

CHEMISTRY (CHEM)

Chemistry Graduate Courses

CHEM 8040 SEMINAR IN TEACHING ADVANCED PLACEMENT CHEMISTRY (2 credits)

This course provides an introduction to the Advanced Placement high-school chemistry course and includes instruction on content and methods specific to teaching an Advanced Placement chemistry course. Emphasis will be placed on subject content and adaptations of college-level laboratory experiments to the high-school level.

Prerequisite(s): Concurrent enrollment in the Advanced Placement Chemistry Institute at UNO and current employment as a high-school science teacher or instructor permission.

CHEM 8215 INTRODUCTION TO MOLECULAR MODELING (3 credits)

The course covers the advantages and limitations of current modeling systems, the criteria for choosing the appropriate modeling system to best solve a given problem and the computer resources needed to conduct the modeling experiments. Following an introduction to the theory behind a variety of modeling systems, students model organic and bioorganic compounds in projects designed to mimic real world applications. (Alternate Spring semesters). (Cross-listed with CHEM 3210).

Prerequisite(s): CHEM 2260 and CHEM 2274 with a grade of C- or better.

CHEM 8236 ADVANCED ORGANIC CHEMISTRY - SYNTHESIS (3 credits)

An advanced lecture course in modern theories and organic reactions with application to synthesis. (Alternate Fall semesters) (Cross-listed with CHEM 4230).

CHEM 8246 ADVANCED ORGANIC CHEMISTRY - MECHANISM (3 credits)

An advanced lecture course in organic chemical reactions. (Cross-listed with CHEM 4240).

Prerequisite(s): CHEM 2260 and CHEM 2400 with a C- or better

CHEM 8256 ADVANCED ORGANIC CHEMISTRY: MECHANISMS AND MODELING (4 credits)

Presentation of advanced topics in organic chemistry focused on structure, bonding and reaction mechanisms. The use of molecular modeling software as means to predict structure, relative stabilities and reaction thermodynamics are covered in a hands-on environment. The course will survey various modeling methods and show its relevance to molecular orbital theory. The basic methodologies used to explore organic mechanisms are presented and then used to study mechanistic details of various reaction types. Students cannot count both Chem 4250 and Chem 4240 toward their degree. (Cross-listed with CHEM 4250).

Prerequisite(s): CHEM 2260 and CHEM 2274 with a C- or better

CHEM 8276 ADVANCED ORGANIC CHEMISTRY-MOLECULAR MODELING LABORATORY (1 credit)

The use of molecular modeling software as means to predict structure, relative stabilities and reaction thermodynamics are covered in a hands-on environment. The course will survey various modeling methods and show its relevance to organic reactions and mechanisms therein. Students will learn how to use commercial software to obtain/supplement experimental data in a manner suitable for peer-review publication. (Cross-listed with CHEM 4244).

Prerequisite(s): CHEM 2260 and CHEM 2400 with a C- or better

CHEM 8316 POLYMER CHEMISTRY (3 credits)

An introduction to the chemical and physical properties of polymers. Emphasis will be on physical properties and structure/property relationships. Topics will include kinetics and synthesis. Students will gain an understanding of the characteristics of polymers and their applications.

Prerequisite(s): CHEM 2260 and CHEM 3350 with a grade of C or better, or instructor permission.

CHEM 8355 PHYSICAL CHEMISTRY I (3 credits)

A presentation of selected topics from the laws of thermodynamics, chemical and physical equilibria, phase diagrams, thermodynamics of solutions, electrochemistry and kinetics. (Fall) (Cross-listed with CHEM 3350).

Prerequisite(s): CHEM 2260, CHEM 2274, CHEM 2400, CHEM 2404, PHYS 1120 or PHYS 2120; MATH 1960 or higher. (Chemistry courses must be with a grade of C- or better). Concurrent enrollment in CHEM 3354/8359.

CHEM 8359 PHYSICAL CHEMISTRY I LABORATORY (1 credit)

Physical chemistry laboratory covering topics in thermodynamics, kinetics and electrochemistry, to be taken concurrently with CHEM 3350/8355. Instruction and practice in scientific writing is also an emphasis of the course. Fulfills the third writing course requirement for students majoring in chemistry when NSCI 3940 and another approved laboratory course have been completed with a C- or better. Offered in Fall. (Cross-listed with CHEM 3354).

CHEM 8365 PHYSICAL CHEMISTRY II (3 credits)

This course provides students with an overview of quantum mechanics and its application to chemistry, particularly through the lens of atomic and molecular spectroscopy and computational modeling. (Cross-listed with CHEM 3360).

Prerequisite(s): CHEM 3350 and CHEM 3354 OR CHEM 8355 and CHEM 8359 with a grade of C- or better.

CHEM 8369 PHYSICAL CHEMISTRY II LABORATORY (1 credit)

Physical chemistry laboratory covering topics in quantum mechanics, computational chemistry, spectroscopy, and kinetics, to be taken concurrently with CHEM 3360. Fulfills the third writing course requirement for students majoring in chemistry when NSCI 3940 and another approved laboratory course have been completed with a C- or better. Offered in Spring. (Cross-listed with CHEM 3364).

