CHEMISTRY (CHEM)

CHEM 101 Introduction to Chemistry 3 Hours
A one semester terminal general education course for non-science majors covering chemistry in everyday life. In-class laboratory constitutes 20 percent of class. **Colonnade/Statewide General Education Code E-NS, E-SL | SL, NS**
Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; summer 2023; fall 2023; winter 2024; spring 2024; summer 2024; fall 2024

CHEM 105 Fundamentals of General Chemistry 3 Hours
The first half of a one-year course predominantly for majors in agriculture and consumer and family sciences, and for non-science majors desiring a full year sequence in chemistry. It does not count toward a major or a minor in chemistry. Note: Two years of high school algebra required. **Colonnade/Statewide General Education Code E-NS | NS**
Corequisite(s): CHEM 106
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 106 Fundamentals of General Chemistry Laboratory 1 Hour
Laboratory to accompany CHEM 105. Pre-lab lecture and laboratory meet two and one-half hours per week. **Colonnade/Statewide General Education Code E-SL | SL**
Corequisite(s): CHEM 105
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 107 Fundamentals of Organic Chemistry 3 Hours
A continuation of CHEM 105 with a major portion of the course devoted to organic chemistry which ends the one-year course for non-science majors. It does not count toward a major or minor in chemistry.
Prerequisite(s): CHEM 105 and CHEM 106
Corequisite(s): CHEM 108
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 108 Fundamentals of Organic Chemistry Laboratory 1 Hour
The laboratory to accompany CHEM 107. A major portion of the course deals with experiments in organic and biochemistry. Pre-lab lecture and laboratory meet two and one-half hours per week.
Prerequisite(s): CHEM 105 and CHEM 106
Corequisite(s): CHEM 107
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 109 Chemistry for the Health Sciences 4 Hours
A course designed to emphasize the practical aspects on inorganic, organic and biochemistry as related to human health. The course is offered specifically for students in the allied health programs, but is also recommended for students in physical education, recreation, health and safety and other disciplines dealing with human health. It does not count toward a major or minor in chemistry, but does satisfy general education requirement. **Colonnade/Statewide General Education Code E-NS | NS**
Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; winter 2024; spring 2024; summer 2024; fall 2024

CHEM 111 Introduction to Forensic Chemistry 3 Hours
A combination of lecture and in-class laboratory activities designed to introduce the fundamentals of forensic chemistry in a criminalistics context. Topics discussed may include evidence collection and preservation, patterns (especially fingerprints and blood spatter), fire and arson, drugs and poisons, firearms and explosives, trace evidence analysis, and DNA. In-class laboratory constitutes 20% of the class. **Colonnade/Statewide General Education Code E-SL, E-NS | SL, NS**
Recent Term(s) Offered: spring 2022

CHEM 116 Introduction to College Chemistry 3 Hours
A one-semester course for students desiring a general survey of chemistry with a mathematical emphasis. An introductory course for College Chemistry students whose ACT score in mathematics would indicate marginal success in CHEM 120. Does not count toward a major/minor in chemistry nor does it satisfy the requirements for certain consumer and family science or agriculture majors. CHEM 106 laboratory is optional. **Colonnade/Statewide General Education Code E-NS | NS**
Prerequisite(s): (MATH 116 (may be taken concurrently) or MATH 117 (may be taken concurrently) or MATH 118 (may be taken concurrently) or MATH 119 (may be taken concurrently) or MATH 136 (may be taken concurrently) or MA 116C (may be taken concurrently) or MATH 116E (may be taken concurrently))
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 120 College Chemistry I 3 Hours
The first half of the standard year-long general chemistry course sequence for science majors and minors. **Colonnade/Statewide General Education Code E-NS | NS**
Prerequisite(s): ((ACT Math with a score of 26 or SAT Math Score with a score of 630) or (ACT Math with a score of 22 and MPE - Algebra with a score of 18) or (SAT Math Score with a score of 560 and MPE - Algebra with a score of 18) or (MATH 116 with a minimum grade of C or MATH 116E with a minimum grade of C or MA 116C with a minimum grade of C))
Corequisite(s): CHEM 121
Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; summer 2023; fall 2023; winter 2024; spring 2024; summer 2024; fall 2024

