

Department SLOs

Department of Chemistry, Ventura College

ChemV01A, General Chemistry I

- **CSLO-1:** Balance chemical equations and solve general chemistry problems by applying the scientific method, including developing hypotheses, hypotheses testing, and evaluation.
- **CSLO-2:** Calculate quantities involving chemical equations, including using chemical symbols, IUPAC nomenclature, balancing reactions, and stoichiometry.
- **CSLO-3:** Use chemical concepts such as enthalpy, VSEPR theory, changes of state, and colligative properties to determine the physical properties of substances.
- **ISLO-3, Critical Thinking and Problem Solving:** Students will recognize and identify the components of problems or issues, examine them from multiple perspectives and investigate the ways to resolve them using reasoned and supportable conclusions while differentiating between facts, influences, opinions, and assumptions.

ChemV01AL, General Chemistry I Lab

- **CSLO-1:** Understand laboratory procedures, safety, scientific method, and lab notebook recording.
- **CSLO-2:** Understand the concepts of random error, systematic error, precision and accuracy, and their relationship to significant figures.
- **CSLO-3:** Master chemical laboratory techniques such as measurement, determination of density, pipetting, titration, and spectroscopy.
- **ISLO-2, Reasoning – Scientific and Quantitative:** Students will locate, identify, collect, and organize data in order to analyze, interpret, or evaluate it using mathematical skills and/or the scientific method.

ChemV01B, General Chemistry II

- **CSLO-1:** Use kinetic data to formulate chemical mechanisms and analyze the results using thermodynamic arguments.
- **CSLO-2:** Understand the concepts of equilibrium and the equilibrium constant as it pertains to acids, bases, titrations, and solubility product.
- **CSLO-3:** Be able to apply the Nernst Equation to non-equilibrium systems and relate it to thermodynamic principles.
- **ISLO-3, Critical Thinking and Problem Solving:** Students will recognize and identify the components of problems or issues, examine them from multiple perspectives and investigate the ways to resolve them using reasoned and supportable conclusions while differentiating between facts, influences, opinions, and assumptions.

ChemV01BL, General Chemistry II Lab

- **CSLO-1:** Evaluate a chemical reaction system to determine how chemical equilibria will be altered by changes in temperature, concentration, or pressure by applying Le Chatelier's Principle.
- **CSLO-2:** Experiment with rate dependence on temperature and calculate activation energy from experimental data analysis.
- **CSLO-3:** Test common hydrocarbons and organic compounds to identify what functional groups are present.
- **ISLO-2:** Reasoning—Scientific and Quantitative: Students will locate, identify, collect, and organize data in order to analyze, interpret, or evaluate it using mathematical skills and/or the scientific method.

ChemV12A, General Organic Chemistry I

- **CSLO-1:** Categorize, arrange and assemble structures of alkanes, alkenes, alkynes, alkyl halides, alicyclics, alcohols, ethers, and aromatics using IUPAC, derived and common systems of nomenclature.
- **CSLO-2:** Examine, evaluate, and formulate mechanisms for the reactions of alkanes, alkenes, alkynes, alkyl halides, alcohols and aromatics given reactant and target compounds. They will also be required to propose alternate steps in reaction mechanisms for common reactions.
- **CSLO-3:** Examine, evaluate and formulate appropriate multi-step synthetic pathways leading to target compounds involving alkanes, alkenes, alkynes, alkyl halides, alcohols, and aromatics.
- **CSLO-4:** Evaluate spectra (infrared, mass, H NMR, C NMR, UV) to formulate structures for organic compounds involving alkanes, alkenes, alkynes, alkyl halides, alcohols, and aromatics.
- **ISLO-3,** Critical Thinking and Problem Solving: Students will recognize and identify the components of problems or issues, examine them from multiple perspectives and investigate the ways to resolve them using reasoned and supportable conclusions while differentiating between facts, influences, opinions, and assumptions.

ChemV12AL, General Organic Chemistry I Lab

- **CSLO-1:** Synthesize simple organic molecules using modern reaction techniques and analyze the success of each synthesis on the basis of gravimetric, spectroscopic, and chromatographic evidence and physical properties.
- **CSLO-2:** Analyze unknown substances using qualitative chemical tests and to confirm the analysis using the interpretation of infrared, nuclear magnetic resonance, and gas chromatography-mass spectroscopy.
- **ISLO-2,** Reasoning—Scientific and Quantitative: Students will locate, identify, collect, and organize data in order to analyze, interpret, or evaluate it using mathematical skills and/or the scientific method.

