

# CHEMISTRY (CHEM)

## **CHEM 412G Introduction to Physical Chemistry 5 Hours**

Chemical principles involved in thermodynamics, kinetics, molecular structure, and other topics using biological examples. Specifically for secondary education students and those students not qualifying for the CHEM 450/452 sequence. Lecture, 3 hours; lab, 2 hours. Lab meets 4 + hours per week.

**Restriction(s):** Students cannot enroll who are in Chemistry (059)

**Course Fee:** \$35

*Recent Term(s) Offered: None*

## **CHEM 420G Inorganic Chemistry 3 Hours**

Atomic and molecular structure, bonding theory, ionic substances, electron deficient compounds, acid-base theory and coordination chemistry.

*Recent Term(s) Offered: spring 2019; spring 2020; spring 2021*

## **CHEM 421G Inorganic Chemistry Laboratory 1 Hour**

A laboratory course emphasizing the synthesis and characterization of inorganic compounds of main group and transition metals. Laboratory meets once a week for three hours.

**Corequisite(s):** CHEM 420G

*Recent Term(s) Offered: None*

## **CHEM 425G Polymer Chemistry 4 Hours**

The principles of polymer chemistry. Lecture topics include molecular weights, morphology, mechanisms, kinetics, characterization, and uses of polymers by free radical and ionic methods in their characterization by thermal analysis, spectroscopy, viscometry, and chromatography.

**Course Fee:** \$35

*Recent Term(s) Offered: None*

## **CHEM 430G Forensic Chemistry 3 Hours**

Methods and instrumentation used in the crime laboratory and in the medical technology laboratory. Topics include drugs, blood enzymes, organic and inorganic analysis, etc.

**Course Fee:** \$35

*Recent Term(s) Offered: spring 2019; spring 2021*

## **CHEM 435G Instrumental Analysis 3 Hours**

Modern instrumental methods of analysis including spectroscopic, electroanalytical and chromatographic techniques.

*Recent Term(s) Offered: fall 2019; fall 2020; fall 2021*

## **CHEM 446G Biochemistry 3 Hours**

A study of biochemical compounds and their role in intermediary metabolism. Special topics include biochemical energetics and coenzyme mechanisms.

*Recent Term(s) Offered: spring 2019; fall 2020; spring 2021; fall 2021*

## **CHEM 447G Lab Biochemistry 2 Hours**

A basic laboratory study involving selected experiments which illustrate biochemical principles including separation, identification and chemical properties of carbohydrates, lipids, proteins and enzymes.

**Corequisite(s):** CHEM 446G

**Course Fee:** \$35

*Recent Term(s) Offered: None*

## **CHEM 450G Physical Chemistry I 3 Hours**

A study of theoretical chemistry, including such as gaseous state, solid state, liquid state, thermodynamics, thermochemistry and phase and chemical equilibria.

*Recent Term(s) Offered: spring 2020; spring 2021*

## **CHEM 451G Lab Physical Chemistry I 2 Hours**

A laboratory to accompany CHEM 450G and includes experiments on state of matter, surface phenomena, macromolecules, thermochemistry, thermodynamics and equilibria. Pre-lab lecture and laboratory meets four and one-half hours per week.

**Corequisite(s):** CHEM 450G

**Course Fee:** \$50

*Recent Term(s) Offered: None*

## **CHEM 452G Physical Chemistry II 3 Hours**

A continuation of CHEM 450G including studies of kinetics, atomic and molecular structure, theory of chemical bonding, electromotive force and selected topics.

*Recent Term(s) Offered: spring 2019; spring 2020; spring 2021*

## **CHEM 453G Lab Physical Chemistry II 2 Hours**

A laboratory to accompany CHEM 452G and includes experiments on chemical kinetics, spectroscopy, molecular structure, electrochemistry and mass spectroscopy. Pre-lab lecture and laboratory meets four and one-half hours per week.

**Corequisite(s):** CHEM 452G

**Course Fee:** \$50

*Recent Term(s) Offered: None*

## **CHEM 462G Bioinorganic Chemistry 3 Hours**

This course is a study of the coordinating properties and reactivity of metal ions in living organisms. Metal ion toxicity and detoxification systems and functions of various metalloenzymes will be discussed.

