

# CHEMISTRY (CHEM)

## CHEM 101 – GENERAL CHEMISTRY I LABORATORY

1 credit.

Stoichiometry and the mole concept, chemical reactions, thermochemistry, electronic structure of atoms, periodic properties, chemical bonding, intermolecular forces, and the behavior of gases, liquids and solids. Equivalent to laboratory-only part of CHEM 103. Provides a mechanism for awarding credit for experiences with no lecture component. The combination of CHEM 101 and CHEM 105 is equivalent to CHEM 103.

**Requisites:** Consent of instructor

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

## CHEM 102 – GENERAL CHEMISTRY II LABORATORY

1 credit.

Principles and applications of chemical equilibrium, electrochemistry, thermodynamics, kinetics, organic chemistry and other topics that may include nuclear chemistry, biological chemistry and coordination chemistry. Equivalent to laboratory-only part of CHEM 104. Provides a mechanism for awarding credit for experiences with no lecture component. The combination of CHEM 102 and CHEM 106 is equivalent to CHEM 104.

**Requisites:** Consent of instructor

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

## CHEM 103 – GENERAL CHEMISTRY I

4 credits.

Stoichiometry and the mole concept, the behavior of gases, liquids and solids, thermochemistry, electronic structure of atoms and chemical bonding, descriptive chemistry of selected elements and compounds, intermolecular forces, and chemistry laboratory skills.

**Requisites:** MATH 112, 114, 171, 221, or placement into MATH 211 or 221. Not open to students with credit for CHEM 109 or 115

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Summer 2023

## CHEM 104 – GENERAL CHEMISTRY II

5 credits.

Principles and application of chemical equilibrium, coordination chemistry, oxidation-reduction and electrochemistry, kinetics, nuclear chemistry, introduction to organic chemistry, and chemistry laboratory skills.

**Requisites:** CHEM 103 and (MATH 112, 114, 171, or 221). Not open to students with credit for CHEM 109 or 115

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Summer 2023

## CHEM 105 – GENERAL CHEMISTRY I

3 credits.

Stoichiometry and the mole concept, chemical reactions, thermochemistry, electronic structure of atoms, periodic properties, chemical bonding, intermolecular forces, and the behavior of gases, liquids and solids. Equivalent to lecture-only part of CHEM 103. Provides a mechanism for awarding credit for experiences with no laboratory component. The combination of CHEM 101 and CHEM 105 is equivalent to CHEM 103.

**Requisites:** Consent of instructor

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Summer 2023

## CHEM 106 – GENERAL CHEMISTRY II

4 credits.

Principles and applications of chemical equilibrium, electrochemistry, thermodynamics, kinetics, organic chemistry and other topics that may include nuclear chemistry, biological chemistry and coordination chemistry. Equivalent to lecture-only part of CHEM 104. Provides a mechanism for awarding credit for experiences with no laboratory component. The combination of CHEM 102 and CHEM 106 is equivalent to CHEM 104.

**Requisites:** Consent of instructor

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

## CHEM 108 – CHEMISTRY IN OUR WORLD

5 credits.

Selected topics in inorganic and organic chemistry. Emphasis is on relevance to biological, environmental and social issues.

**Requisites:** Not open to students with credit for CHEM 104, 109, or 115

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 109 – ADVANCED GENERAL CHEMISTRY**

5 credits.

Accelerated coverage of topics in general chemistry, including introduction to laboratory techniques. Topics include atomic and molecular structure, chemical equilibrium, acid-base chemistry, thermodynamics, kinetics, and electrochemistry.

**Requisites:** MATH 113, 114, 171, or placement into MATH 221. Not open to students with credit for CHEM 104 or 115

**Course Designation:** Gen Ed - Quantitative Reasoning Part B  
Breadth - Physical Sci. Counts toward the Natural Sci req  
Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 115 – CHEMICAL PRINCIPLES I**

5 credits.

Explores a detailed atomic and molecular view of matter and its interactions, with a specific focus on quantum theory, molecular structure, and chemical bonding. Application required for enrollment.

**Requisites:** Consent of instructor

**Course Designation:** Gen Ed - Quantitative Reasoning Part B  
Breadth - Physical Sci. Counts toward the Natural Sci req  
Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 116 – CHEMICAL PRINCIPLES II**

5 credits.

