CHEMISTRY (CHE)

CHE 100 CHEMISTRY AND SOCIETY
3, 3/0; NS14
Non-mathematical approach to the study of matter. Presentation of the fundamentals of chemistry followed by socially relevant topics such as toxic waste management, environmental pollution, space technology, agricultural chemistry, chemistry of consumer products, food processing, polymers, and plastics. Offered every semester and J Term.

CHE 101 GENERAL CHEMISTRY I
3, 2/3; NS14
Basic principles of chemistry, including atomic and molecular structure; gases, liquids, solids, and solutions; chemical reactions; acids and bases. Not open to chemistry majors. Offered every fall semester.

CHE 102 GENERAL CHEMISTRY II
3, 2/3
Prerequisite: CHE 101. Continuation of CHE 101. Includes chemical equilibria, electrochemistry, metals and nonmetals, some fundamentals of organic chemistry, polymers, fibers and plastics, natural products, and some fundamentals of biochemistry. Not open to chemistry majors. Offered spring only.

CHE 110 INTRODUCTORY CHEMISTRY
3, 3/0
Preparation for college-level chemistry with an emphasis on mathematical methods used in chemistry. Introduction to atomic structure, atomic and formula mass, chemical equations, stoichiometry, solution concentration, acid-base chemistry. Mathematical methods include: the metric system, significant figures, dimensional analysis, conversion factors, word problems, quadratic equations, logarithms. Recommended for students who have not taken high school chemistry or need to develop the math skills required for CHE 101 and CHE 111. Course offered every semester.

CHE 112 FUNDAMENTALS OF CHEMISTRY II
3, 3/0
Prerequisites: CHE 111. Co-requisite CHE 112. Continuation of Fundamentals of Chemistry I. Liquids and solids, phase transitions, mixtures, colligative properties, chemical kinetics, chemical equilibria, chemical thermodynamics, electrochemistry, general properties of elements, and complex ion formation.

CHE 113 LABORATORY FOR FUNDAMENTALS OF CHEMISTRY I
1, 0/3
Corequisites: CHE 111. Laboratory-based exploration of the basic chemical concepts taught in Fundamentals of Chemistry I (CHE 111). Experiments exploring the basic principles of chemical bonding, geometry of molecules, gases, stoichiometry, solution chemistry, and enthalpy. Lab safety, use of graphing software, and introduction to basic laboratory equipment. Offered every semester.

CHE 114 LABORATORY FOR FUNDAMENTALS OF CHEMISTRY II
1, 0/3
Prerequisites: CHE 111; co-requisite: CHE 112. Laboratory-based exploration of the basic chemical concepts taught in Fundamentals of Chemistry II (CHE 112). Experiments exploring the phases of matter, physical properties of solutions, kinetics, thermodynamics, equilibrium, redox reactions, and basic electrochemistry. Safe laboratory practices and basic laboratory skills, introduction to basic spectrophotometry and the use of pH meters.

CHE 189 TOPIC COURSE
1-3, 0/0
See the Undergraduate Course Catalog (http://catalog.buffalostate.edu/undergraduate/docs/currentugcat.pdf).

CHE 201 ORGANIC CHEMISTRY I
3, 3/0; NS14
Prerequisite: CHE 112. Chemistry of carbon compounds. Bonding, stereochemistry, and structural theory. Fundamental reactions of the functional groups considered from the mechanistic standpoint. Offered every semester.

CHE 202 ORGANIC CHEMISTRY II
3, 3/0
Prerequisite: CHE 201. Continuation of CHE 201. The reactions and mechanisms of organic functional groups including aromatic compounds, alcohols, aldehydes, carboxylic acids, and acid derivatives. Spectroscopic techniques (IR, UV, NMR) for the identification of organic molecules are also included. Offered every semester.
CHE 203 ORGANIC CHEMISTRY LABORATORY I 1, 0/3
Prerequisite: CHE 112. Laboratory techniques in organic chemistry including distillation, crystallization, extraction, sublimation, and chromatography are learned by application to the synthesis and purification of organic compounds. Experiments chosen from a variety of possible topics such as isolation of natural products, separation of mixtures, and synthesis. Offered every semester.

CHE 204 ORGANIC CHEMISTRY LABORATORY II 1, 0/3
Prerequisite: CHE 203. Prerequisite or concurrent registration: CHE 202. Continuation of CHE 203. Synthesis, isolation, purification, and identification of organic compounds with emphasis placed on spectroscopic methods of structure determination. Experiments chosen from a variety of possible topics such as multistep synthesis, mechanistic studies, and qualitative organic analysis. Offered every semester.

CHE 295 INTRODUCTORY RESEARCH IN CHEMISTRY 1-3, 0/0
Prerequisite: Instructor Permission. Scholarship or creative work conducted under the supervision of a faculty member. Offered occasionally.

