunities for learning outside the classroom are provided by the internship program and by seminars conducted by prominent scientists from academic, governmental and industrial laboratories.

Additional information about the Chemistry Department can be found on our website: http://titan.iwu.edu/~chem/

Major Sequence:

The regular chemistry major consists of the following courses:

1) chemistry 201, 202, 311, 312
2) chemistry 301, 304, 321, 322, 332, and 380
3) one course unit selected from chemistry 323, 413, 414, 415, 432, or 470

Those students desiring certification by the American Chemical Society must take the following courses:

1) chemistry 201, 202, 311, 312
2) chemistry 301, 304, 321, 322, 332, 380, and 414
3) one unit of chemistry 499
4) one of the following courses: chemistry 323, 413, 415, 432 or 470.

Courses outside the department that majors are required to take include:

1) mathematics 156 or 162 or 166 or proficiency
2) physics 101 and 102 or physics 105, 106 and 207.

Courses outside the department that majors are expected to take include: biology 101 and 102 or biology 107 and 108.

Chemistry Minor Sequence:

The chemistry minor consists of the following courses:

1) chemistry 201, 202, 311, 312,
2) one of the following courses: chemistry 301 or 321
3) two of the following courses: chemistry 322, 323, 413, 414, 415, 432, or 470

Biochemistry Minor Sequence:

There are two ways in which one can complete the biochemistry minor. Since courses cannot be double counted for a major and a minor, the two tracks are designed so that either biology or chemistry majors could obtain a biochemistry minor.

Track 1: (Excludes chemistry majors)

1) chemistry 311 and 312
2) chemistry/biology 414 and chemistry 415
3) one of the following courses: biology 314, 330, or 412

Track 2: (Excludes biology majors)

1) biology 101 and 102 or Biology 107 and108
2) chemistry/biology 414 and chemistry 415
3) one of the following: biology 314, 330, or 412

Special Notes: Students will not receive credit toward a chemistry major, minor or biochemistry minor for the following courses: Chemistry 104, 110, 130, 140 and 150.

104 Inside Chemistry (1.25) (PSL) Basic aspects of structural chemistry and interaction of chemical and biochemical knowledge with society, emphasizing consumer chemistry. Offered occasionally.

110 Basic Chemistry (1.25) (PSL) Basic aspects of structural chemistry with emphasis on physiological applications. Offered each fall.

130 Chemistry of the Environment (1.25) (PSL) See Environmental Studies 130. A survey of chemistry principles with an emphasis on the application of these principles to environmental topics such as air and water pollution, global warming, and energy. Laboratory experiments may involve analysis of water from local stream and lakes and the analysis of vegetables for pesticide residue. Can be used toward the Environmental Studies minor. Offered occasionally.

135 Water Quality (PSL) See Environmental Studies 135. A May Term investigation of water quality, with a double focus: (1) laboratory and field environmental work to describe local issues of water quality (drinking water, lakes, and rivers), focusing on the chemical analysis of water; and (2) study of global water quality issues and science, including uses, sources, shortages, and politics. Offered occasionally. Offered in May Term.

140 Chemistry in the Kitchen (PSI) An introduction to the basic chemical concepts through an examination of food. The course examines the constitution of raw foodstuffs, and what happens on a molecular level as these substances are combined, cooked and metabolized. Offered occasionally.

150 Molecular Architecture 1.25 (PSL) Introduction to the basic chemical principles emphasizing structure and reactivity. We will study how chemists determine the structure of molecules using a variety of instrumental techniques and discuss the role of structure in chemical behavior. The course will focus primarily on common organic molecules (e.g., drugs, pesticides, biomolecules, etc.). Offered occasionally.

201, 202 General Chemistry (1.25) (201 - PSL) Fundamental principles and concepts of chemistry. Prerequisites: 201 for 202. 201 offered each fall; 202 offered each spring.

301 Quantitative Analysis (1.25) Introduction to modern analytical chemistry with emphasis on ionic equilibria. Prerequisite: 202. Offered each fall.

304 Instrumental Analysis Principles of the design and use of modern electronic instrumentation in the chemistry laboratory with emphasis on spectral, electroanalytical and chromatographic instrumentation. Prerequisites: 301 and 321or consent of instructor. Corequisites: 322 and 380 or consent of instructor. Offered each spring.

311, 312 Organic Chemistry (1.25) (311 - PSL) Fundamentals of aliphatic and aromatic chemistry including mechanisms, syntheses, stereochemistry, and spectroscopy. Prerequisites: 202; 311 for 312. 311 offered each fall; 312 offered each spring.