A quantitative treatment of macroscopic phenomena including thermodynamics, chemical equilibria, solution behavior, electrochemistry, and chemical kinetics.

**Requisites:** CHEM 115

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req  
Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Accelerated Honors (!)

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 155 – STUDY ABROAD IN INTRODUCTORY CHEMISTRY**

1-6 credits.

Study abroad equivalency for introductory chemistry. Enrollment in a UW-Madison resident study abroad program.

**Requisites:** None

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**CHEM 175 – INTRODUCTORY TOPICS IN CHEMISTRY**

1-3 credits.

Various topics in chemistry at the introductory level.

**Requisites:** None

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Fall 2022

**CHEM 260 – ENTERING RESEARCH I**

1 credit.

Introduction to skills that support conducting research in chemistry.

**Requisites:** CHEM 103, 109, or 115

**Course Designation:** Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 261 – ENTERING RESEARCH II**

1 credit.

Advanced skills that support conducting research in chemistry.

**Requisites:** (CHEM 299, 681, 691, or 699, BIOCHEM 699, CBE 599) or concurrent enrollment

**Course Designation:** Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2016

**CHEM 299 – DIRECTED STUDY**

1-4 credits.

Mentored research project as arranged with a faculty or academic staff member.

**Requisites:** Consent of instructor

**Course Designation:** Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023

**CHEM 311 – CHEMISTRY ACROSS THE PERIODIC TABLE**

4 credits.

Explores the properties, reactions and uses of elements and compounds, with emphasis on coordination chemistry of transition-metal ions, bioinorganic chemistry, solid-state structure and main-group elements. Introduces the synthesis and characterization of inorganic compounds.

**Requisites:** CHEM 104, 109, or 116

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 327 – FUNDAMENTALS OF ANALYTICAL SCIENCE**

4 credits.

Fundamentals of chemical measurement in chemistry, biology, engineering, geology, and the medical sciences. Topics include equilibria of complex systems, spectroscopy, electrochemistry, separations, and quantitative laboratory technique.

**Requisites:** CHEM 104 or 109. Not open to students with credit for CHEM 329.

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Summer 2023

**CHEM 329 – FUNDAMENTALS OF ANALYTICAL SCIENCE**

4 credits.

Fundamentals of chemical measurement in chemistry, biology, engineering, geology, and the medical sciences. Topics include equilibria of complex systems, spectroscopy, electrochemistry, separations, and quantitative laboratory technique. Covers chemical equilibria in greater depth and with greater mathematical rigor than CHEM 327.

**Requisites:** CHEM 104 or 109. Not open to students with credit for CHEM 327.

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Accelerated Honors (!)

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 341 – ELEMENTARY ORGANIC CHEMISTRY**

3 credits.

Core organic chemistry concepts of structure, reactivity, and synthesis with regards to the functional groups commonly found in commercial and biological substances. Covers a selection of topics from CHEM 343 and 345.

**Requisites:** CHEM 104, 109, or 116. Not open to students with credit for CHEM 343 or 345

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 342 – ELEMENTARY ORGANIC CHEMISTRY LABORATORY**

1 credit.

Introduces organic laboratory techniques in synthesis, purification and spectral interpretation.

**Requisites:** CHEM 341 or concurrent enrollment. Not open to students with credit for CHEM 344

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 343 – ORGANIC CHEMISTRY I**

3 credits.

Principles of molecular structure and bonding applied to predict and explain the reactivity of alkanes, alkenes, alkynes, alkyl halides, alcohols, and thiols. Emphasis placed on rationalizing the stereochemical and regiochemical outcome of chemical processes.

**Requisites:** CHEM 104, 109, or 116

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Summer 2023

**CHEM 344 – INTRODUCTORY ORGANIC CHEMISTRY LABORATORY**

2 credits.

Introduces the basic synthesis, purification, and characterization techniques of organic chemistry, along with critical interpretation of experimental data.

**Requisites:** (CHEM 345 or concurrent enrollment) and (CHEM 102, 104, 109, or 116)

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Summer 2023

**CHEM 345 – ORGANIC CHEMISTRY II**

3 credits.