CHE 300 MEDICATIONS: CHEMICALS FOR YOUR HEALTH 3, 3/0
Prerequisite: CHE 100 or CHE 101 or CHE 111. The structure, uses, and physiological effects of common medications, at a level appropriate for the nonscience major. Emphasis on consumer issues related to safe and effective use of prescription and nonprescription drugs; drug development and approval; alternative medicines, vitamins, generic drugs, and consumer guides for using drugs wisely. Not open to chemistry or forensic chemistry majors. Offered occasionally.

CHE 301 ANALYTICAL CHEMISTRY 4, 2/6
Prerequisites: CHE 112 and CHE 114. Fundamental principles and laboratory applications of analytical chemistry. Elementary statistics, chemical equilibrium, acids and bases, redox reactions, gravimetry, separations, spectrophotometry, and basic electrochemistry. Laboratory experiences including acquisition of hands-on analytical laboratory skills and guided experiments selected from course topics.

CHE 305 PHYSICAL CHEMISTRY I 3, 3/0
Prerequisites: CHE 202, CHE 301, PHY 112, and, and MAT 263 (or concurrently), or, instructor’s permission. A study of the fundamental concepts in thermodynamics and equilibria of matter and polymer solutions. Topics include: zero, first, second and third laws of thermodynamics, thermochemistry, chemical equilibrium, phase diagrams and the equilibrium of phase change, ideal vs. real solutions, introduction to polymer science, thermodynamic analysis of polymeric solutions. Offered annually in the fall semester.

CHE 306 PHYSICAL CHEMISTRY II 3, 3/0
Prerequisite: CHE 305, and MAT 263. The second semester of a two-semester sequence in physical chemistry. Topics include quantum chemistry, atomic and molecular structure, molecular and atomic spectroscopies, kinetic theory of gases, and kinetics. Offered spring only.

CHE 307 PHYSICAL CHEMISTRY LABORATORY I 1, 0/3; WIIF
Prerequisites: CWP 102, CHE 204, CHE 301, and CHE 305 or concurrent registration. Thermodynamic studies on the properties of solids, liquids and gases, including polymer solutions, using modern techniques. Laboratory experiments include: treatment and analysis of raw data, morphology of polymers, thermogravimetric analysis of solids, heat of combustion of solids, heat of reactions’ solutions, heat of sorption of gases into polymers, heat of evaporation of liquids, heat capacities of gases and solid–liquid phase equilibrium. Utilizing the literature and practice in recording and disseminating data collected using an electronic notebook, organizing and writing a scientific report. Offered annually in the fall semester.

Equivalent Course: CHE 307W

CHE 308 PHYSICAL CHEMISTRY LABORATORY II 1, 0/3; WIIF
Prerequisites: CHE 305 and CHE 307 and MAT 263 AND CWP/ENG 102. A laboratory study of principles of physical chemistry covered in CHE 306. Topics include determination of rate laws; ultraviolet, visible, and infrared spectroscopy; and photochemistry. Data analysis using statistical methods and error analysis is required. Offered spring only.

Equivalent Course: CHE 308W

CHE 310 LITERATURE OF CHEMISTRY 1, 1/0
Sources of chemical literature. Experiences in chemical information searching and retrieval, including examples of computer searching. Offered fall only.

CHE 315 ENVIRONMENTAL CHEMISTRY AND TECHNOLOGY 3, 3/0
Prerequisite: CHE 112 or CHE 102. Discussion of chemical reactions in air, water, and soil. Effect of human activities on the chemical environment. Alternative energy sources, pollution-control methods and devices. Offered occasionally.

CHE 321 PRINCIPLES OF ORGANIC CHEMISTRY 4, 3/3
Prerequisite: CHE 102 or CHE 112. Survey of organic chemistry including functional groups and their chemical behavior. Not open to chemistry or forensic chemistry majors. Offered fall only.

CHE 322 BIOLOGICAL CHEMISTRY 4, 3/3
Prerequisite: CHE 202 or CHE 321. Structure and functions of the substances of biochemical interest found in living systems, supplemented by illustrative laboratory work. Not open to chemistry or forensic chemistry majors. Offered spring only.

CHE 325 MEDICATIONS 3, 3/0
Prerequisites: CHE 201 or CHE 321. Structure and mechanism of action for common medications; history of drug development and discovery; FDA regulations governing drug testing and sale; drug’s potential to reach its target via various routes of administration; underlying causes of common drug-interactions; differences between prescription, over the counter, generic, herbal, and schedule drugs. Formerly CHE 300. Not open to the students who took CHE 300 previously. Offered occasionally.

