CHEMISTRY (3150)

3150:501. Biochemistry Lecture I. (3 Credits)

3150:502. Biochemistry Lecture II. (3 Credits)
Prerequisite: 3150:501. Overview of metabolism; thermodynamics; carbohydrate, fatty acid, amino acid, and nucleoside anabolism and catabolism; hormonal control of metabolism. Photosynthesis.

3150:506. Biochemistry of Gene Expression. (3 Credits)
Prerequisites: 3150:501, or permission of the department. DNA, RNA, and protein synthesis, translation and transcription. Gene function and expression, cell cycle and cancer, genetic engineering, gene silencing, gain of function studies.

3150:572. Advanced Inorganic Chemistry. (3 Credits)

3150:590. Workshop in Chemistry. (1-3 Credits)
(May be repeated) Group studies of special topics in chemistry. May not be used to meet undergraduate or graduate major requirements in chemistry.

3150:592. Special Topics: Chemical Education. (1-3 Credits)
(May be repeated up to 6 credits) Consideration of topics in chemical education.

3150:599. Master's Degree Research. (1-6 Credits)
For properly qualified candidates for master's degree. Supervised original research in analytical, inorganic, organic, physical or biochemistry.

3150:603. Biochemistry Lecture III. (3 Credits)

3150:610. Basic Quantum Chemistry. (3 Credits)
Quantum mechanics with applications to molecular systems. Includes angular momentum, molecular hamiltonians, variation and perturbation methods and molecular orbital theories.

3150:611. Spectroscopy. (3 Credits)

3150:619. Transition-Metal Organometallics. (3 Credits)
The organometallic chemistry of the transition metal elements. Topics covered include synthesis, characterization methods, structure, bonding, reactivity, and application.

3150:620. Main Group Organometallics. (3 Credits)
The organometallic chemistry of main group elements. Topics covered include synthesis, characterization methods, structure, bonding, reactivity, and applications.

3150:625. Chemistry Seminar. (1 Credit)
Lectures on current research topics in chemistry by invited speakers.

3150:629. Physical Inorganic Chemistry. (3 Credits)
Detailed treatment of chemistry of transition elements. Group theoretical applications, ligand field theory, kinetics and mechanism magnetism, electronic spectra, molecular orbital theory.

3150:630. Theoretical Inorganic Chemistry II. (2 Credits)
Prerequisite: 3150:629. Detailed treatment of chemistry of transition elements. Group theoretical applications, ligand field theory, kinetics and mechanism, electronic spectra, molecular orbital theory.

3150:631. Metals in Medicine. (3 Credits)
Prerequisite: 3150:572. This course will cover the synthesis and development of metal based medicines including the tumor drug cisplatin, technetium 99m based imaging agents, and silver antimicrobials.

3150:635. Thermodynamics & Statistical Thermodynamics. (3 Credits)
Rigorous treatment of laws of thermodynamics and their applications to selected chemical systems. Fundamentals of statistical thermodynamics and applications to systems in chemical equilibrium.

3150:636. Chemical Kinetics. (3 Credits)
Phenomenological kinetics, experimental methods of investigation and analysis of reaction systems. Theoretical treatments of reaction rates.

3150:640. Chemical Separations. (3 Credits)
General theory, instrumentation and application of methods of separation. Emphasis on modern chromatographic techniques and recent advances.

3150:641. Spectral Methods. (3 Credits)
Theory and application of instrumental measurements. Interpretation of data.

3150:645. X-Ray Crystallography. (3 Credits)
The theoretical and practical aspects of single crystal x-ray crystallography are discussed. Topics covered include diffraction, space groups, structure solution and refinement.

3150:670. Spectroscopic Identification of Organic Compounds. (3 Credits)
Determination of the structures of organic compounds by spectroscopic analysis: ORD/CD, UV-VIS spectroscopy, IR spectroscopy, mass spectrometry, FT-NMR spectroscopy, 2D-NMR.

3150:679. Inorganic Polymers. (3 Credits)
Prerequisite: 3150:572 or permission of instructor. Synthesis, structure, bonding, characterization, and applications of polysiloxanes, polyphosphazenes, polysilanes, polycarbosilanes, poly(ferroceneophanes), sol-gel materials, coordination polymers and related materials.

3150:683. Mechanistic & Synthetic Organic Chemistry I. (3 Credits)
Introduction to the structural and mechanistic aspects of organic reactions: HMO calculations, acids and bases, equilibrium, kinetics, linear free energy relationships, reactive intermediates, reaction mechanisms.

3150:684. Mechanistic & Synthetic Organic Chemistry II. (3 Credits)
Prerequisite: 3150:683. Synthetic organic chemistry from a mechanistic perspective: nucleophilic and electrophilic substitution and addition reactions, carbonyl chemistry, functional group manipulations, oxidations, reductions, cycloaddition reactions.

3150:699. Master's Thesis. (1-6 Credits)
For properly qualified candidates for master's degree. Supervised original research in analytical, inorganic, organic, physical or biochemistry.

3150:710. Special Topics in Analytical Chemistry. (1-3 Credits)
(May be repeated) Topics in advanced analytical chemistry. Electroanalytical, activation analysis, atomic absorption spectrometry, mass spectrometry, liquid-liquid, liquid-solid and gas chromatography, ion exchange, thermoanalytical methods, separations, standards, sampling, recent developments.
3150:711. Special Topics in Inorganic Chemistry. (1-3 Credits)
(May be repeated) Consideration of topics in modern inorganic chemistry such as coordination compounds, chemistry of the solid state, representative elements, nonaqueous solvents, organometallic compounds, homogeneous catalysis.

3150:712. Special Topics in Organic Chemistry. (1-3 Credits)
(May be repeated) Topics in advanced organic chemistry such as natural products, heterocyclic compounds, photochemistry.

3150:713. Special Topics in Physical Chemistry. (1-3 Credits)
(May be repeated) Subjects from modern physical chemistry.

3150:715. Special Topics: Biochemistry. (1-3 Credits)
(May be repeated) Recent developments in areas of biochemistry.

3150:720. Advanced Biochemical Techniques. (3 Credits)
Prerequisite: 3150:502. An advanced lecture course on physical techniques in biochemistry. Includes optical and hydrodynamic methods; radioanalytical techniques, scattering and magnetic resonance spectroscopy.

3150:722. Enzymatic Reactions. (3 Credits)

3150:724. Bioinorganic Chemistry. (3 Credits)
Prerequisites: 3150:501 and 3150:502. Survey of the structure and properties of metal ion complexes with amino acids, nucleotides, metabolites and macromolecules; metal ion metabolism; metals in medicine.

3150:726. Advanced Metabolism. (3 Credits)
Prerequisites: 3150:501 and 3150:502. Study of advanced pathways in carbohydrate, lipid and protein metabolism with emphasis placed on metabolic dysfunction.

3150:740. Physical Organic Chemistry. (3 Credits)
Prerequisites: 3150:683 and 3150:684. An advanced treatment of the theory and mechanisms of organic chemistry: FMO theory, molecular mechanics, molecular strain, kinetics, thermodynamics, acidity functions, linear free energy relationships.

3150:750. Advanced Synthetic Organic Chemistry. (3 Credits)

3150:899. Doctoral Dissertation. (1-16 Credits)
Open to qualified student accepted as a candidate for Doctor of Philosophy in Chemistry. Supervised original research undertaken in organic, inorganic, physical, analytical or biochemistry.