Principles of molecular structure and bonding applied to predict and explain the reactivity of aromatic systems, benzylic and allylic systems, aryl and vinyl halides, and carbonyl-containing compounds (e.g., ketones, carboxylic acids, esters, acid chlorides, amides). Emphasis placed on rationalizing the stereochemical and regiochemical outcome of chemical processes as well as arguing reaction outcomes from spectroscopic evidence.

**Requisites:** CHEM 343

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Summer 2023

**CHEM 346 – INTERMEDIATE ORGANIC CHEMISTRY LABORATORY**

1-2 credits.

Multi-step synthetic processes. Advanced experimental techniques such as high-vacuum distillation. Independent research projects.

**Requisites:** CHEM 344 and 345

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 350 – COMMUNICATING CHEMISTRY TO THE PUBLIC VIA DEMONSTRATIONS**

2 credits.

Gain experience in the safe and proper presentation of chemical demonstrations. Join experienced staff who enjoy doing demonstrations and who continue to develop the art of presenting them; learn from students, staff, and faculty from science departments, music, theater and other performing artists who combine their art with scientific experiments to share the joy and excitement of both artistic and scientific creativity. Public presentations will be offered both on and off campus to a wide variety of audiences (students, teachers, parents and the community at large) in a variety of settings (school settings and public venues).

**Requisites:** CHEM 103, 108 or 109**Course Designation:** Level - Intermediate

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**Last Taught:** Fall 2017**CHEM 355 – STUDY ABROAD IN INTERMEDIATE CHEMISTRY**

1-6 credits.

Study abroad equivalency for intermediate chemistry. Enrollment in a UW-Madison resident study abroad program.

**Requisites:** None**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**CHEM 375 – INTERMEDIATE TOPICS IN CHEMISTRY**

1-4 credits.

Various topics in chemistry at the intermediate level.

**Requisites:** CHEM 104, 109, or 116**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Fall 2022**CHEM/M S & E 421 – POLYMERIC MATERIALS**

3 credits.

Polymer chemistry and physics terminologies, structure-property relationship, polymer characterization, polymer synthesis, material requirements for optoelectronics including conjugated polymers, thin film transistors, light emitting diodes, non-linear optical materials, holographic data storage and liquid crystal polymers.

**Requisites:** CHEM 341, 343, or member of Engineering Guest Students**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Intermediate

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM/CBE 505 – ASPECTS OF INDUSTRIAL CHEMISTRY AND BUSINESS FUNDAMENTALS**

3 credits.

Learn the chemistry and chemical engineering that defines societies' standard of living. Commercial chemical processes will be reviewed. Practical realities of how a discovery moves from research to commercial product will be taught through examples and case studies. Financial concepts that guide investment will be reviewed.

**Requisites:** Junior standing and CHEM 345, graduate/professional standing, or member of Engineering Guest Students**Course Designation:** Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**Last Taught:** Spring 2022**CHEM 509 – SENIOR SEMINAR**

2 credits.

Synthesize and integrate advanced chemistry knowledge and skills. Through a series of seminars, specific research problems will be identified. Work in groups utilizing the chemical literature to identify routes to the solutions of these problems.

**Requisites:** (CHEM 561 or 565) and CHEM 563 or concurrent enrollment in CHEM 563**Course Designation:** Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**Last Taught:** Spring 2019**CHEM 511 – ADVANCED INORGANIC CHEMISTRY**

3 credits.

Emphasizes the symmetry, structure and bonding of inorganic compounds. Selected topics may include applications in transition metal chemistry, organometallic chemistry, industrial catalysis, advanced bioinorganic chemistry, solid-state chemistry or main group chemistry.

**Requisites:** (CHEM 345 or concurrent enrollment and junior standing) or graduate/professional standing**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

Honors - Accelerated Honors (!)

**Repeatable for Credit:** No**Last Taught:** Spring 2023

**CHEM 512 – ADVANCED SYNTHESIS AND LABORATORY TECHNIQUES**

1-2 credits.

