

# CHEMISTRY (CHEMSTRY)

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## **CHEMSTRY 1010 Introduction to College Life for Chemistry Majors 1 Credit**

This course is designed to provide a student with some of the academic and social skills that are necessary to successfully complete their academic career specially in the area of Chemistry. Topics include important study skills necessary to maintain success in college-level study, student rights responsibilities, campus diversity issues, academic policies, academic advising and registration, time management, and campus and Chemistry Departmental resources for students.

**Components:** Discussion, Class

**GE:** Entry Level requirement

## **CHEMSTRY 1020 Introductory Chemistry 2 Credits**

A one semester course for students who do not have a sufficiently strong chemistry background to succeed in Chemistry 1450. Topics will include measurements, atomic and molecular structure, periodicity, stoichiometry, states of matter, intermolecular forces, and solutions.

**Components:** Discussion, Class

**Prereqs/Coreqs:** P. math placement score of 15 or higher

## **CHEMSTRY 1050 Survey of General Chemistry 5 Credits**

A one-semester survey of chemistry including organic and inorganic compounds. A course to partially satisfy the laboratory science requirement, and for students who need only one semester of chemistry for their major.

**Components:** Discussion, Class, Laboratory

**GE:** Natural Science

## **CHEMSTRY 1110 Introduction to Chemistry Research 1 Credit**

Through a series of faculty presentations and informal receptions, students will learn about research projects that are currently being conducted on our campus by UWP chemistry faculty. Students will also learn how best to approach an undergraduate research experience: strategies for seeking a faculty mentor, how to negotiate the research process itself, the role that ethics play in science, and so on. Students will also carry out critical analyses of research papers, draft proposals, and attend workshops. As second-semester freshmen, they will receive timely advice on how best to organize their activities in order to complete their degrees on schedule, with the most successful learning outcomes.

**Components:** Discussion, Class

## **CHEMSTRY 1140 General Chemistry I 4 Credits**

First semester of a two-semester sequence. Basic theory and concepts; atomic structure, periodic laws, stoichiometry, gas laws, thermochemistry, solutions, the chemical bond, oxidation-reduction.

**Components:** Laboratory, Class

**GE:** Natural Science

**Prereqs/Coreqs:** P. a "C-" or better MATH 1530 or MATH 1920 (formerly 1630) or MATH 1730 or MATH 1830 or math proficiency level of 20 or higher

## **CHEMSTRY 1150 General Chemistry I with Math Development 5 Credits**

Basic theory and concepts of Chemistry with additional focus on mathematical and analytical techniques. Investigates atomic structure, periodic laws, stoichiometry, gas laws, thermochemistry, solutions, chemical bonding, oxidation-reduction. Additional emphasis on algebraic and graphing methods for scientists.

**Components:** Class, Laboratory

**GE:** Natural Science

**Prereqs/Coreqs:** P. Previous completion with a 'C-' or better in Math 1530 or concurrent enrollment in MATH 1530 or math proficiency level of 15 or higher

## **CHEMSTRY 1240 General Chemistry II 4 Credits**

Second semester of a two-semester sequence. Kinetics, chemical equilibrium, electrochemistry, thermodynamics, organic, descriptive and nuclear chemistry.

**Components:** Laboratory, Class

**GE:** Natural Science

**Prereqs/Coreqs:** P. 'C-' or better in CHEMSTRY 1140 or 'C-' or better in CHEMSTRY 1450 or ('C-' or better in CHEMSTRY 1150 and 'C-' or better in MATH 1530)

**CHEMISTRY 1450 Chemistry for Engineers 5 Credits**

A one semester course for engineering students with a strong background in high school chemistry and mathematics. Topics include measurements, atomic theory, stoichiometry, molecular structure, thermochemistry, states of matter, intermolecular forces, solutions, kinetics, equilibrium, thermodynamics, electrochemistry, solid state, material science and organic chemistry.

**Components:** Class, Laboratory

**GE:** Natural Science

**Prereqs/Coreqs:** P. an "A" or B" in high school chemistry or a "C" or better in CHEMISTRY 1020 and previous completion or concurrent enrollment in MATH 2530 or higher

**CHEMISTRY 2000 Undergraduate Research 1-3 Credits**

Training in research methods, use of scientific literature and evaluation of data. A student may register for one to three credits in a given semester.

**Components:** Independent Study

**Prereqs/Coreqs:** P. a "C-" or better in one semester of general chemistry

**CHEMISTRY 2150 Quantitative Analysis 4 Credits**

Theories and principles of gravimetric and volumetric analysis, equilibrium and stoichiometry of solubility, neutralization, oxidation-reduction, complexometry; introduction to absorption spectrophotometry, flame photometry, ion exchange, and statistical treatment of data.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 1240

**CHEMISTRY 2730 Inorganic Chemistry 4 Credits**

An introductory course with an emphasis on coordination chemistry, solid state chemistry, descriptive chemistry of the common representative and transition elements, metallurgy.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 1240

**CHEMISTRY 3110 Environmental Chemistry Lab 1 Credit**

Laboratory complementary to CHEM 3130 in which students gain experience in the laboratory techniques and methods associated with structure, composition, and chemical reactions of the three spheres of the environment.

