CHEM - CHEMISTRY (CHEM)

CHEM 6204 Spectrochem Meth-Analy (3 Credits)
The application of electromagnetic absorption and emission processes to the characterization of chemical systems. Emphasis on experimental techniques in all regions of the spectrum.

CHEM 6205 Modern Separation Tech (3 Credits)
Principles and practice of chemical and physical separation methods, gas and liquid chromatography, electrophoresis, membrane separation methods, extraction, distillation. Theory, instrumentation and applications of each technique.

CHEM 6301 Theoretical Organic Chem I (3 Credits)
Correlation of structure and mechanism in organic chemistry. Major topics include bonding; aromaticity; substituent effects, including linear free energy relationships, kinetics and rate studies; isotope effects; solvent effects and solvent scales; nucleophilicity; acid and base catalysis. Specific reactions covered include additions to carbon-carbon multiple bonds, additions to carbonyls, acyl transfer reactions, conservation of orbital symmetry for electrocyclic reactions and cycloadditions.

CHEM 6303 Synthetic Organic Chemistry (3 Credits)
Reactions commonly used in the synthesis of organic compounds; discussion of their selectivity and stereochemistry and the extent to which they can be utilized in the preparation of complex materials.

CHEM 6323 Sem Org Chem Entrpr Cosmetics (1 Credit)

CHEM 6401 Chemical Thermodynamics (3 Credits)
The course will review classical thermodynamics, including Laws of Thermodynamics with application to real and ideal systems. The course will cover an introduction to statistical thermodynamics including application to gases, liquids and solid-state systems.

CHEM 6403 Quantum Chemistry (3 Credits)
Use of quantum theory applied to the structure of atoms and molecules; Topics to be covered include angular momentum and spin, harmonic oscillators, electronic quantum states, and variational and perturbation many-body approximation methods.

CHEM 6404 Surface Chemistry (3 Credits)
The fundamentals and the applications of solid surfaces and interfaces, including solid-vapor, solid-liquid and solid-solid will be covered. Advanced topics will include surface thermodynamics, adsorption, electronic structure of surfaces, surface modification and organic monolayers, and nanostructured materials. The course will review surface sensitive techniques including, XPS, FTIR, UPS, LEED, STM/AFM, Adsorption, and Contact Angles. The application of surface modified materials to separation science, wettability and adhesion control, optical and electronic devices will be discussed.

CHEM 6405 Princ Colloid - Interface Chem (3 Credits)
The course will introduce the fundamentals of colloid and interface chemistry. The main topics include: thermodynamics of flat and curved surfaces, surface energy and surface tension, capillarity, monolayers, surfactants, nucleation, adsorption and wetting phenomena, molecular and surface forces, and stability of colloidal systems. An overview of characterization methods and applications of colloids and surfaces in industry and research will be provided. 3 credits

CHEM 6411 Intro to Polymer Chem (3 Credits)
Classification of macromolecules; methods and mechanisms of polymerizations; methods of polymer characterization; properties of polymeric solids.

CHEM 6423 Computational Chemistry (3 Credits)
The course will cover the fundamental theory and application of Molecular Mechanics, Classical Molecular Dynamics, Semi-empirical, Ab Initio and Density Functional simulation and modeling techniques to atoms, molecules, and solids. Available application programs will be used by the students to demonstrate the principles and provide hands-on experience with modern computational chemistry tools.

CHEM 6501 General Biochemistry I (3 Credits)
The course focus will be directed to selected aspects of the biomacromolecules (carbohydrates, lipids, proteins, enzymes, nucleic acids) involved in cell architecture and dynamics. Cell dynamics will be addressed from a molecular-level perspective, with emphasis on the fine-tuned interplay between the energetic and kinetic components of the main metabolic pathways.

CHEM 6502 Bio-Organic Chemistry (3 Credits)
The course covers synthetic methods in organic chemistry applied to the major classes of biological molecules and their derivatives, such as those belonging to the: carbohydrates, amino acids, peptides, proteins, nucleic acids, terpenes, lipids and natural products. Emphasis will be dedicated to the reactions and mechanisms that contribute to their applications in biological systems.

CHEM 6601 Advanced Inorganic Chem I (3 Credits)
A survey of transition metal chemistry focusing on the structural and dynamic properties of transition metal complexes. The presentation begins with a discussion of ions and their environment followed by a description of the bonding theories for transition metal complexes. Electronic spectra, magnetism and reactivity of these molecules will be explained in terms of these bonding theories. Related topics of main group compounds, organometallic complexes and bioinorganic chemistry also will be covered.

CHEM 6710 Chemistry Seminar (0 Credits)

CHEM 6712 Chemistry Seminar (1 Credit)
Discussion of current literature topics by staff and students. One credit for two semesters.

CHEM 7399 Spec Topics-Organic Chemistry (3 Credits)
Selected topics in organic chemistry chosen by the instructor.

CHEM 7512 General Biochemistry II (3 Credits)
Course deals with topics not usually covered in CHEM 6501, such as biosynthetic pathways, nucleic acid chemistry (including replication, repair, transcription, translation) and integration/ chemical control of metabolism. Prerequisite: CHEM 6501.

CHEM 7991 Advanced Topics in Chemistry (1 Credit)
Offers advanced topics in chemistry to meet the present and future needs of graduate students and other professionals in the surrounding chemical industry. Topics include chiral separations, asymmetric synthesis, medicinal chemistry and biotechnology.

CHEM 8701 Matriculation Exam (0 Credits)

CHEM 8702 Cumulative Examination (0 Credits)

CHEM 8703 Perm to Write Dissertation (0 Credits)

CHEM 8704 Ph.D. Seminar (0 Credits)

CHEM 8831 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8832 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8833 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8834 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8835 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8836 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8837 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8838 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8839 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 8840 Introduction to Research (2 Credits)
Acceptable written research report or thesis on work performed in these courses must be filed with the research supervisor in order to count these credits toward the requirements for any graduate degree.

CHEM 9931 Research for Doctorate (3 Credits)
Research courses are taken only after the student has successfully passed the matriculation examination.

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CHEM 9938 Research for Doctorate (3 Credits)
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CHEM 9939 Research for Doctorate (3 Credits)
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CHEM 9940 Research for Doctorate (3 Credits)
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