Synthesis, purification, and characterization of compounds spanning the sub-disciplines of inorganic chemistry, including main-group, transition metal, bioinorganic, organometallic, and solid-state compounds. Laboratory skills developed include Schlenk techniques, glovebox methods, and high-temperature methods, all with an emphasis on chemical safety. Characterization methods may include UV-visible and IR spectroscopy, multi-nuclear NMR spectroscopy, magnetic susceptibility, cyclic voltammetry, mass spectrometry, X-ray diffraction, and chromatographic methods.

**Requisites:** CHEM 311**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM 524 – CHEMICAL INSTRUMENTATION**

3 credits.

Basic principles for designing, developing, and using chemical instrumentation and applying these principles in the laboratory. Spectroscopy, separations, and mass spectrometry instruments are emphasized.

**Requisites:** (CHEM 116, 327, or 329), CHEM 343, MATH 222, and (PHYSICS 202, 208, or 248)**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

Honors - Accelerated Honors (!)

**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM 547 – ADVANCED ORGANIC CHEMISTRY**

3 credits.

Modern principles of synthetic and mechanistic organic chemistry.

**Requisites:** CHEM 345**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

Honors - Accelerated Honors (!)

**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 555 – STUDY ABROAD IN ADVANCED CHEMISTRY**

1-6 credits.

Study abroad equivalency for advanced chemistry. Enrollment in a UW-Madison resident study abroad program.

**Requisites:** None**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**CHEM 561 – PHYSICAL CHEMISTRY**

3 credits.

Macroscopic theory: equilibrium thermodynamics, chemical kinetics and transport properties.

**Requisites:** (CHEM 116, 327, or 329), MATH 222, and (PHYSICS 201, 207, or 247). Not open to students with credit for CHEM 565**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

Honors - Accelerated Honors (!)

**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM 562 – PHYSICAL CHEMISTRY**

3 credits.

Molecular theory: quantum chemistry, molecular structure and spectra, statistical mechanics, selected topics in the molecular theory of matter in bulk.

**Requisites:** MATH 222, (PHYSICS 202, 208, or 248), and (CHEM 561, 565, CBE 310, or MSE 330)**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

Honors - Accelerated Honors (!)

**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM 563 – PHYSICAL CHEMISTRY LABORATORY I**

1 credit.

Principles of experimental physical chemistry applied to the acquisition of thermodynamic and kinetic data; use of basic physical laboratory equipment; related computations, analysis of errors, interpretation of results.

**Requisites:** (CHEM 116, 327 or 329) and (CHEM 561 or concurrent enrollment, CHEM 565 or concurrent enrollment, CBE 310, or M S & E 330)**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**Last Taught:** Summer 2023**CHEM 564 – PHYSICAL CHEMISTRY LABORATORY II**

1 credit.

Principles of experimental physical chemistry applied to the acquisition and interpretation of basic data on molecular structure and dynamics, and properties of macromolecules; principles and use of spectroscopic and other electronic instrumentation.

**Requisites:** (CHEM 562 or concurrent enrollment) and CHEM 563**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** No**Last Taught:** Summer 2023

**CHEM 565 – BIOPHYSICAL CHEMISTRY**

4 credits.

Equilibrium thermodynamics, chemical kinetics, and transport properties, with emphasis on solution behavior and applications to biological macromolecules in solution. Focus on biological applications of physical chemistry.

**Requisites:** (CHEM 116, 327, or 329), MATH 222, (PHYSICS 201, 207, or 247), and (BIOCORE 383 or concurrent enrollment, BIOCHEM 501 or concurrent enrollment, or BIOCHEM 507 or concurrent enrollment). Not open to students with credit for CHEM 561

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 575 – ADVANCED TOPICS IN CHEMISTRY**

1-4 credits.

Various topics in chemistry at the advanced level.

**Requisites:** CHEM 311, 327, 329, or 343

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023

**CHEM 605 – SPECTROCHEMICAL MEASUREMENTS**

3 credits.

Determination of organic structures and reaction mechanisms using mass spectrometry and nuclear magnetic resonance techniques.

**Requisites:** CHEM 344 and 345, or graduate/professional standing

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 606 – PHYSICAL METHODS FOR STRUCTURE DETERMINATION**

1-3 credits.