CHEM 121 College Chemistry I Laboratory 2 Hours
Laboratory to accompany CHEM 120. One third of each meeting is spent reviewing material from the lecture and the remaining time is used to carry out laboratory investigations. Pre-lab lecture and laboratory meet once each week for three hours per week. **Colonnade/Statewide General Education Code E-SL | SL**
Corequisite(s): CHEM 120
Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 222 College Chemistry II 3 Hours
A continuation of the standard year long general chemistry course sequence for science majors and minors.
Prerequisite(s): CHEM 120 with a minimum grade of C and CHEM 121 with a minimum grade of C
Corequisite(s): CHEM 223
Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 223 College Chemistry II Laboratory 2 Hours
Laboratory to accompany CHEM 222. Pre-lab lecture and laboratory meet for four hours per week.
Corequisite(s): CHEM 222
Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 295 Introduction to Research Methodology 1 Hour
To familiarize Ogden Research Scholars and other research oriented students with the fundamentals of choosing a research topic, performing a bibliographical search on a subject, classification or instruments, data taking, data reduction, professional ethics and other research oriented topics. The common points of research methodology in the different scientific areas will be accentuated. Examples will be drawn from the various disciplines. Use of computers will be emphasized. (Course does not count toward any major or minor). Note: Ogden Research Scholar,or 3.2 grade point average at the end of freshman year; or Ogden College faculty member recommendation required.
Equivalent(s): MATH 295, BIOL 295, CS 295, ENGR 295, PHYS 295
Recent Term(s) Offered: None

CHEM 299 Introduction to Chemical Research 3 Hours
Course designed to introduce the student to independent chemical research. Each credit hour requires 2 1/2 hours laboratory work per week with written and oral reports of laboratory work suggested. Note: Consent of a faculty research advisor.
Prerequisite(s): permission of instructor
Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; fall 2024

CHEM 304 Biochemistry for the Health Sciences 3 Hours
A brief treatment of organic chemistry is used as an introduction to carbohydrates, lipids, proteins and nucleic acids emphasizing their functional roles in the biological system. Specific topics will include bioenergetics, enzymes, acid-based balance. This course does not count toward a major or minor in biology or chemistry.
Prerequisite(s): (CHEM 109 or CHEM 107)
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CHEM 320 Inorganic Chemistry I 3 Hours
Introduction to the foundational principles of inorganic chemistry: atomic and molecular structure, periodicity, bonding, ionic substances, main group, and transition metal chemistry.
Prerequisite(s): CHEM 222 with a minimum grade of C and CHEM 223 with a minimum grade of C
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CHEM 330 Quantitative Analysis 5 Hours (repeatable max of 5 hrs)
A study of the common techniques and theory of gravimetric, volumetric, electrochemical, and optical methods of analysis. Lecture, 3 hours; laboratory, 2 hours. Laboratory meets four and one-half hours per week.
Prerequisite(s): CHEM 222 with a minimum grade of C and CHEM 223 with a minimum grade of C
Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 340 Organic Chemistry I 3 Hours
The first half of the standard one-year course for chemistry majors. Discussion includes structure of organic molecules, mechanisms, and preparations.
Prerequisite(s): CHEM 222 with a minimum grade of C and CHEM 223 with a minimum grade of C
Corequisite(s): CHEM 341
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 341 Organic Chemistry Laboratory I 2 Hours
Laboratory work includes purification and characterization of organic compounds.
Prerequisite(s): CHEM 222 with a minimum grade of C and CHEM 223 with a minimum grade of C
Corequisite(s): CHEM 340
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 342 Organic Chemistry II 3 Hours
A continuation of CHEM 340.
Prerequisite(s): CHEM 340 with a minimum grade of C and CHEM 341 with a minimum grade of C
Corequisite(s): CHEM 343
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 343 Organic Chemistry II Laboratory 2 Hours
Includes studies of typical organic reactions and an introduction to qualitative organic analysis.
Prerequisite(s): CHEM 340 with a minimum grade of C and CHEM 341 with a minimum grade of C
Corequisite(s): CHEM 342
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 369 Cooperative Education in Chemistry I 3-6 Hours
(repeatable max of 6 hrs)
Practical out-of-the classroom experience in a supervised work situation with a cooperating business, industry, or governmental agency, emphasizing laboratory skills in chemistry.
Restriction(s): Students with a semester level of Freshman may **not** enroll.
Recent Term(s) Offered: fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 389 Cooperative Education in Chemistry II 3-6 Hours
(repeatable max of 6 hrs)
Practical out-of-the classroom experience in a supervised work situation with a cooperating business, industry, or governmental agency, emphasizing laboratory skills in chemistry.
Restriction(s): Students with a semester level of Freshman or Sophomore may **not** enroll.
Recent Term(s) Offered: spring 2023

