

CHEMISTRY (CM-GY)

CM-GY 440 Polymer Chemistry (4 Credits)

This course introduces polymer chemistry. It covers the principles of various polymerization methods, characterization and physical chemistry of polymers. A laboratory is included. | Prerequisites: CM-UY 2214 and CM-UY 2514 or CM-UY 2614.

Grading: Ugrd Tandon Graded

Repeatable for additional credit: No

CM-GY 785 Special Topics in Organic Chemistry (3 Credits)

This course covers special Topics in Organic Chemistry. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes

CM-GY 940 Special Topics in Polymer Chemistry (3 Credits)

This course covers special topics in polymer chemistry. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes

CM-GY 974 Seminar in Chemistry II (1.5 Credits)

This course covers chemical topics of current interest and is presented by participating students, staff and outside speakers. One semester is required for MS chemistry students; three semesters required for PhD candidates.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes

CM-GY 997X MS THESIS IN CHEMISTRY (3-9 Credits)

Typically offered Fall, Spring, and Summer terms

This course requires original experimental or theoretical research, guided by a chemistry faculty member that may serve as basis for an MS degree. The minimum research registration requirements for the master's thesis: 9 credits. Registration is required each semester consecutively until students complete adequate research projects and acceptable theses and have passed required oral examinations. | Prerequisite: Advisor approval

Grading: Satisfactory/Unsatisfactory

Repeatable for additional credit: Yes

CM-GY 998X RESEARCH IN MATERIALS CHEMISTRY (1-9 Credits)

Typically offered Fall, Spring, and Summer terms

Research course for PhD students prior to passing the qualifying exam.

Grading: Satisfactory/Unsatisfactory

Repeatable for additional credit: Yes

CM-GY 999X PHD DISSERTATION IN MATERIALS CHEMISTRY (3-9 Credits)

Typically offered Fall, Spring, and Summer terms

This course requires original experimental or theoretical research, guided by a chemistry faculty member, that may serve as basis for a PhD. The minimum research registration requirement is 36 credits. Registration is required each semester consecutively until students complete adequate research projects and acceptable theses and have passed required oral examinations. A research fee is required. | Prerequisite: Passing grade in RE-GY 9990 Phd Qualifying Exam

Grading: Satisfactory/Unsatisfactory

Repeatable for additional credit: Yes

CM-GY 5021 Information Sources for the Chemical Sciences (1.5 Credits)

Typically offered Fall

This course is a hands-on introduction to methods and tools for searching and includes both electronic (CD-ROM and online) as well as print databases. Students may emphasize topics related to their research. Graduate students are required to take this course.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 5040 Chemical Laboratory Safety (0 Credits)

Typically offered Fall and Spring

This course discusses problems of health and safety in chemical laboratories, including how to work safely with dangerous chemicals.

This course must be completed by graduate and undergraduate chemistry students before they begin laboratory research.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 6013 Advanced Inorganic Chemistry (3 Credits)

Typically offered occasionally

This course covers theories of bonding in inorganic compounds. It introduces group theory as applied to molecular orbital and ligand field theories. Also covered are spectra of inorganic compounds and non-aqueous solvent. The transition to metal chemistry is introduced. |

Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 6153 Special Topics in Inorganic Chemistry (3 Credits)

Typically offered occasionally

This course covers special topics in Inorganic Chemistry. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 7033 Quantum Chemistry (3 Credits)

Typically offered occasionally

This course covers quantum structures of atoms and molecules. It covers fundamental ideas of quantum mechanics, applications to atomic and molecular structures and bonding, approximation methods and Interactions of light and matter. | Prerequisite: Undergraduate physical chemistry and physics or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 7043 Statistical Thermodynamics and Kinetics (3 Credits)

Typically offered Fall

This course covers statistical mechanics for chemical systems. Also covered are ensembles, partition functions, thermodynamic functions, applications to various systems, including non-ideal gas, gas of diatomic molecules, polymer, surface phenomena, chemical equilibria, biophysics and reaction kinetics. | Prerequisite: Undergraduate physical chemistry and physics or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 7103 BIOPHYSICAL CHEMISTRY (3 Credits)

This course covers structure and properties of important biological macromolecules, including proteins, nucleic acids and polysaccharides; membranes and macromolecular complexes; applications of x-ray diffraction; NMR; vibrational and CD spectroscopy to the analysis of structure. | Prerequisite: CM-GY 7043 or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 7503 Special Topics in Physical Chemistry (3 Credits)*Typically offered occasionally*

This course covers special Topics in Physical Chemistry. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** Yes**CM-GY 7573 Special Topics in "Informatics in Chemical and Biological Sciences" (3 Credits)***Typically offered occasionally*

This course covers special topics on various advanced or specialized topics in chemo- or bioinformatics that are presented at intervals.