A survey of spectroscopic methods for inorganic structure determination. Introduces major non-crystallographic techniques with an emphasis on the application to structural analysis. The basic theory and methodology of each form of spectroscopy will be presented. Topics covered include: ligand field theory, electronic absorption, Raman, Mossbauer and EPR spectroscopies, and magnetic susceptibility.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2022

**CHEM 607 – LABORATORY SAFETY**

1 credit.

Aspects of laboratory safety relating to chemical, electrical, optical, mechanical, cryogenic and radiological hazards will be discussed. Safety equipment, techniques (including first aid), and facilities will be introduced.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 608 – SYMMETRY, BONDING, AND MOLECULAR SHAPES**

1-3 credits.

Elementary bonding theory and its application to understanding molecular geometry and reactivity. Emphasizes qualitative methods applied to the bonding of elements from throughout the periodic table.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 613 – CHEMICAL CRYSTALLOGRAPHY**

3 credits.

Theory of structural chemistry, experimental methods involved, applications to problems of chemical interest; use of diffractometric equipment and computer data analysis for an actual structure determination.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 622 – ORGANIC ANALYSIS**

2 credits.

Biological Mass Spectrometry: Fundamentals and Applications.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2021

**CHEM 623 – EXPERIMENTAL SPECTROSCOPY**

2-3 credits.

Current spectroscopic methods employed in chemical analysis with applications in atomic and molecular absorption spectroscopy, infrared and Raman vibrational spectroscopy, fluorescence and light scattering; lecture and laboratory projects.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2022



**CHEM 624 – ELECTROCHEMISTRY**

2-3 credits.

Interfacial electron transfer and mass transport processes in electrochemistry, with applications to electroanalysis, electrodeposition and electrochemical separations.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM/GENETICS 626 – GENOMIC SCIENCE**

2 credits.

Brings cutting-edge topics in the genomic sciences into the reach of those in chemistry, biology, engineering, computer science statistics fields. Enables biologically-oriented students to deal with advances in analytical science so that they may incorporate new genomic science concepts into their own scientific repertoires.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 629 – ATMOSPHERIC CHEMICAL MECHANISMS**

3 credits.

Focuses on the chemical mechanisms and kinetics of reactive gases and aerosol in Earth's atmosphere. Fundamental concepts from analytical, physical, and organic chemistry will be used as tools to describe atmospheric processes occurring in both the troposphere and the stratosphere. Specific topics include: Evolution and chemical composition of Earth's atmosphere; applications of the steady-state approximation; residence and renewal time; sources, transformation, transport and deposition of trace gases in the troposphere; air pollution control strategies; stratospheric chemistry.

**Requisites:** CBE 310 or concurrent enrollment in CHEM 561 or 565; or graduate/professional standing

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 630 – SELECTED TOPICS IN ANALYTICAL CHEMISTRY**

1-3 credits.

Lectures of a specialized nature in advanced analytical chemistry.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023

**CHEM 635 – TOPICS IN COMPUTATIONAL CHEMISTRY**

1 credit.

An introduction to computational chemistry. Covers new techniques and developments in the literature, and specific types of calculations that are relevant to current research and needs.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023

**CHEM 636 – TOPICS IN CHEMICAL INSTRUMENTATION: INTRODUCTION TO NMR**

2 credits.

Theory and practice of nuclear magnetic resonance (NMR) spectroscopy.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 637 – TOPICS IN CHEMICAL INSTRUMENTATION: ADVANCED METHODS IN NMR**

1-2 credits.

Advanced methods of nuclear magnetic resonance (NMR) spectroscopy.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Summer 2017

**CHEM 641 – ADVANCED ORGANIC CHEMISTRY**

3 credits.

Topics in physical organic chemistry.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 652 – CHEMISTRY OF INORGANIC MATERIALS**

3 credits.

Materials chemistry of inorganic solids. Focuses on the application of chemical concepts to an understanding of properties of solids and how these properties are manifested in practical applications.

**Requisites:** Graduate/professional standing

**Repeatable for Credit:** No

**Last Taught:** Fall 2021

**CHEM 653 – CHEMISTRY OF NANOSCALE MATERIALS**

3 credits.