CHEM 8406 INSTRUMENTAL ANALYSIS (3 credits)

Study of instrumentation for use in chemical analysis and chemistry research. Advanced instrumental methods and data analysis techniques are included. (Cross-listed with CHEM 4400).

Prerequisite(s): CHEM 3350 and CHEM 3354 both with a C- or better; or CHEM 3360 and CHEM 3364 both with a C- or better; or instructor permission. Concurrent enrollment in CHEM 8409.

CHEM 8409 INSTRUMENTAL ANALYSIS LABORATORY (1 credit)

Investigation of instrument performance and use of instrumentation in quantitative and trace analysis. Advanced instrumental methods and electronics for instrumentation are included. (Spring) (Cross-listed with CHEM 4404).

Prerequisite(s): Concurrent enrollment in CHEM 8406

CHEM 8425 SPECTROMETRIC CHARACTERIZATIONS (1 credit)

A laboratory course intended to further develop the ability to determine chemical structure from focused spectrometric data especially IR, MS, 1D and 2D (proton and carbon) NMR. Lab time focuses on the spectrochemical data collection and interpretation. (Cross-listed with CHEM 3424).

CHEM 8506 ADVANCED INORGANIC CHEMISTRY (3 credits)

The application of bonding models for understanding of the composition, structure, and reactions of inorganic molecules, including organometallic and bioinorganic complexes. (Cross-listed with CHEM 4500).

Prerequisite(s): CHEM 8355 or may be taken concurrently.

CHEM 8654 BIOCHEMISTRY I LABORATORY (1 credit)

A laboratory course to help integrate the concepts learned in biochemistry lecture with the development of biochemical laboratory skills including experimental design, data analysis, presentation of results and communication of scientific information, with a focus on formal instruction in journal-style writing and notebook skills. There is an emphasis on protein properties, including enzyme activity. Fulfills the third writing course requirement for students majoring in chemistry when NSCI 3940 and another approved laboratory course have been completed with a C- or better. (Fall) (Cross-listed with BIOL 4654, BIOL 8654, CHEM 4654).

CHEM 8656 BIOCHEMISTRY I (3 credits)

A comprehensive introduction to biochemistry emphasizing: structure-function relationships for proteins, carbohydrates, lipids, and nucleic acids; protein purification; enzyme kinetics and mechanisms; membranes and membrane transport; carbohydrate metabolism including glycolysis, the citric acid cycle and oxidative phosphorylation; and important applications of thermodynamics and the properties of water to living systems. (Fall) (Cross-listed with BIOL 4650, BIOL 8656, CHEM 4650).

Prerequisite(s): CHEM 2260 and CHEM 2274; and either CHEM 2400 or BIOL 3020, all with a C- or better. Other comparable courses taken at accredited colleges or universities are acceptable. CHEM 8654 must be taken concurrently.

CHEM 8664 BIOCHEMISTRY II LABORATORY (1 credit)

A laboratory course to help integrate the concepts learned in Biochemistry II lecture with the development of biochemical laboratory skills, to gain practical experience in experimental design, data analysis, presentation of results and communication of scientific information, with a focus on formal instruction in journal-style writing and notebook skills. There is an emphasis on nucleic acid properties. Fulfills the third writing course requirement for students majoring in chemistry when NSCI 3940 and another approved laboratory course have been completed with a C- or better. (Spring) (Cross-listed with BIOL 4664, BIOL 8664, CHEM 4664).

CHEM 8666 BIOCHEMISTRY II (3 credits)

A continuation of the study of the structure and function of biomolecules and biochemical reactions with an emphasis on metabolism of carbohydrates, lipids, amino acids and nucleotides, and the chemistry of signal transduction and genetic information transfer. (Spring) (Cross-listed with BIOL 4660, BIOL 8666, CHEM 4660).

Prerequisite(s): CHEM 8656 and CHEM 8654 or BIOL 8656 and BIOL 8654 with a grade of B- or better. CHEM 8664 must be taken concurrently.

CHEM 8676 PROTEIN PURIFICATION AND CHARACTERIZATION (2 credits)

This course is a study of protein biochemistry, protein purification techniques, and characterization strategies with an emphasis on chromatography and crystallography. The course has a significant laboratory component. (Cross-listed with CHEM 4670).

Prerequisite(s): CHEM 8656 and CHEM 8654 (grade of B or better), or permission of instructor.

CHEM 8936 SPECIAL TOPICS IN CHEMISTRY (1-3 credits)

Selected special topics in chemistry. (Cross-listed with CHEM 4930).

Prerequisite(s): CHEM 2260, CHEM 2400 with a grade of C or better. Some topics will require more advanced prerequisites and will be accepted for advanced course work in chemistry.

CHEM 8966 CHEMISTRY PROBLEMS (1-3 credits)

Independent student research and communication of results. (Cross-listed with CHEM 4960).

Prerequisite(s): CHEM 4950 with a grade of C or better and permission of instructor or graduate standing in a related discipline

CHEM 8990 RESEARCH IN CHEMISTRY (1 credit)

Experimental or theoretical work in chemistry or an interdisciplinary field involving chemical content, analysis and communication of results.

Prerequisite(s): Permission of instructor, graduate, and sufficient grounding in the research area to fully support successful project accomplishment.