*Recent Term(s) Offered: None*

## **CHEM 467G Biochemistry 3 Hours**

A study of the reactions of living systems and an introduction to the mechanisms and energetics of metabolism.

*Recent Term(s) Offered: spring 2019*

## **CHEM 470G Chemistry/Middle School 2-4 Hours**

Chemical theories and principles in the middle school science curricula. (elective credit only)

*Recent Term(s) Offered: None*

## **CHEM 475G Selected Topics in Chemistry 1-3 Hours (repeatable max of 6 hrs)**

Topics in analytical, biochemical, coal, inorganic, organic, physical and polymer chemistry.

*Recent Term(s) Offered: None*

## **CHEM 476G Advanced Laboratory Investigations in Chemistry 2 Hours**

A course for advanced students involving assigned laboratory work in the field of inorganic chemistry. Typical procedures and experiments are those involving the synthesis, characterization, and identification of various chemical compounds, using a variety of handling techniques, and the application of various physical methods.

**Course Fee:** \$50

*Recent Term(s) Offered: None*

**CHEM 490G Materials Chemistry 3 Hours**

A study of the three major classes of materials, metals, polymers, and ceramics. Topics discussed will include chemical composition, bonding, common chemical and physical properties, microstructures, and how processing and uses are affected by chemical and physical properties.  
*Recent Term(s) Offered: None*

**CHEM 491G Materials Chemistry Laboratory 3 Hours**

A laboratory course in materials that includes experiments on liquid flow, solid deformation, thermal properties, electrical conductivity of materials, microscopy, diffraction techniques, processing and testing of shaped articles.  
*Recent Term(s) Offered: None*

**CHEM 516 Chemical Literature Review 1-3 Hours**

Review of chemical literature on topics of individual interest. Includes reports and proposals for further research.  
*Recent Term(s) Offered: spring 2019; fall 2019; spring 2020; fall 2020; spring 2021; fall 2021*

**CHEM 520 Advanced Inorganic Chemistry 3 Hours**

Various aspects of coordination chemistry.  
*Recent Term(s) Offered: fall 2020*

**CHEM 531 Advanced Analytical Chemistry 3 Hours**

Survey of selected topics in modern instrumental methods of chemical analysis. Includes instrumental techniques not covered in CHEM 435.  
*Recent Term(s) Offered: spring 2020*

**CHEM 535 Analytical Biochemistry 3 Hours**

An overview of the science of modern analytical and instrumental techniques with particular emphasis on techniques relevant to measurements in biochemistry and biology.  
**Prerequisite(s):** (CHEM 446G or CHEM 446) or (BIOL 446G or BIOL 446) or permission of instructor  
**Equivalent(s):** BIOL 535  
*Recent Term(s) Offered: spring 2020; fall 2021*

**CHEM 540 Organic Reactions 3 Hours**

An advanced discussion of organic synthesis, including modern synthetic methods used to make targeted compounds in systematic ways.  
*Recent Term(s) Offered: fall 2019*

**CHEM 541 Advanced Organic Chemistry 3 Hours**

Modern physical-organic chemistry including bonding, stereochemistry, reaction mechanisms, concerted reactions, photo-chemistry, and free-radical reactions.  
*Recent Term(s) Offered: spring 2019; spring 2021*

**CHEM 550 Advanced Physical Chemistry 3 Hours**

Covers thermodynamics, kinetics and molecular structure in preparation for graduate study or research.  
*Recent Term(s) Offered: spring 2019; fall 2020*

**CHEM 560 Chemical Agents and Explosives 3 Hours**

A study of the fundamental principles of chemical agents and explosives. Review of chemical reactions associated with these chemicals including detection methods, effects on targets, modes of delivery, and methods for protecting people.  
*Recent Term(s) Offered: fall 2019; fall 2021*

**CHEM 562 Advanced Biochemistry 3 Hours**

Survey of biochemical research areas where significant advances have been made in recent years. Textbook readings, review articles and current research papers will be incorporated into lectures and discussions.  
**Equivalent(s):** BIOL 562  
*Recent Term(s) Offered: fall 2019; fall 2021*