317 Survey of Biochemistry (cross listed as Bio 317) An introduction to the fundamental principles of biochemistry and the application of chemical principles to biological problems. Topics include the structure and function of proteins, nucleic acids, carbohydrates, lipids as well as the major catabolic and biosynthetic pathways. Pre-requisite: Biology 102 and Chemistry 312 or the consent of the instructor. Offered each spring.

321 Physical Chemistry I: Thermodynamics (1.25) Classical thermodynamics and its applications in chemistry. Prerequisites: 202, physics 102 or 106; math 156, 162 or 166; or consent of instructor. Offered each fall.

322 Physical Chemistry II: Kinetics Kinetic molecular theory, mass transport, experimental and theoretical chemical kinetics. Prerequisites: 202, physics 102 or 106, math 156, 162, or 166. Corequisite: enrollment in 304 and 380. Or consent of instructor. Offered each spring.

323 Physical Chemistry III: Quantum Mechanics See physics 407.

330 Topics in Environmental Chemistry and Toxicology See Environmental Studies 330. Application of chemistry and biology fundamentals to the study of fate and behavior of chemicals in the environment. This course will consider natural chemical processes, reactivity and transport of pollutant chemicals, and exposure and toxicology of potentially toxic pollutants to humans and the biosphere. Prerequisites: Chemistry 311 and Biology 102, or consent of instructor. Offered in spring.

332 Inorganic Chemistry An introduction to the fundamentals of inorganic chemistry including atomic structure; metallic, ionic, and covalent substances; acids and bases; coordination compounds; and descriptive chemistry of the elements. Students will use electronic structure, modern bonding theories, and models (tangible, virtual, and theoretical) to systematically understand the physical and chemical properties of inorganic substances. Prerequisite: 311 or consent of instructor. Offered each spring.

380 Advanced Inorganic Synthesis and Analysis (1.0) (W) Individualized projects which emphasize techniques of advanced inorganic synthesis and instrumental analysis. Prerequisites: 301 and 321. Corequisites: 304 and 322. Offered each spring.

397 Internship in Chemistry Internships in scientific research centers or industrial laboratories. Prerequisites: sophomore status and consent of the department chair. This course does not meet major requirements. Internship offered for 0.5 or 1.0 course units. Offered occasionally.

413 Advanced Organic Chemistry A detailed examination of selected classical and modern topics within organic chemistry. Topics may include pericyclic reactions, spectroscopic methods of structure determination, physical-organic chemistry, synthetic transformations and strategy, and bio-organic/medicinal chemistry. Prerequisites: 312 and 321, or consent of instructor. Offered each spring.

414 Biochemistry I(1.25) (cross listed as Bio 414) The fundamentals of bio-chemistry, including an exploration of biomolecules and an introduction to experimental techniques. An emphasis is placed on understanding the structure and function of proteins, enzyme kinetics and regulation, nucleic acid chemistry, and bioenergetics. Primary literature will be used to explore topics in depth. One four-hour lab per week is required. The laboratory component will emphasize the use of molecular biology and spectroscopic techniques. Prerequisite: 312 or the consent of the instructor. Offered each fall.

415 Biochemistry II A continuation of Chemistry 414. Topics include the major catabolic and anabolic pathways, the integration and regulation of these pathways, cell signaling and biochemical genetics. The majority of the readings for this course will come from the current primary literature. Prerequisite: Chemistry 414 or the consent of the instructor. Offered each spring.

432 Advanced Inorganic Chemistry A detailed examination of advanced topics in inorganic chemistry. Topics will include the quantum atom and electronic states; the application of molecular symmetry and group theory to spectroscopy and X-ray crystallography; the mechanisms of inorganic reactions; bioinorganic chemistry; and catalysis. Prerequisites: 301 and 321 and 332 or consent of the instructor. Offered each fall.

470 Special Topics in Chemistry Designed to offer topics not normally covered by the chemistry curriculum. May be used to meet major requirements. May be repeated for credit if subject matter is different. Prerequisite: 322 or consent of instructor. Offered occasionally.

495 Directed Study Individualized directed readings on a topic of interest to the student which is not normally a part of the curriculum. The work may include a labora-tory component. It may also include the requirement for the preparation of a significant paper which brings together the results of the study. Offered for 0.5 or 1.0 course unit. Prerequisite: consent of instructor. Offered each semester.

499 Research/Thesis (W) Directed or independent study of a specialized topic which may include laboratory research. May be repeated for a maximum of two course units. Offered for .5 or 1.0 course units. Prerequisites: junior standing, four previous course units in chemistry, and consent of instructor. Offered each semester.