Grading: Grad Poly Graded**Repeatable for additional credit:** Yes**CM-GY 7723 Synthesis of Macromolecules (3 Credits)***Typically offered Spring*

This course covers organic aspects, including chemistry of monomer and polymer formation; modern mechanistic analyses of reactions; stereochemistry of polymer structures; forces of stereo regulation; condensation, free radical (bulk, suspension, emulsion, solution), ionic, ring-opening and non-classical polymerization reactions. | Prerequisite: Undergraduate organic chemistry or adviser's approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** No**CM-GY 7813 Characterization of Macromolecules (3 Credits)***Typically offered occasionally*

This course covers characterization methods for linear-chain polymer and macromolecules in solution such as static and dynamic light scattering, osmometry, size exclusion chromatography, and viscometry. Also covered are characterization methods for macromolecules in solid state such as crystallography and mechanical and thermal analysis. | Prerequisite: Undergraduate physical chemistry or adviser approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** No**CM-GY 7853 Special Topics in Polymer Chemistry (3 Credits)***Typically offered occasionally*

This course covers special topics in polymer chemistry. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** Yes**CM-GY 7923 NATURAL POLYMERS AND MATERIALS (3 Credits)**

This course introduces natural and biomimetic polymers and is taught with an interdisciplinary view of biology, chemistry and macromolecular science. Topics covered include natural building blocks and methods by which nature carries out polymer synthesis and modification reactions; DNA; structural proteins; plant proteins; polysaccharides; polyesters; biosurfactants; polymers built from natural monomers and a wide variety of renewable resources; uses of these polymers as fibers, films, rheological modifiers, flocculants, foams, adhesives and membranes; special applications of natural polymers in medicine and as biodegradable plastics. | Prerequisite: undergraduate chemistry and biology or adviser's approval. Co-requisite: None.

Grading: Grad Poly Graded**Repeatable for additional credit:** No**CM-GY 8023 Principles of Spectroscopy (3 Credits)***Typically offered occasionally*

This course covers rotational, vibrational and electronic states of atoms and molecules. Also covered are the interaction of radiation with atoms and molecules; molecular symmetry; rotational and vibrational spectroscopy; and electronic spectroscopy. | Prerequisite: Undergraduate physical chemistry or adviser approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** No**CM-GY 8073 Organic Spectroscopy (3 Credits)***Typically offered Spring*

This course covers structure elucidation by joint applications of spectroscopic techniques such as proton and carbon-13 magnetic resonance, infrared and mass spectroscopy and other methods. | Prerequisite: Undergraduate organic chemistry or adviser's approval. Prerequisite: CM-GY 9033.

Grading: Grad Poly Graded**Repeatable for additional credit:** No**CM-GY 8103 Liquid Chromatography (3 Credits)***Typically offered occasionally*

This course covers the fundamentals of liquid chromatography. Also covered are partitioning; physical and chemical properties of packing materials; size exclusion chromatography; normal-phase and reversed-phase chromatography; hydrophilic interaction liquid chromatography; hydrophobic interaction chromatography; ion-exchange chromatography; preparative chromatography; gradient elution; and method development. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** No**CM-GY 8123 MASS SPECTROSCOPY (3 Credits)***Typically offered occasionally*

This course covers isotopes and molecular masses; various ionization methods and mass analyzers; application to biomolecules in sequential analysis of nucleic acids, peptides, proteins; and analysis of phospholipids, polysaccharides and fatty acids. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** No**CM-GY 8213 Bioanalytical Chemistry (3 Credits)***Typically offered not typically offered*

This course covers exciting new analytical methods in biochemistry and biotechnology, including atomic force microscopy, capillary electrophoresis, surface plasmon resonance and microarrays. The course is based directly on current scientific literature. | Prerequisite: CM-GY 9413 or adviser's approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** No**CM-GY 8303 Nuclear Magnetic Resonance Spectroscopy (3 Credits)***Typically offered not typically offered*

This course covers principles of NMR, including NMR spectrometers; spin decoupling; multi-pulse experiments; 2D NMR; and solid-state NMR. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded**Repeatable for additional credit:** No

CM-GY 8323 MICROSCOPY (3 Credits)

This course review of optics, including optical-microscope fundamentals; phase contrast microscopy; confocal microscopy; IR and Raman microscopy; transmission and scanning electron microscopy; and atomic force microscopy. | Prerequisite: Undergraduate physics or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 8503 SPECIAL TOPICS IN ANALYTICAL CHEMISTRY (3 Credits)

Typically offered occasionally

This course covers Special Topics in Analytical Chemistry. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes

CM-GY 8713 Guided Studies in Chemistry I (3 Credits)

Typically offered Fall, Spring, and Summer terms

This is a special project (experimental, theoretical, computational or literature search). | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 8723 Guided Studies in Chemistry II (3 Credits)

