CHEMISTRY (CHEM)

CHEM*7100 Selected Topics in Inorganic Chemistry Unspecified [0.50]
Discussion of specialized topics related to the research interests of members of the Centre. Special topics could include, for example: bioinorganic chemistry; inorganic reaction mechanisms; synthetic methods in inorganic and organometallic chemistry; homogeneous and heterogeneous catalysis; chemistry of polynuclear compounds.
Department(s): Department of Chemistry
Location(s): Guelph, Waterloo Campus

CHEM*7120 X-ray Crystallography Unspecified [0.50]
Introduction: crystals, basic concepts; space groups: the reciprocal lattice; x-ray diffraction; the phase problem; structure factors; electron density; small molecule structure solution, structure refinement, structure results, journals and databases, paper writing.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7130 Chemistry of Inorganic Solid State Materials Unspecified [0.50]
Introduction to solid state chemistry, common crystal structures, principles of solid state synthesis, theory and experimental methods for characterizing solids, including thermal analysis techniques, powder x-ray and neutron diffraction methods; special topics to include one or more of the optical, electronic, magnetic, or conductive properties of inorganic materials. Prerequisites: one semester-long undergraduate course (at least third-year level) in inorganic chemistry, preferably with content in structural and/or solid state.
Department(s): Department of Chemistry
Location(s): Guelph, Waterloo Campus

CHEM*7150 Structure and Bonding in Inorganic Chemistry Unspecified [0.50]
Free electron, Hueckel and extended Hueckel methods for molecules and clusters. Perturbation theory. Applications of group theory in inorganic chemistry; Jahn-Teller effects in molecules and solids. Energy bands in one, two and three dimensions. Prerequisites: three semester-long undergraduate courses in inorganic chemistry and one semester-long undergraduate course in quantum mechanics or group theory.
Department(s): Department of Chemistry
Location(s): Guelph, Waterloo Campus

CHEM*7170 Advanced Transition Metal Chemistry Unspecified [0.50]
Magnetocochemistry of transition metal compounds. Electronic spectra of complex ions including applications of molecular orbital and ligand field theories. Stabilization of unusual oxidation states and co-ordination numbers. Bonding, structure and reactivity of certain important classes of metal complexes, e.g., metal hybrides, metal-metal bonded species, biologically significant model systems such as macrocycles.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7180 Advanced Organometallic Chemistry Unspecified [0.50]
Reactions, structure and bonding of organometallic compounds of transition and non-transition metals.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7200 Selected Topics in Analytical Chemistry Unspecified [0.50]
Special topics could include, for example: trace analysis using modern instrumental and spectroscopic methods; advanced mass spectrometry (instrumentation and interpretation of spectra); analytical aspects of gas and liquid chromatography.
Department(s): Department of Chemistry
Location(s): Guelph, Waterloo Campus

CHEM*7240 Chemical Instrumentation Unspecified [0.50]
Instrumental components and optimum application; rudiments of design; electrical, spectral, migrational and other methods.
Department(s): Department of Chemistry
Location(s): Guelph, Waterloo Campus

CHEM*7260 Topics in Analytical Spectroscopy Unspecified [0.50]
Atomic emission and absorption spectroscopy; methods of excitation and detection; quantitative applications. Molecular electronic spectroscopy, UV, visible and Raman; instrumental characteristics; applications to quantitative determinations, speciation, measurements of equilibrium, etc. Sources and control of errors and interferences. Determination and description of colour.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7270 Separations Unspecified [0.50]
Material to be covered is drawn from the following topics: diffusion; isolation of organic material from the matrix; chromatographic techniques - principles of chromatographic separation, gas (GLC, GSC), liquid (LLC, LSC, SPC, IEC), supercritical fluid (SFC) chromatographies; GC-MS, CG-FTIR; electrophoresis, flow field fractionation. Prerequisites: undergraduate level course in instrumental analysis.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7280 Electroanalytical Chemistry Unspecified [0.50]
A study of electroanalytical techniques and their role in modern analytical chemistry. The underlying principles are developed. Techniques include chronamperometry, chronocoulometry, polarography, voltammetry, chronopotentiometry, coulometric titrations, flow techniques, electrochemical sensors and chemically modified electrodes.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7290 Surface Analysis Unspecified [0.50]
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7300 Proteins and Nucleic Acids Unspecified [0.50]
Determination of protein sequence and 3-dimensional structure, protein anatomy; prediction of protein structure; intermolecular interactions and protein-protein association; effects of mutation. Nucleic acid structure and anatomy; DNA and chromatin structure; RNA structure; snRNPs and ribozymes; protein-nucleic acid interactions.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7310 Selected Topics in Biochemistry Unspecified [0.50]
Discussion of specialized topics related to the research interests of members of the Centre: for example, recent offerings have included peptide and protein chemistry, biochemical toxicology, medical aspects of biochemistry, glycolipids and glycoproteins, redox enzymes, biological applications of magnetic resonance, etc.
Department(s): Department of Chemistry
Location(s): Guelph
CHEM*7360 Regulation in Biological Systems  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7370 Enzymes  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7380 Cell Membranes and Cell Surfaces  
Membrane proteins and lipids - structure and function; dynamics; techniques for their study; model membrane systems. Membrane transport. The cytoskeleton. Membrane protein biogenesis, sorting and targeting. Signal transduction across membranes. The cell surface in immune responses.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7400 Selected Topics in Theoretical Chemistry  
Discussion of specialized topics related to the research interests of the members of the Centre. Special topics could include for example: theory of intermolecular forces; density matrices; configuration interaction; correlation energies of open and closed shell systems; kinetic theory and gas transport properties; theory of the chemical bond.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7450 Statistical Mechanics  
Review of classical and quantum mechanics; principles of statistical mechanics; applications to systems of interacting molecules; imperfect gases, liquids, solids, surfaces and solutions.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph, Waterloo Campus

