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.

3150:510 Special Readings in Analytical Chemistry (1-3 Credits)
Selected topics in advanced analytical chemistry for which no course exists. (May be repeated)

3150:511 Special Readings in Inorganic Chemistry (1-3 Credits)
Selected topics in advanced inorganic chemistry for which no course exists. (May be repeated)

3150:512 Special Readings in Organic Chemistry (1-3 Credits)
Selected topics in advanced organic chemistry for which no course exists. (May be repeated)

3150:513 Special Readings in Physical Chemistry (1-3 Credits)
Selected topics in advanced physical chemistry for which no course exists. (May be repeated)

3150:515 Special Readings in Biochemistry (1-3 Credits)
Selected topics in advanced biochemistry for which no course exists. (May be repeated)

3150:517 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.

3150:627 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(ferrocenophanes), 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. Electroanalysis, 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.