**Components:** Laboratory

**Prereqs/Coreqs:** P. CHEMISTRY 3130 or concurrent enrollment

**CHEMISTRY 3130 Environmental Chemistry 3 Credits**

A study of structure, composition, and chemical reactions of the three major spheres of the environment: atmosphere, hydrosphere, and lithosphere. Additional inquiries into the human impact on the environment and environmental toxicology are also addressed.

**Components:** Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 1240 or CHEMISTRY 1450

**CHEMISTRY 3270 Forensic Chemistry 2 Credits**

An in-depth examination of forensic applications of chemical analysis: presumptive and confirmatory drug identification, microscopic techniques in trace evidence analysis, quality assurance, quality control (QA-QC) issues for the crime lab analyst, the toxicology of illicit compounds, and modern methods of DNA analysis related to criminalistics.

**Components:** Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 2150 and CHEMISTRY 3540

**CHEMISTRY 3510 Organic Chemistry I Lab 1 Credit**

Laboratory complementary to CHEMISTRY 3540 which involves an introduction to basic organic laboratory techniques including gas chromatography and infrared spectroscopy.

**Components:** Laboratory

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 3540 or concurrent enrollment in CHEMISTRY 3540

**CHEMISTRY 3520 Organic Chemistry Lab Bootcamp 2 Credits**

This course provides the synthetic organic chemistry laboratory experience needed for chemistry and science majors, and pre-professional majors in medicine, dentistry, pharmacy, and chiropractic. This accelerated schedule includes 85 hours of instruction and lab over a two-week period of time. The goal is to provide a laboratory experience for students who are taking organic chemistry lecture at small campuses via distance education but who do not have access to laboratory instruction. The course will also serve other students who have been unable to complete organic chemistry laboratory. CHEMISTRY 3520 includes reactions and techniques typically covered in both semesters of organic chemistry lecture. Students enrolled in CHEMISTRY 3520 are expected to demonstrate understanding of all reactions and techniques covered in the laboratory.

**Components:** Laboratory

**Prereqs/Coreqs:** P. a 'C' or better in Chemistry 3540

**CHEMSTRY 3540 Organic Chemistry I 4 Credits**

An introduction to organic chemistry including a study of aliphatic and aromatic compounds and the functional groups, fundamentals of organic structural theory, chemical bonding, nomenclature, stereochemistry, infrared spectroscopy, structure/property relationships and analysis, as well as proteins, carbohydrates, and other natural compounds.

**Components:** Class

**Prereqs/Coreqs:** P: a "C-" or better in CHEMSTRY 1240 or "B-" or better in CHEMSTRY 1450

**CHEMSTRY 3610 Organic Chemistry II Lab 1 Credit**

Continuation of CHEMSTRY 3510. Complementary to CHEMSTRY 3630 involving preparations of greater difficulty and an introduction to organic qualitative analysis.

**Components:** Laboratory

**Prereqs/Coreqs:** P: a "C-" or better in CHEMSTRY 3510 and a "C-" or better in CHEMSTRY 3630 or concurrent enrollment in CHEMSTRY 3630

**CHEMSTRY 3630 Organic Chemistry II 3 Credits**

A second semester of organic chemistry providing an in-depth study of the preparation, reactions, and analysis of the functional groups with an emphasis on mechanisms, structure/property relationships, multistep synthesis, nuclear and mass spectrometry, and pericyclic reactions.

**Components:** Class

**Prereqs/Coreqs:** P: a "C-" or better in CHEMSTRY 3540

**CHEMSTRY 3810 Chemical Synthesis and Characterization 1 Credit**

For students desiring additional laboratory experience. In cooperation with the instructor, students will select experiments which require insights into the application and execution of more sophisticated techniques.

**Components:** Laboratory

**Prereqs/Coreqs:** P or C: CHEMSTRY 3610

**CHEMSTRY 3900 Directed Studies 1-3 Credits**

Supervised individual study of a topic selected by the student and approved by the staff. A student may register for one to three credits in a given semester and may accumulate a total of four credits.

**Components:** Independent Study

**Prereqs/Coreqs:** P: 12 credits of chemistry

**CHEMSTRY 4000 Undergraduate Research 1-3 Credits**

Training in research methods, use of scientific literature and evaluation of data; results presented in a written report. A student may register for one to three credits in a given semester and may accumulate a total of four credits.

**Components:** Independent Study

**Prereqs/Coreqs:** P: 18 credits in chemistry and department consent

**CHEMSTRY 4060 Chemistry Seminar 1 Credit**

This course will develop student's abilities to present scientific findings in both seminar and poster format.

