

Chemistry (CH)

CH 500 - TOPICS IN CHEMISTRY

Semester Hours: 1-3

Advanced laboratory research in one of the departmental research groups. The student works on an independent or group research project. Completion of the course requires an appropriate written and oral report. Prerequisites: Approval of instructor.

CH 521 - CHEMICAL INSTRUMENTATION

Semester Hours: 4

Use of basic instrumentation in NMR, mass spectrometric, chromatographic, and spectrophotometric analysis.

CH 540 - POLYMER SYNTHESIS & CHARACTERI

Semester Hours: 3

Same as MTS 649.

CH 549 - SPECTROSCOPY & MOLEC STR

Semester Hours: 3

Intermediate level treatment of principles of spectroscopy and their application to determination of molecular structure.

CH 553 - INTRO QUANTUM MECH I

Semester Hours: 3

Waves and particles; Bohr's model; de Broglie waves, wave-packets, uncertainty principle; quantum mechanics postulates; Schroedinger equation; systems in 1, 2 & 3 dimensions; hydrogen atom. Same as PH 551, OSE 555, and MTS 651.

CH 554 - INTRO QUANTUM MECH II

Semester Hours: 3

Angular momentum and spin; atomic structure and spectrum; time-independent perturbation theory, variational methods; time-dependent perturbation theory and interactions of light with matter; scattering theory; electronic structure of solids; relativistic quantum mechanics. Same as: PH 552, MTS 652. Prerequisite: PH 551 or CH 553.

CH 561 - BIOCHEMISTRY I

Semester Hours: 3

Structural chemistry and function of biomolecules, mechanisms of biochemical reactions, enzyme kinetics, and energy transfer. Same as: BYS 547.

CH 562 - BIOCHEMISTRY II

Semester Hours: 3

Metabolism, biosynthesis of macromolecular precursors, storage, transmission, and expression of genetic information, and molecular physiology. Same as BYS 548. Prerequisites: CH 561 or BYS 547.

CH 600 - ADV INORGANIC CHEMISTRY

Semester Hours: 3

Survey with emphasis on structure and reactivity of inorganic compounds.

CH 602 - CHEM COORD COMPOUNDS

Semester Hours: 3

Modern bonding theory and stereo chemistry of coordination compounds.

CH 621 - METHODS OF CHEMICAL ANALYSIS

Semester Hours: 3

Literature, seminar course. Theory and methodology of various techniques of chemical analysis.

CH 631 - SYNTHETIC ORGANIC CHEMISTRY

Semester Hours: 3

Survey of certain reactions that enjoy widespread application to the synthesis of organic compounds.

CH 632 - PHYSICAL ORGANIC CHEMISTRY

Semester Hours: 3

Reactive intermediates, structure-activity relationships, reaction mechanisms and techniques used to determine them.

CH 633 - ORGANIC STRUCTURE DETERMINATION

Semester Hours: 3

Structure determination of organic molecules using spectroscopic methods, especially NMR, IR, and MS. Emphasis on the theory and interpretation of many NMR methods useful in chemistry research.

CH 634 - MOLECULAR MODELING

Semester Hours: 4

Molecular modeling methods, including molecular mechanics, molecular docking, molecular orbital theory, and density functional theory, will be used to investigate conformational properties of organic compounds, molecular interactions between biological macromolecules and organic ligands, electronic structure of organic and inorganic compounds, frontier molecular orbitals, pericyclic reactions, and reactive intermediates. Extensive computational laboratory work included.

CH 635 - CHEMICAL TOXICOLOGY

Semester Hours: 3

An introduction to the principles of chemical toxicology, including the effects of drugs, environmental pollutants, natural toxins and venoms and other potentially hazardous chemicals at the physiological, cellular, and molecular level.

CH 640 - ADVANCED CHEMICAL THERMODYNAMICS

Semester Hours: 3

First, second, and third laws of thermodynamics. Thermodynamic functions. Applications to thermal properties of gases, liquids, solids, and solutions. Chemical reactions, phase transitions, and electrochemistry.

CH 641 - STATISTICAL THERMODYNAMICS

Semester Hours: 3

Principles leading to the development of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics. Thermodynamic properties calculated from partition functions.