CHEM 398 Undergraduate Seminar 1 Hour
A formal introduction to the chemical literature culminating in a student presentation on a selected topic. A treatment pertaining to career opportunities for chemists, resume writing, interview techniques and outside speakers from industry and academics will be included.
Restriction(s): Students with a semester level of Freshman or Sophomore may **not** enroll.
Recent Term(s) Offered: fall 2022; fall 2023; spring 2024; fall 2024

CHEM 399 Research Problems in Chemistry 3 Hours
Special research assignments in accord with the interest of the student. Requires a minimum of (3) hours laboratory work per week for each hour of credit. A written report of the work is required. Note: Consent of faculty research advisor required.
Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 420 Inorganic Chemistry II 3 Hours
Advanced study of inorganic chemistry: molecular symmetry and applications, covalent bonding and molecular orbital, ionic bonding and solid state chemistry, acid-base theory, coordination chemistry, and organometallic chemistry.
Prerequisite(s): CHEM 450 with a minimum grade of C and CHEM 451 with a minimum grade of C and CHEM 320 with a minimum grade of C
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CHEM 421 Inorganic Chemistry Laboratory 1 Hour
A laboratory course emphasizing the synthesis and characterization of inorganic compounds of the main group and transition metals. Laboratory meetings once a week for three hours.
Corequisite(s): CHEM 420
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CHEM 425 Polymer Chemistry 4 Hours
The principles of polymer chemistry; synthesis of polymers, reactions of synthetic and biological polymers, thermodynamics and kinetics of polymerization, characterization of polymers such as molecular weights and morphology and fabrication and application of polymeric materials.
Prerequisite(s): CHEM 342 with a minimum grade of C and CHEM 343 with a minimum grade of C and CHEM 330 with a minimum grade of C
Recent Term(s) Offered: None

CHEM 430 Forensic Chemistry 3 Hours
A study of the methods and instrumentation used in the crime laboratory. Topics discussed may include metrology, drug analysis, toxicology, firearms and explosives, trace evidence analysis, and fingerprints. Laboratory work is a significant portion of the course. Course Fee.
Prerequisite(s): CHEM 340 with a minimum grade of C and CHEM 330 with a minimum grade of C
Recent Term(s) Offered: spring 2023

CHEM 435 Instrumental Analysis 3 Hours
An in-depth course in modern instrumental methods of analysis including spectroscopic, chromatographic and electroanalytical techniques.
Prerequisite(s): CHEM 330 with a minimum grade of C and CHEM 340 with a minimum grade of C
Corequisite(s): CHEM 436
Recent Term(s) Offered: fall 2023; fall 2024

CHEM 436 Instrumental Analysis Laboratory 2 Hours
A laboratory to accompany CHEM 435, focusing on techniques involving modern instrumental methods of analysis. Pre-lab and laboratory meets 4.5 hours per week.
Corequisite(s): CHEM 435
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CHEM 440 Introduction to Synthetic Organic Methodology 3 Hours
An advanced course designed to address a broad spectrum of topics including an overview of the year-long organic chemistry sequence and a systematic treatment of modern synthetic organic chemistry focusing on basic reactions and methodologies.
Prerequisite(s): CHEM 342 with a minimum grade of C
Recent Term(s) Offered: None

CHEM 446 Biochemistry I 3 Hours
A study of biochemical compounds and their role in intermediary metabolism. Special topics include biochemical energetics and coenzyme mechanisms.
Prerequisite(s): CHEM 340 with a minimum grade of C
Equivalent(s): BIOL 446
Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024