**CHEM 569 Internship in Chemistry 3 Hours**

Practical experience in a supervised work situation with a cooperating business, industry, or governmental agency. Emphasizes application of knowledge and skills in chemistry.  
*Recent Term(s) Offered: None*

**CHEM 570 Lecture Demonstration Techniques 3 Hours**

The design and operation of meaningful lecture demonstrations in chemistry.  
*Recent Term(s) Offered: None*

**CHEM 572 Detection/Analysis of Chemical Agents and Explosives Lecture 3 Hours**

An advanced study of the fundamental principles and applications for detection/analysis of chemical threats.  
**Prerequisite(s):** CHEM 560  
**Corequisite(s):** CHEM 573  
*Recent Term(s) Offered: None*

**CHEM 573 Detection/Analysis of Chemical Agents and Explosives Laboratory 1 Hour (repeatable max of 3 hrs)**

An applications laboratory for detection/analysis of chemical threats.  
**Course Fee:** \$25  
*Recent Term(s) Offered: None*

**CHEM 580 Chemical Skills 3 Hours**

Skills in the use of the library, glass working, and the laboratory. May be used to satisfy the research tool requirement.  
*Recent Term(s) Offered: None*

**CHEM 588 Research Proposal 2 Hours**

This course is to provide a practical graduate-level overview of research design and proposal writing in chemistry. Students will learn to identify problems/needs, review chemical literature, formulate hypotheses, and design research methodology for their thesis projects.  
*Recent Term(s) Offered: spring 2019; summer 2019; fall 2019; spring 2020; fall 2020; spring 2021; fall 2021*

**CHEM 590 Material Chemistry 3 Hours**

A class describes the various materials, including metals, semiconductors and polymers. The class is focusing on understanding the relationships between the arrangement of atoms, ions, or molecules comprising materials, and its bulk structural/physical properties, as well as thermochemical properties, kinetic rates and spectroscopic properties of materials.  
*Recent Term(s) Offered: fall 2021*

**CHEM 591 Material Chemistry Laboratory 3 Hours**

Laboratory course focusing on the properties of materials and how they relate to the structure of the materials. Materials studies will include metals, polymers, ceramics, composites and energetic materials, and a variety of applications will be discussed including high energy, industrial, and pharmaceutical materials. Techniques including thermal analysis, X-ray diffraction, microscopy, and mechanical testing will be employed.  
*Recent Term(s) Offered: None*

**CHEM 595 Scientific Writing in Chemistry 1-6 Hours**

A course to build and enhance students' writing skills when preparing lab reports, scientific articles and other professional communications.

**Prerequisite(s):** CHEM 596 (may be taken concurrently) or permission of instructor

*Recent Term(s) Offered: spring 2019; spring 2021; fall 2021*

**CHEM 596 Practicum Research Experience in Chemistry 1-10 Hours**

A student will work under the direction of a faculty advisor on a project proposed by the student or a project of mutual scientific interest. This research will lead to a thesis in chemistry.

**Prerequisite(s):** permission of instructor

*Recent Term(s) Offered: spring 2019; fall 2019; spring 2021; fall 2021*

**CHEM 598 Graduate Seminar 0.5 Hours** (repeatable max of 2 hrs)

Required each semester for all MS Chemistry students. Attendance is required of all full-time graduate students.

*Recent Term(s) Offered: spring 2019; summer 2019; fall 2019; spring 2020; summer 2020; fall 2020; spring 2021; fall 2021*

**CHEM 599 Thesis Research/Writing 1-6 Hours** (repeatable max of 6 hrs)

Thesis research and writing directed by faculty committee.

**Course Fee:** \$50

*Recent Term(s) Offered: spring 2019; summer 2019; fall 2019; spring 2020; summer 2020; fall 2020; spring 2021; summer 2021; fall 2021*

**CHEM 600 Maintaining Matriculation 1-6 Hours** (repeatable max of 6 hrs)

Continued enrollment for thesis completion.

*Recent Term(s) Offered: summer 2019; summer 2020; spring 2021*

**CHEM 799 Doctoral Research/Chemistry 1-6 Hours**

No course description is available

*Recent Term(s) Offered: None*