CHEM*7460 Quantum Chemistry  
Approximate solutions of the Schrodinger equation and calculations of atomic and molecular properties.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph, Waterloo Campus

CHEM*7500 Selected Topics in Physical Chemistry  
Discussion of specialized topics related to the research interests of the members of the Centre. Special topics could include for example: principles of magnetic resonance in biological systems; collisions, spectroscopy and intermolecular forces, surface chemistry; catalysis; electrolyte theory; non-electrolyte solution theory, thermodynamics of biological systems; thermodynamics.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph, Waterloo Campus

CHEM*7550 Kinetics - Dynamics  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7560 Spectroscopy  
Aspects of electronic vibrational and rotational spectroscopy of atoms, molecules, and the solid state. Relevant aspects of quantum mechanics, Dirac notation, and angular momentum will be discussed. Group Theory will be presented and its implications for spectroscopy introduced. Prerequisites: one semester-long undergraduate course in quantum mechanics or the approval of the instructor.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph, Waterloo Campus

CHEM*7600 Selected Topics in Organic Chemistry  
Two or three topics from a range including: bio-organic chemistry, environmental organic chemistry; free radicals; heterocyclic molecules; molecular rearrangements; organometallic chemistry, photochemistry; natural products.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7640 Synthetic Organic Reactions  
Named organic reactions and other synthetically useful reactions are discussed. The mechanism, stereochemical implications and use in organic synthesis of these reactions will be presented. Examples from the organic literature will be used to illustrate these aspects.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7650 Strategies in Organic Synthesis  
The synthesis of organic compounds is discussed and emphasis is placed on the design of synthetic routes. Examples drawn from the literature are used to illustrate this synthetic planning.  
**Prerequisite(s):** CHEM*7640  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7660 Organic Spectroscopy  
Ultraviolet, infrared, resonance spectroscopy and mass spectrometry, with emphasis on applications to studies of organic molecules.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph, Waterloo Campus

CHEM*7690 Physical Organic Chemistry  
Linear free energy relationships; substituent effects and reactive intermediates.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph

CHEM*7700 Principles of Polymer Science  
Introduction to the physical chemistry of high polymers, principles of polymer synthesis, mechanisms and kinetics of polymerization reactions, copolymerization theory, polymerization in homogeneous and heterogeneous systems, chemical reactions of polymers. Theory and experimental methods for the molecular characterization of polymers.  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph, Waterloo Campus

CHEM*7710 Physical Properties of Polymers  
The physical properties of polymers are considered in depth from a molecular viewpoint. Rubber elasticity, mechanical properties, rheology and solution behaviour are quantitatively treated.  
**Prerequisite(s):** CHEM*7700  
**Department(s):** Department of Chemistry  
**Location(s):** Guelph, Waterloo Campus
CHEM*7720  Polymerization and Polymer Reactions  Unspecified  [0.50]
The reactions leading to the production of polymers are considered with emphasis on emulsion and suspension polymerization and polymerization reaction engineering. Polymer degradation, stabilization and modification reactions are also considered in depth.
Prerequisite(s): CHEM*7700
Department(s): Department of Chemistry
Location(s): Waterloo Campus

CHEM*7730  Selected Topics in Polymer Chemistry  Unspecified  [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.
Department(s): Department of Chemistry
Location(s): Guelph, Waterloo Campus

CHEM*7840  Foundations of Chemistry and Biochemistry Research Literature Review  Fall and Winter  [0.50]
Students will prepare a written literature review on a topic relevant to their research proposal. Incoming MSc thesis students are required to take this course within the first two semesters of their program and are strongly encouraged to take it in their first semester.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7940  Master's Seminar  Summer, Fall, and Winter  [0.50]
A public seminar and defence of a research proposal, required to be given by all MSc thesis students within two terms of entering this program. Co-requisite(s): Students must take CHEM*7840, either previously or concurrently and obtain a minimum grade of 65%.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7950  PhD Seminar  Unspecified  [0.00]
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7970  MSc Research Paper  Unspecified  [0.50]
An experimental project normally based on the CHEM*7940 research proposal, supervised by the advisor, taking three to four months to complete. This project may be completed at any time during the student's program, but it must follow CHEM*7940. A written report is required, and a seminar based on the content of the report will be presented. The report must be completed as per the project/thesis guidelines of the University campus on which the student is registered. This course normally will follow the course CHEM*7940 Master's Seminar.
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7980  MSc Thesis  Unspecified  [0.00]
Department(s): Department of Chemistry
Location(s): Guelph

CHEM*7990  PhD Thesis  Unspecified  [0.00]
Department(s): Department of Chemistry
Location(s): Guelph