



Course Competency Report by Code

Code: C295

Chemistry: Content Knowledge (C295)

Course of Study: C295 - Chemistry: Content Knowledge
Course Level: Undergraduate
Course Division: Senior
Discipline: Chemistry
Course Type:
Department: Education

COMPETENCY #	COMPETENCY NAME	COMPETENCY TEXT
204.3.1	Chemical Structure	The graduate has a broad understanding of chemical structure and stability.
204.3.2	Chemical Reactions	The graduate has a broad understanding of chemical reactions.
204.3.3	Stoichiometry	The graduate has a broad understanding of stoichiometry.
204.3.4	Solutions, Rates, and Energy Changes	The graduate has a broad understanding of solutions, rates of reaction, and energy changes.
208.1.2	Carbon Compounds and Chemical Bonds	The graduate can calculate formal charges and organic shorthand notation, and demonstrate basic concepts of chemical bonding.
208.1.3	Organic Compounds	The graduate can solve problems using critical concepts of orbital structure, molecular formula, boiling, and solubility.
208.1.4	Organic Reactions: Acids and Bases	The graduate can solve acid/base problems, and determine equilibrium concentration, using Bronsted-Lowry and Lewis acid-base concepts.
208.1.6	Alkanes and Cycloalkanes-Conformations	The graduate can analyze, draw, and solve problems concerning the conformations of alkanes and cycloalkanes.
208.1.7	Ionic Reactions, Nucleophilic Substitutions, and Elimination Reactions of Alkyl Halides	The graduate can determine the structures of compounds and solve reaction problems with alkenes.
208.1.9	Alcohols and Ethers	The graduate can solve reaction equations and draw structures for alcohols and ethers.
208.1.12	Aldehydes and Ketones I	The graduate can construct chemical models, write chemical equations for common aldehyde and ketone reactions, and distinguish between aldehydes and ketones.



Course Competency Report by Code

208.1.13	Carboxylic Acids and Their Derivatives	The graduate can draw chemical structures of carboxylic acids and their derivatives, name, solve problems involving carboxylic acids, and use tests to distinguish acids.
208.2.1	First Law of Thermodynamics	The graduate applies the first law of thermodynamics to analyze heat transfers associated with chemical processes and changes in state.
208.2.2	Second Law of Thermodynamics	The graduate applies concepts of the second law of thermodynamics and free energy to predict the spontaneity of a process and analyze chemical equilibrium.
208.2.3	Chemical Equilibrium	The graduate solves problems of equilibrium and determines the effect of catalysts on a system at equilibrium.
208.2.4	Real Gases	The graduate applies models and equations of state to analyze properties of real gases.
208.2.5	Phase Diagrams	The graduate solves problems of interprets phase diagrams based on laboratory activities.
208.2.6	Solutions	The graduate predicts concentrations of gases in solutions, completes solution calculations, and demonstrates the distillation process.
208.2.7	Electrochemistry	The graduate applies concepts of thermodynamics and electrochemistry to analyze the interchange of chemical and electrical energy.
208.2.8	Chemical Kinetics	The graduate uses experimental data and kinetic models to analyze reaction rates and reaction mechanisms.
208.3.1	Atomic Structure	The graduate analyzes atomic structure and can demonstrate major principles and rules of atomic structure.
208.3.2	Periodic Trends	The graduate demonstrates that groups of elements possess similar physical and chemical properties and can determine trends using the periodic chart.
208.3.3	Bonding Models	The graduate demonstrates how atoms or ions in minerals are glued together by electrical bonds that are ionic or covalent, and computes the bond order in a molecule.
208.4.1	Organic Contaminants in Ground Water	The graduate applies basic principles of geochemistry to identify the sources and mechanisms of contamination of groundwater and completes original research in chemistry.
208.4.2	Geochemistry of the Atmosphere and Atmospheric Precipitation	The graduate applies principles of geochemistry to demonstrate the chemical cause and process of acid rain and solves problems involving ozone depletion.
208.4.3	Global Carbon Cycle and Climate Change	The graduate demonstrates the cause and effect of atmospheric carbon dioxide and other greenhouse gases on climate change.



Course Competency Report by Code

208.4.6	Nuclear Energy	The graduate demonstrates how nuclear energy is generated in a nuclear reactor to provide the most efficient and effective use of fuel.
208.5.1	DNA and RNA	The graduate demonstrates how nucleic acid polymers can transform cells and transmit information within the cell.
208.5.2	Amino Acids, Peptide Bonds, and Protein Structure	The graduate constructs models of the structure and function of amino acids and peptide bonds, predicts ionization of an amino acid, demonstrates peptide bond breaking, and demonstrates how protein structure affects susceptibility or resistance to disease.
208.5.5	Carbohydrate Metabolism and Adenosine Triphosphate (ATP)	The graduate constructs models of carbohydrates, demonstrates metabolism of carbohydrates, and demonstrates how adenosine triphosphate (ATP) is essential to energy transfer in the cell and how irregularities in ATP synthesis in the cell can cause cytopathologies.
208.5.6	Lipids	The graduate constructs models of fatty acids and demonstrates why lipids are essential to the functioning of cells.
602.6.1	Teaching Methods-Science (Secondary)	The graduate understands and provides safe, effective, research-based instruction in science.