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Governing Iowa's Public Universities

In accordance with Board of Regents policy 3.20, the following required information is available below:

Fall 2026

I. Course title and number as designated in the institutional course catalog

CHEM 1130 General Chemistry I-II, 01

II. A course description including learning objectives that students are expected to achieve by the end of the course

A. Course Description:

- Accelerated course for well-prepared students. Content similar to CHEM 1110 and CHEM 1120 but covered in one semester. Completion satisfies General Chemistry requirement of any chemistry major. Discussion, 4 periods; lab, 3 periods. Prerequisite(s): consent of department head. (Fall)

B. Course Level Learning Objectives:

- Explain the particulate nature of matter.
- Classify compounds into two subgroups: ionic and molecular and be able to name common compounds.
- Determine the connectivity, shape, structure, and polarity of molecules based on chemical bonding.
- Apply the Law of Conservation of Matter to chemical systems.
- Apply the Law of Conservation of Energy to chemical systems.
- Describe physical properties of pure substances and mixtures mathematically and in terms of intermolecular forces.
- Apply mathematical and conceptual reasoning to chemical kinetics.
- Apply the Law of Mass Action and reaction stoichiometry to chemical equilibrium systems.
- Apply the Bronsted-Lowry acid-base definition to acid-base equilibrium systems.
- Apply Gibbs Free Energy to chemical systems.
- (Lab) Analyze experimentally obtained data and effectively communicate the results as support for a scientific claim.

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III. A general outline of the topics to be covered throughout the course:

- Elements of Scientific Inquiry
- Models of the Atom
- Force and Energy
- Phases of Matter
- Atomic Interactions
- Comparing properties of atoms
- Light and Waves
- Absorption and Emission Spectra
- Quantum and Electron Configuration
- Periodic Trends
- Molecular Orbital Theory
- Valence Bond Theory
- Lewis Theory
- Covalent bonding and Nomenclature
- Electronegativity, Shape, and Polarity
- Ionic Properties and Nomenclature
- Enthalpy
- Calorimetry
- Entropy
- Gibbs Free Energy
- Solutions and Solubility
- Making Solutions
- Types of Solutions
- Writing and Balancing Chemical Reactions
- Bronsted-Lowry Acids and Bases
- Arrhenius Acids and Bases
- Strength of Acids
- pH and % Ionization
- Mass Stoichiometry
- Limiting & Excess Reactants
- Solutions Stoichiometry
- Kinetics
- Reaction Rates
- Method of Initial Rates
- Integrated Rate Laws and Graphing
- Reaction Mechanisms
- Equilibrium and the Law of Mass Action
- Relative Acid Strengths

- Ka, pKa, pH, and ICE tables
- LeChatelier's Principle
- Predicting Conjugate Salt pH
- Buffers
- Buffer Capacity and Range
- Henderson-Hasselbalch
- Electrochemistry
- Half-Reactions and Electron Movement
- Drawing Galvanic Cells
- Galvanic vs Electrolytic Cells

IV. List of required textbooks, readings, and other materials necessary for the course

- CLUE (Chemistry, Life, the Universe, and Everything)—free online textbook
- Aktiv Homework system--$40 per semester; linked through Blackboard/eLearning
- Lab, worksheets, and handouts and necessary printed materials are provided on paper or on Blackboard/eLearning.

V. General description of the types of assessments used in the course (e.g., exams, papers, projects, experiential learning):

Class Content

- Blackboard/eLearning quizzes for nomenclature and unit conversions (required)
- 5 Exams scheduled over the course of the semester
- Course engagement measured by HW completion and attendance

Lab Graded in three areas: pre-lab, lab notebook, and lab reports:

- Individual Pre-lab quizzes (on Blackboard/elearning)
- Team Lab Notebook (submitted on Blackboard/eLearning)
- Individual Lab Reports (submitted on eLearning)