CHEM 447 Biochemistry Laboratory 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.
Prerequisite(s): BIOL 446 (may be taken concurrently) with a minimum grade of C or CHEM 446 (may be taken concurrently) with a minimum grade of C
Equivalent(s): BIOL 447
Recent Term(s) Offered: fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 450 Physical Chemistry I 3 Hours
A detailed study of the fundamental principles and models describing the physical and chemical properties of matter at both the microscopic and macroscopic levels. Selected topics may include thermodynamics and equilibria, the kinetic theory of gases, transport properties, chemical kinetics, and interdisciplinary applications.
Prerequisite(s): CHEM 340 with a minimum grade of C and CHEM 330 with a minimum grade of C and (PHYS 231 with a minimum grade of C or PHYS 255 with a minimum grade of C) and MATH 136 with a minimum grade of C
Corequisite(s): CHEM 451
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 451 Physical Chemistry I Laboratory 2 Hours
A laboratory to accompany CHEM 450 that emphasizes the treatment and analysis of scientific data as well as formal scientific communication. Pre-lab lecture and laboratory meets 4.5 hours per week.
Corequisite(s): CHEM 450
Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CHEM 452 Physical Chemistry II 3 Hours
A continuation of CHEM 450. Selected topics include introductory quantum mechanics, spectroscopy, statistical thermodynamics, and interdisciplinary applications.
Prerequisite(s): CHEM 450 with a minimum grade of C and CHEM 320 with a minimum grade of C and MATH 137 with a minimum grade of C and (PHYS 265 with a minimum grade of C or PHYS 332 with a minimum grade of C)
Corequisite(s): CHEM 453
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CHEM 453 Physical Chemistry II Laboratory 2 Hours
A laboratory to accompany CHEM 452 that emphasizes the treatment and analysis of scientific data as well as formal scientific communication. Pre-lab lecture and laboratory meets 4.5 hours per week.
Corequisite(s): CHEM 452
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CHEM 462 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.
Prerequisite(s): CHEM 340 with a minimum grade of C
Recent Term(s) Offered: None

CHEM 467 Biochemistry II 3 Hours
A study of the reactions of living systems and an introduction to the mechanisms and energetics of metabolism.
Prerequisite(s): (BIOL 446 or CHEM 446)
Equivalent(s): BIOL 467
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CHEM 470 Chemistry / Middle School 3 Hours
A study of the atomic and electronic structure of atoms, bonding theories, types of chemical reactions, intermolecular forces and the structure of solids as related to the middle school science curriculum. The course may not be used to fulfill the requirements for a chemistry major or minor.
Prerequisite(s): (CHEM 105 or CHEM 120)
Recent Term(s) Offered: spring 2023

CHEM 475 Selected Topics in Chemistry 1-3 Hours
Special topics are presented to acquaint advanced students with significant problems and developments of current interest in the field of chemistry. The course may be repeated for credit provided topics differ.
Recent Term(s) Offered: summer 2022; winter 2023; winter 2024

CHEM 476 Selected Topics in Chemistry Laboratory 1-3 Hours
(repeatable max of 6 hrs)
Special laboratory techniques are presented to acquaint advanced students with significant problems and developments of current interest in the field of chemistry. Note: Permission of instructor required.
Prerequisite(s): permission of instructor
Recent Term(s) Offered: None

CHEM 489 Cooperative Education in Chemistry III 3-6 Hours
(repeatable max of 6 hrs)
Practical out-of-the classroom experience in a supervised work situation with a cooperating business, industry, or governmental agency, emphasizing laboratory skills in chemistry.
Restriction(s): Students with a semester level of Freshman, Junior or Sophomore may **not** enroll.
Recent Term(s) Offered: None

CHEM 490 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.
Prerequisite(s): CHEM 320 with a minimum grade of C and CHEM 330 with a minimum grade of C and CHEM 342 with a minimum grade of C
Recent Term(s) Offered: None

CHEM 491 Materials Chemistry Laboratory 1-3 Hours (repeatable max of 6 hrs)
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. Note: Permission of department may be required.
Prerequisite(s): CHEM 320 with a minimum grade of C and CHEM 330 with a minimum grade of C and CHEM 342 with a minimum grade of C
Recent Term(s) Offered: None