Typically offered Fall, Spring, and Summer terms

This is a special project (experimental, theoretical, computational or literature search). | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9033 Physical Organic Chemistry (3 Credits)

Typically offered Fall

This course covers molecular structure and bonding. Also covered are stereochemical and conformational principles; theories of bonding; physical parameters of stable and reactive molecular states; and applications in biochemistry and polymer chemistry. | Prerequisite: Undergraduate organic chemistry or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9043 Synthetic Organic Chemistry (3 Credits)

Typically offered occasionally

This course covers reactivity of molecules. Also covered are methods of mechanistic study of reaction pathways and important reactions of organic and organometallic chemistry. The course introduces synthesis and applications in living systems and in polymer reactions. | Prerequisite: Undergraduate organic chemistry or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9053 Enzyme Catalysis in Organic Synthesis (3 Credits)

Typically offered occasionally

This course provides students with a working knowledge of how to use biotransformations as a tool in organic chemistry. Students learn about general enzymatic reaction types that carry out the cleavage and formation of C-O bonds, P-O bonds, C-N bonds, C-C bonds, reduction reactions, oxidation reactions and isomerizations. In addition, students are taught about advanced principles currently being applied to the engineering of catalytic proteins. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9403 Special Topics in Organic Chemistry (3 Credits)

Typically offered occasionally

This course covers special Topics in Organic Chemistry. | Prerequisite: Adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes

CM-GY 9413 Biochemistry I (3 Credits)

Typically offered occasionally

This course covers structure and function of biological macromolecules: proteins, nucleic acids, polysaccharides. Also covered are enzymatic kinetics, mechanism and control. | Prerequisite: Undergraduate biochemistry or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9423 Biochemistry II (3 Credits)

Typically offered occasionally

This course covers membrane structure and function and energy production, transformation and utilization. Also covered are the regulation of biochemical systems; the replication, transcription and translation of DNA; mutagenesis and carcinogenesis; and the Immune system. | Prerequisite: undergraduate biochemistry or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9433 Protein Engineering (3 Credits)

Typically offered Spring

This course introduces modern protein engineering techniques available to researchers to understand protein structure and function and to create entirely new proteins for a variety of purposes. This is a new field that lies on the interface of chemistry, biology and engineering. The first part of the course discusses protein composition and structure and various genetic, biochemical and chemical techniques required to engineer proteins—all followed by specific topics. Topics include designing proteins that are highly structured and active at high temperatures and in non-aqueous solvents; that selectively interact with other proteins, small molecules and nucleic acids for therapeutic purposes; and that catalyze new reactions. | Prerequisite: CM-GY 9413 or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9443 Tissue Engineering (3 Credits)

Typically offered occasionally

This course teaches: (1) basic biological processes that occur during blood contact with artificial surfaces, (2) critical review of the literature in the field of tissue engineering, (3) biocompatibility issues relevant to a variety of implant devices that the student may encounter in future endeavors and (4) current approaches directed toward the engineering of cell-based replacements for various tissue types. | Prerequisite: undergraduate biochemistry or adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9453 Special Topics in Biochemistry (3 Credits)

Typically offered occasionally

This course covers special Topics in Biochemistry. | Prerequisite: adviser's approval.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes

CM-GY 9463 RECOMBINANT DNA TECHNOLOGY (3 Credits)

The course consists of lectures and demonstrations and covers practical aspects of recombinant DNA technology, including fundamental aspects of gene expression, restriction enzyme cleavage, plasmids, cloning, genetic transformation of bacteria, protein expression vectors, basic principles of protein purification and manipulation of cloned genes (site-directed mutagenesis). | Prerequisite: CM-GY 9413 or instructor's permission.

Grading: Grad Poly Graded

Repeatable for additional credit: No

CM-GY 9710 CHEMICAL COLLOQUIUM (0 Credits)

Typically offered Fall and Spring

Recent developments in chemical and biomolecular sciences and engineering are presented by engineers and scientists from industry and academia

Grading: Grad Poly Pass/Fail

Repeatable for additional credit: Yes

CM-GY 9731 Seminar in Chemistry I (1.5 Credits)

Typically offered Fall

This course covers chemical topics of current interest and is presented by participating students, staff and outside speakers. One semester is required for MS chemistry students; three semesters required for PhD candidates.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes

CM-GY 9741 Seminar in Chemistry II (1.5 Credits)

Typically offered occasionally

This course covers chemical topics of current interest and is presented by participating students, staff and outside speakers. One semester is required for MS chemistry students; three semesters required for PhD candidates.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes

CM-GY 9751 Seminar in Chemistry III (1.5 Credits)

Typically offered occasionally

This course covers chemical topics of current interest and is presented by participating students, staff and outside speakers. One semester is required for MS chemistry students; three semesters required for PhD candidates.

Grading: Grad Poly Graded

Repeatable for additional credit: Yes