Introduction to solid state materials chemistry, with an emphasis on contemporary topics in the chemistry of nanomaterials. Incorporates fundamental knowledge of solid-state chemistry and traditional materials chemistry with current nanoscale and nanostructural materials research.

**Requisites:** (CHEM 311 and 561) or graduate/professional standing

**Course Designation:** Breadth - Physical Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 654 – MATERIALS CHEMISTRY OF POLYMERS**

2-3 credits.

Polymer classification, synthesis, and molecular architecture; solid state structure and characterization; glassy state and glass transition; polymer rheology in solids and gels; transport, dielectric and optical properties.

**Requisites:** CHEM 345 and (CHEM 561, 565 or CBE 310), or graduate/professional standing

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 661 – CHEMICAL AND STATISTICAL THERMODYNAMICS**

3 credits.

Basic chemical thermodynamics with applications to chemical and phase equilibria and the study of solutions; introduction to statistical mechanics and calculation of thermodynamic quantities from molecular models; stability and fluctuations.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 664 – PHYSICAL CHEMISTRY OF MACROMOLECULES**

2-3 credits.

Structure, thermodynamics, and dynamics of polymers in solution and in the bulk; theoretical models and experimental methods; polymer characterization.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2021

**CHEM/BIOCHEM 665 – BIOPHYSICAL CHEMISTRY**

4 credits.

Equilibrium thermodynamics, chemical kinetics and transport properties, with emphasis on solution behavior and application to noncovalent interactions of biological macromolecules in solution. Focus on biological applications of physical chemistry.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**CHEM 668 – BIOPHYSICAL SPECTROSCOPY**

2-3 credits.

Focuses on the underlying principles and applications of spectroscopic and microscopy methods employed to solve biological problems at the atomic and molecular level. Techniques covered include electronic absorption and fluorescence spectroscopy, circular dichroism, light scattering, fluorescence microscopy, multidimensional nuclear magnetic resonance and electron spin resonance.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 675 – INTRODUCTORY QUANTUM CHEMISTRY**

3 credits.

Basic principles of quantum chemistry, exactly solvable problems, angular momentum, approximation methods, applications to electronic structure.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2022

**CHEM 681 – SENIOR HONORS THESIS**

2-4 credits.

Mentored research for students completing a thesis in an Honors program.

**Requisites:** Consent of instructor

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S Honors - Honors Only Courses (H)

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Fall 2022

**CHEM 682 – SENIOR HONORS THESIS**

2-4 credits.

Mentored research for students completing a thesis in an Honors program.

**Requisites:** Consent of instructor

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S Honors - Honors Only Courses (H)

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023



**CHEM 691 – SENIOR THESIS**

2-6 credits.

Mentored research for students completing a senior thesis.

**Requisites:** Consent of instructor**Course Designation:** Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Fall 2022**CHEM 692 – SENIOR THESIS**

2-6 credits.

Mentored research for students completing a senior thesis.

**Requisites:** Consent of instructor**Course Designation:** Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023**CHEM 699 – DIRECTED STUDY**

1-6 credits.

Advanced mentored research project as arranged with a faculty or academic staff member.

**Requisites:** Consent of instructor**Course Designation:** Level - Advanced

L&amp;S Credit - Counts as Liberal Arts and Science credit in L&amp;S

**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Summer 2023**CHEM 701 – RESPONSIBLE CONDUCT OF RESEARCH IN THE CHEMICAL SCIENCES**

1 credit.

Scientific integrity and professional behavior in the chemical sciences. Topics include conflict of interest, human and animal subjects in research, mentor and mentee responsibilities, collaborative research, peer review, data acquisition and management, research misconduct, responsible authorship and publication, and societal impacts.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, for 3 number of completions**Last Taught:** Spring 2023**CHEM/BIOCHEM 704 – CHEMICAL BIOLOGY**

3 credits.

Chemistry and biology of proteins, nucleic acids and carbohydrates; application of organic chemistry to problems in cell biology, biotechnology, and biomedicine.

**Requisites:** Declared in Biochemistry or Chemistry graduate program**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 713 – INORGANIC AND ORGANOMETALLIC CHEMISTRY OF THE MAIN GROUP ELEMENTS**

1-3 credits.