CH 642 - ADVANCED CHEMICAL DYNAMICS

Semester Hours: 3

Non-equilibrium thermodynamics, macroscopic and microscopic theories of diffusion, chemical reaction rate laws and mechanisms, transition state theory, gas phase molecular dynamics, electrical conduction in electrolyte solutions, electrode kinetics. Prerequisite: CH 640.

CH 643 - QUANTUM CHEMISTRY

Semester Hours: 3

Application of quantum theory to the chemical bond.

CH 644 - CHEMICAL ELECTRODYNAMICS

Semester Hours: 3

Maxwell's equations applied to electrodynamic problems in chemistry. Theory of dielectrics, dipole moments, Beer's law, Landolt's rule, light scattering, magnetic properties, quantum theory of radiation.

CH 645 - POLYMER PHYSICAL CHEMISTRY

Semester Hours: 3

Introduction to structure, properties and processing of polymers. Physical behavior of polymers, structure-property relationships, polymer characterization, thermodynamics of polymer solutions and melts, mechanical evaluation of polymers. Same as MTS 747. Prerequisite: CH 540.

CH 646 - THERMODYNAMICS OF MATERIALS

Semester Hours: 3

Fundamental thermodynamic review, phase equilibrium, chemical reaction equilibrium, free energy, binary and ternary phase transformations, solution models and selected topics. Same as CHE 646 and MTS 646.

CH 647 - ADVANCED BIOPHYSICAL CHEMISTRY I

Semester Hours: 3

Topics include: computer data analysis & simulation, first & second laws of thermodynamics, free energy & equilibrium, calorimetry, protein stability, binding & interactions, solution thermodynamics, electrolytes. Students who have completed CH 347 cannot earn credit for CH 647.

CH 648 - ADV BIOPHYSICAL CHEMISTRY II

Semester Hours: 3

Advanced biophysical chemistry, including biochemical reaction kinetics, enzyme catalysis, quantum mechanics, statistical thermodynamics, spectroscopy, including UV-VIS, fluorescence, circular dichroism, NMR, and Structure determinations. An emphasis is placed on the current research literature. Prerequisite: CH 647 Students who have completed CH 348 cannot earn credit for CH 648.

CH 650 - PRINC LIQUID/SOLID INTER

Semester Hours: 3

Applies principles in thermodynamics & kinetics to characterize surfaces & surface phenomena. Fundamental properties of gas-liquid, liquid-liquid, solid-liquid and solid-gas interfaces and phenomena at these interfaces. Same as MTS 650 and CHE 650.

CH 699 - MASTER'S THESIS

Semester Hours: 3-6

Required each semester a student is enrolled and receiving direction on a masters thesis. Minimum of two terms is required. (A maximum of six hours may be applied towards the degree).

CH 700 - CURRENT TOPICS IN CHEMISTRY

Semester Hours: 1-3

Advanced laboratory research in one of the departmental research groups. The student works on an independent or group research project. Completion of the course requires a written and an oral report. Prerequisite: approval of instructor.

CH 705 - SEL TOP IN INORGANIC CHEM

Semester Hours: 3

Prerequisites: CH 600 and approval of instructor.

CH 721 - SP TOP IN ANALYTICAL CHEMISTRY

Semester Hours: 3

Prerequisites: CH 621 and approval of instructor.

CH 735 - SEL TOP IN ORGANIC CHEM

Semester Hours: 3

Prerequisites: CH 632 and approval of instructor.

CH 745 - SEL TOP IN PHYSICAL CHEM

Semester Hours: 3

CH 746 - SOLID STATE CHEMISTRY

Semester Hours: 3

Chemical properties of solids. Includes phase equilibria, chemical bonding in ionic and covalent crystals, thermodynamics of atomic defects, ionic conductivity in solids, corrosion, & introduction to surfaces and adsorption.

CH 765 - SEL TOPICS IN BIOCHEM

Semester Hours: 3

Prerequisites: CH 560 and approval of instructor.

CH 780 - CHEMISTRY SEMINAR

Semester Hour: 1

Required during each semester of residence.

CH 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9