**Components:** Seminar

**Prereqs/Coreqs:** P: satisfied speech general education requirement and a chemistry major

**CHEMSTRY 4110 Physical Chemistry Lab I 1 Credit**

Experimental studies applying theoretical principles to practical problems and processes involving chemical and physical phenomena. Fundamentals of chemical measurement using chemical and physical sensors.

**Components:** Laboratory

**Prereqs/Coreqs:** P: a "C-" or better in CHEMSTRY 2150; C: "C-" or better in CHEMSTRY 4130

**CHEMSTRY 4130 Physical Chemistry 3 Credits**

Atomic structure, thermodynamics and quantum mechanics, molecular structure, spectroscopy, intermolecular interactions, macromolecules, structure of liquids and solids.

**Components:** Class

**Prereqs/Coreqs:** P: a "C-" or better in PHYSICS 1450 or PHYSICS 2340, and MATH 2640

**CHEMSTRY 4210 Physical Chemistry Lab II 1 Credit**

Advanced experimental studies applying theoretical principles to chemical and physical phenomena.

**Components:** Laboratory

**Prereqs/Coreqs:** P: a "C-" or better in CHEMSTRY 4110; P or C: CHEMSTRY 4230

**CHEMISTRY 4230 Physical Chemistry 3 Credits**

Statistical and quantum mechanics, transport processes, thermodynamics, spectroscopy, solutions, phase transitions, and kinetics.

**Components:** Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 4130 and MATH 2840

**CHEMISTRY 4240 Instrumental Analysis 4 Credits**

Theory and laboratory experience in instrumental methods of analysis; common electrochemical and spectrochemical methods, chromatographic methods, electronics and other selected topics.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. a "C-" or better in both CHEMISTRY 2150 and CHEMISTRY 4130

**CHEMISTRY 4320 Polymer and Supramolecular Chemistry 2 Credits**

An introduction to the preparation, characterization, and physical properties of macromolecular and supramolecular materials: synthetic polymers, biological macromolecules, metal/covalent-organic frameworks, selected supramolecular assemblies. Relationship of physical properties to structure and composition with material applications.

**Components:** Class

**Prereqs/Coreqs:** P. "C-" or better in CHEMISTRY 3540 and CHEMISTRY 4130

**CHEMISTRY 4610 General Biochemistry Lab 1 Credit**

Chemistry of biological compounds and biochemical techniques.

**Components:** Laboratory

**Prereqs/Coreqs:** C. CHEMISTRY 4630 or concurrent enrollment

**CHEMISTRY 4630 General Biochemistry 3 Credits**

Introduction to the chemistry of proteins, carbohydrates, lipids, and nucleic acids in biological systems including the basics of metabolism and enzyme kinetics.

**Components:** Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 3540

**CHEMISTRY 4660 Cooperative Field Experience 1-8 Credits**

Enhancement of the educational experience through placement of a student with a cooperative agency, business, industry or institution. The nature of the assignment, type of experience, number of credits and evaluation procedure to be stipulated in a statement of agreement (learning contract) between the student and the department.

**Components:** Field Studies

**CHEMISTRY 4680 Criminalistics Emphasis Internship 2 Credits**

This 8-credit course involves working 360 hours with an accredited crime laboratory. The course is designed for the student to integrate the fundamental theory from the first three years of the Criminalistics Emphasis curriculum with the opportunity to work as an intern in a fully functioning crime laboratory as a bench scientist. Students will likely conduct research and development work during their time in the laboratory and are required to complete weekly reports, assignments, and presentations related to the experience.

**Components:** Field Studies

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 2150 and CHEMISTRY 3630

**CHEMISTRY 4730 Advanced Topics in Inorganic Chemistry 2 Credits**

A survey of the theories of atomic and molecular structure and chemical bonding; advanced descriptive studies of the common elements.

**Components:** Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 2730 and CHEMISTRY 4130

**CHEMISTRY 4810 Advanced Topics in Organic Chemistry 2 Credits**

Selected topics from among recent advances in mechanisms, structure-reactivity correlations, stereochemistry and conformational analysis, resonance and molecular orbital theory, spectra, natural products, heterocyclic systems and synthesis.

**Components:** Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 3630 and CHEMISTRY 3610 and C: CHEMISTRY 4230

**CHEMISTRY 4830 Biochemistry Topics 3 Credits**

An in-depth study of metabolism and regulation and enzyme mechanisms as well as cell communication, transport mechanisms, and immunology, gene expression, and regulation.

**Components:** Class

**Prereqs/Coreqs:** P. a "C-" or better in CHEMISTRY 4630

**CHEMSTRY 4910 Advanced Biochemistry Laboratory 1 Credit**

Advanced experimental studies applying theoretical principles discussed in CHEMSTRY 4830 including protein binding, protein characterization, gene expression and gene regulation.

**Components:** Laboratory