Descriptive inorganic chemistry, organometallic chemistry of main-group elements, and organosilicon chemistry.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 714 – ORGANOMETALLIC CHEMISTRY OF THE TRANSITION ELEMENTS**

2-3 credits.

Fundamental and applied aspects of organotransition-metal chemistry, including structure and bonding, reactivity, and catalytic applications of organometallic complexes.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 721 – INSTRUMENTAL ANALYSIS**

3-4 credits.

Chemical instrumentation and instrumental methods of analysis.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 725 – SEPARATIONS IN CHEMICAL ANALYSIS**

2-3 credits.

Basic principles of chemical and biochemical separations by chromatography and electrophoresis.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 728 – ELECTRONICS FOR CHEMICAL INSTRUMENTATION**

3 credits.

Learn and apply the principles of analog and digital electronics and computer interfaces for controlling and monitoring components of importance to chemical instrumentation.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2023

**CHEM 738 – INTRODUCTION TO MASS SPECTROMETRY**

1 credit.

Introduction to the theory and practice of mass spectrometry. Topics include gas chromatography/mass spectrometry (GCMS), electrospray ionization (ESI), matrix assisted laser-desorption ionization (MALDI), liquid chromatography/mass spectrometry (LCMS), imaging mass spectrometry, and ion mobility mass spectrometry.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM/B M E/MED PHYS 750 – BIOLOGICAL OPTICAL MICROSCOPY**

3 credits.

Covers several aspects of state-of-the-art biological and biophysical imaging with an emphasis on instrumentation, beginning with an overview of geometrical optics and optical and fluorescence microscopy. The bulk of the course will focus on advanced imaging techniques including nonlinear optical processes (multi-photon excitation, second harmonic generation, and stimulated Raman processes) and emerging super-resolution methods. Special emphasis will be given to current imaging literature and experimental design. Knowledge of physics-based optics [such as PHYSICS 202] strongly recommended.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2021**CHEM 758 – CHEMISTRY EDUCATION RESEARCH**

2 credits.

An introduction to chemistry education research and the theories that underpin it. Develop and refine models of learning on the basis of primary literature. Explore how theories of cognition could and should inform learning objectives and assessments in college chemistry learning environments. Substantial emphasis placed on critically reading and analyzing studies in the chemistry education research literature with an eye toward the implicit and explicit theories of cognition informing the work.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 762 – MOLECULAR REACTION DYNAMICS**

2-3 credits.

Microscopic approach to chemical dynamics.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2015**CHEM 763 – INTRODUCTION TO MOLECULAR SPECTROSCOPY**

2-3 credits.

Quantum mechanics of molecular rotation and vibration; principles of group theory; electronic, vibrational, and magnetic resonance spectroscopy in gas and condensed phases.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM/PHM SCI 766 – MOLECULAR RECOGNITION**

2-3 credits.

Origin, nature, classification, and description of intermolecular forces. The hydrophobic effect. Molecular complexes, binding constants, and their measurements. General principles of self-assembly, molecular recognition, complex formation, host design. Supramolecular systems and their dynamics. Micelles, bilayers, vesicles, biological membranes.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 775 – ELECTRONIC STRUCTURE OF MOLECULES**

2-3 credits.

Applications of quantum mechanics to the electronic structure and properties of molecules.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM 777 – PHYSICAL CHEMISTRY OF SURFACES**

2-3 credits.

Structure, thermodynamics, kinetics, and reactivity of molecules at the interfaces between gases, liquids and solids, with applications to catalysis, atmospheric chemistry, monolayers, and thin films.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 801 – SELECTED TOPICS IN INORGANIC CHEMISTRY**

1-3 credits.

Various selected topics in contemporary inorganic chemistry.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023

**CHEM 840 – ADVANCED TOPICS IN ORGANIC CHEMISTRY**

1-4 credits.

Various selected topics in contemporary organic chemistry.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2022**CHEM 841 – ADVANCED ORGANIC CHEMISTRY**

3 credits.

Synthesis of simple and complex organic compounds.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM 842 – ADVANCED ORGANIC CHEMISTRY**

1-3 credits.

Various selected topics in contemporary organic chemistry.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2016**CHEM 843 – ADVANCED ORGANIC CHEMISTRY**

1-3 credits.