Equivalent Course: CHE 300
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 331</td>
<td>PRINCIPLES OF PHYSICAL CHEMISTRY</td>
<td>3, 3/0</td>
<td>Prerequisites: CHE 202, MAT 126 or MAT 162, PHY 108 or PHY 112, or permission of instructor. A one-semester survey course exploring the principles of physical chemistry, oriented toward the needs of forensic chemistry majors and students in environmental and health related sciences. Topics include thermodynamics, kinetics, quantum chemistry, and atomic and molecular spectroscopies. Offered fall only.</td>
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<tr>
<td>CHE 360</td>
<td>INTRODUCTION TO INORGANIC CHEMISTRY</td>
<td>3, 3/0</td>
<td>Prerequisites: CHE 202. Descriptive inorganic chemistry of the main group and transition metal elements. Atomic structure and trends in the periodic table. Theories of chemical bonding. Introduction to crystal field, ligand field and molecular orbital theories. Inorganic chemistry of important industrial processes, including metallurgy. Role of metal ions in biological systems. Offered fall only.</td>
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<tr>
<td>CHE 389</td>
<td>TOPIC COURSE</td>
<td>3, 0/0</td>
<td>See the Undergraduate Course Catalog (<a href="http://catalog.buffalostate.edu/undergraduate/docs/currentugcat.pdf">http://catalog.buffalostate.edu/undergraduate/docs/currentugcat.pdf</a>).</td>
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<tr>
<td>CHE 399</td>
<td>INTERNSHIP IN CHEMISTRY</td>
<td>1-6, 0/0</td>
<td>Prerequisite: Permission of instructor. Hands on experience in approved research and/or development project of current interest to local chemical industry. Offered every semester.</td>
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<tr>
<td>CHE 403</td>
<td>INSTRUMENTAL ANALYSIS</td>
<td>4, 2/6</td>
<td>Prerequisites: CHE 301; CHE 331 or CHE 306 (CHE 306 may be taken concurrently with instructor permission). Principles of analytical instruments and their applications for chemical analysis. Statistics, basic optics, various optical spectroscopic methods, chromatography, electrochemical methods, and mass spectrometry. Laboratory experiments using analytical instruments chosen from in-class topics. Offered every semester.</td>
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<tr>
<td>CHE 406</td>
<td>ANALYTICAL TOXICOLOGY</td>
<td>2, 1/3</td>
<td>Prerequisites: MAT 311 and CHE 301. Introductory analytical toxicology for pharmaceutical, forensic, and clinical analysis. Exploration of the main categories of inorganic and organic toxins, sample collection and treatment, chromatographic separation, spectroscopic and mass spectral determination of various toxic compounds in clinical, forensic, and environmental samples. Offered alternate years.</td>
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<tr>
<td>CHE 430</td>
<td>ORGANIC CHEMISTRY III</td>
<td>3, 3/0</td>
<td>Prerequisite: CHE 305. Advanced topics in theoretical and physical organic chemistry with emphasis on reaction types, mechanisms, and structure. Offered alternate years.</td>
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<tr>
<td>CHE 462</td>
<td>ADVANCED INORGANIC CHEMISTRY</td>
<td>3, 2/3</td>
<td>Prerequisites: CHE 202, CHE 204, CHE 305, CHE 360, and CHE 306 or concurrent. Physical inorganic and transition metal chemistry. Development of symmetry and its applications to the spectroscopy of inorganic systems. Crystal field, ligand field and molecular orbital theories. Organometallic chemistry, homogenous and heterogeneous catalysis. Metal ions in bioinorganic systems, inorganic materials. Advanced synthetic methods and methods of characterization.</td>
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<tr>
<td>CHE 470</td>
<td>BIOCHEMISTRY I</td>
<td>3, 3/0</td>
<td>Prerequisites: CHE 202; BIO 211 recommended. Study of the molecular structure and function of the four major classes of biomolecules: proteins, nucleic acids, lipids, and carbohydrates. Examination of enzyme kinetics, mechanism, and regulation. Examination of the molecular nature of DNA replication and an introduction to recombinant DNA technology. Offered fall only.</td>
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<tr>
<td>CHE 471</td>
<td>BIOCHEMICAL TECHNIQUES</td>
<td>2, 1/3; CT14, IM14, WI1F</td>
<td>Prerequisites: CHE 204 and CHE 301. Prerequisite or concurrent registration: CHE 470. Techniques used in the collection and analysis of experimental data on biochemical systems. Participation in laboratory experiments illustrating biochemical techniques and general biochemical principles. Practice in recording and disseminating data collected in a modern biochemistry laboratory, including: record keeping via a laboratory notebook, organizing and writing a scientific report, and giving an oral presentation on scientific results. Offered fall only.</td>
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<td>CHE 472</td>
<td>BIOCHEMISTRY II</td>
<td>3, 3/0</td>
<td>Prerequisites: CHE 202, CHE 470, BIO 211 or BIO 214. A continuation of CHE 470 Biochemistry I. Examination of metabolic processes in living systems. Relationship of metabolic enzyme activity to cellular control. The chemistry of genetic information, storage and expression. Offered spring only.</td>
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<td>CHE 495</td>
<td>SPECIAL PROJECT</td>
<td>1-3, 0/0</td>
<td>Prerequisite: Faculty project adviser permission. Offered every semester.</td>
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<td>CHE 497</td>
<td>CHEMISTRY MICROCOURSE</td>
<td>1-3, 1/0</td>
<td>Examination of significant disciplinary issues, topics, or practices. Offered occasionally. Equivalent Course: FOR 497</td>
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<tr>
<td>CHE 499</td>
<td>INDEPENDENT STUDY</td>
<td>2-12, 0/0</td>
<td>Prerequisite: Faculty project adviser permission. Offered every semester.</td>
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