Fundamental concepts in organic chemistry reactions and mechanisms.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2022**CHEM 845 – MACROMOLECULAR CHEMICAL BIOLOGY**

2 credits.

Critically read, analyze and discuss the primary literature in chemical biology by focusing on topics associated with macromolecules (largely proteins and nucleic acids).

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2023**CHEM 858 – SPECIAL TOPICS IN CHEMISTRY EDUCATION**

1-3 credits.

Various selected topics in contemporary chemistry education.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2022**CHEM 860 – SELECTED TOPICS IN PHYSICAL CHEMISTRY**

1-3 credits.

Various selected topics in contemporary physical chemistry.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023**CHEM 864 – STATISTICAL MECHANICS**

2-3 credits.

Fundamentals of statistical mechanics; applications to equilibrium and non-equilibrium properties of gases and condensed phases.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2018**CHEM/BIOCHEM 872 – SELECTED TOPICS IN MACROMOLECULAR AND BIOPHYSICAL CHEMISTRY**

1-3 credits.

Various selected topics in contemporary macromolecular or biophysical chemistry.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023**CHEM 890 – HIGHLIGHTS AT THE CHEMISTRY-BIOLOGY INTERFACE**

1 credit.

Oral presentations on thesis research at the chemistry-biology interface. Includes discussions of reproducibility, rigor, and the responsible conduct of research.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023**CHEM 900 – SEMINAR-INORGANIC CHEMISTRY**

0 credits.

Presentations of recent research in inorganic chemistry and related areas by external and internal speakers.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023

**CHEM 901 – SEMINAR-TEACHING OF CHEMISTRY**

0-1 credits.

The role of the teaching assistant in undergraduate chemistry instruction. Effective utilization of instructional aids. Innovations for better teaching.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Fall 2022**CHEM/BIOCHEM 918 – SINGLE MOLECULE APPROACHES TO BIOLOGY**

1 credit.

A combination of recent literature and original research presentations relating to the use of single molecule techniques in biochemistry including fluorescence microscopy, tethered particle motion, patch-clamping, cryo-electron microscopy, optical trapping, magnetic tweezers, and super resolution microscopy.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Fall 2022**CHEM 920 – SEMINAR-ANALYTICAL CHEMISTRY**

0 credits.

Presentations of recent research in analytical sciences and related areas by external and internal speakers.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023**CHEM 923 – GENOMIC SCIENCES PROGRAM SEMINAR**

1 credit.

Cross-disciplinary exposure to cutting edge research in genomic sciences. Seminars presented by trainees and other scientists who study genomics using approaches based in chemistry, computer science, biostatistics, engineering and biological and biomedical sciences. Research objectives, findings and future directions are discussed.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023**CHEM 940 – SEMINAR-ORGANIC CHEMISTRY**

0 credits.

Presentations of recent research in organic chemistry and related areas by external and internal speakers.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023**CHEM 941 – SEMINAR-SYNTHETIC ORGANIC CHEMISTRY**

0-1 credits.

Presentations of recent research in synthetic organic chemistry and related areas by external and internal speakers.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Fall 2016**CHEM 942 – SEMINAR-PHYSICAL ORGANIC CHEMISTRY**

0-1 credits.

Presentations of recent research in physical organic chemistry and related areas by external and internal speakers.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2016**CHEM 943 – SEMINAR-BIO-ORGANIC CHEMISTRY**

0-1 credits.

Presentations of recent research in bioorganic chemistry and related areas by external and internal speakers.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2016**CHEM/BIOCHEM 945 – SEMINAR-CHEMICAL BIOLOGY (ADVANCED)**

1 credit.

Presentations and discussions of recently published research in chemical biology and related areas.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023**CHEM 960 – SEMINAR-PHYSICAL CHEMISTRY**

0-2 credits.

Presentations of recent research in physical chemistry and related areas by external and internal speakers.

**Requisites:** Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2023

**CHEM 980 – SEMINAR: REVIEW OF CURRENT RESEARCH**

1 credit.

Research discussions facilitated by individual faculty members and occurring between all members of the research group.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023

**CHEM 990 – RESEARCH**

1-15 credits.

Research supervised by individual faculty members.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Summer 2023