ChemV12B, General Organic Chemistry II

- **CSLO-1:** Categorize, arrange, and assemble structures of aromatics, ketones, aldehydes, carboxylic acids, esters, amines, and biochemical amino acids using IUPAC and common systems of nomenclature, in addition to continued ChemV12A knowledge.
- **CSLO-2:** Examine, evaluate, and formulate mechanisms for the reactions of aromatics, ketones, aldehydes, carboxylic acids, esters, and amines given reactants and reagents; in addition to continued ChemV12A knowledge.
- **CSLO-3:** Ability to propose the multistep synthesis for common functional groups using all learned reagents from ChemV12A and ChemV12B.
- **CSLO-4:** Evaluate spectra (infrared, mass spec, ^1H NMR, ^{13}C NMR) to formulate structures for alkanes, alkenes, alkynes, alkyl halides, cyclics, alcohols, ethers, ketones, aldehydes, carboxylic acids, esters, amines, and aromatics.
- **ISLO-3, Critical Thinking and Problem Solving:** Students will recognize and identify the components of problems or issues, examine them from multiple perspectives and investigate the ways to resolve them using reasoned and supportable conclusions while differentiating between facts, influences, opinions, and assumptions.

ChemV12BL, General Organic Chemistry II Lab

- **CSLO-1:** Synthesize organic molecules using modern reaction techniques and analyze the success of each synthesis on the basis of gravimetric, spectroscopic, and chromatographic evidence and physical properties.
- **CSLO-2:** Analyze unknown substances using qualitative chemical tests and to confirm the analysis using the interpretation of infrared, nuclear magnetic resonance, and gas chromatography-mass spectroscopy.
- **ISLO-2, Reasoning—Scientific and Quantitative:** Students will locate, identify, collect, and organize data in order to analyze, interpret, or evaluate it using mathematical skills and/or the scientific method.

ChemV20, Elementary Chemistry

- **CSLO-1:** Solve quantitative chemistry problems using various mathematical procedures, including dimensional analysis and algebraic equations, and demonstrate clear reasoning in their work.
- **CSLO-2:** Explain the basic structure of atoms and molecules and describe how atoms combine to form compounds.
- **CSLO-3:** Describe how the structure of atoms and molecules leads to the macroscopic properties of a material such as reactivity, boiling point, melting point, and polarity.
- **CSLO-4:** Analyze, predict, and represent chemical changes using knowledge of chemical formulas, solubility rules, periodic trends, stoichiometry, and chemical equations.
- **ISLO-3, Critical Thinking and Problem Solving:** Students will recognize and identify the components of problems or issues, examine them from multiple perspectives and investigate the ways to resolve them using reasoned and supportable

conclusions while differentiating between facts, influences, opinions, and assumptions.

ChemV20L, Elementary Chemistry Lab

- **CSLO-1:** Perform laboratory techniques correctly following written protocols and using appropriate safety procedures.
- **CSLO-2:** Evaluate sources of error and their effect on experiment results.
- **CSLO-3:** Perform careful and accurate laboratory measurements and correlate these measurements with scientific laws and the properties of substances.
- **ISLO-2, Reasoning—Scientific and Quantitative:** Students will locate, identify, collect, and organize data in order to analyze, interpret, or evaluate it using mathematical skills and/or the scientific method.

ChemV21, Introduction to Organic and Biochemistry

- **CSLO-1:** Solve organic and biochemistry problems by applying the scientific method including developing hypotheses, hypotheses testing, and evaluation.
- **CSLO-2:** Know the IUPAC name and the structures of alkanes, alkenes, alkynes, alcohols, ethers, thiols, benzene and aromatic compounds, amines, aldehydes, ketones, carboxylic acids, esters, amides, acid anhydrides, and polyfunctional molecules.
- **CSLO-3:** Understand the processes of DNA replication, transcription, translation, mutation, and polymerase chain reaction; as well as the processes of catabolism and anabolism.
- **ISLO-3, Critical Thinking and Problem Solving:** Students will recognize and identify the components of problems or issues, examine them from multiple perspectives and investigate the ways to resolve them using reasoned and supportable conclusions while differentiating between facts, influences, opinions, and assumptions.

ChemV21L, Organic and Biochemistry Lab

- **CSLO-1:** Understand laboratory procedures, safety, scientific method, and lab notebook recording.
- **CSLO-2:** Master techniques for organic chemistry reactions, syntheses, chromatography, and quantitative analysis.
- **CSLO-3:** Master biochemical laboratory procedures for isolating and identifying DNA.
- **ISLO-2, Reasoning—Scientific and Quantitative:** Students will locate, identify, collect, and organize data in order to analyze, interpret, or evaluate it using mathematical skills and/or the scientific method.

ChemV30, Chemistry for Health Sciences

- **CSLO-1:** Describe the structure and composition of matter, and use knowledge of the particulate structure of matter in order to predict and explain macroscopic properties.
- **CSLO-2:** Solve quantitative chemistry problems using dimensional analysis and algebraic equations involving the mole, pH, unit conversions, and other concepts.

- **CSLO-3:** Classify organic molecules, predict their properties based on their formula and structure, and represent their characteristic reactions.
- **ISLO-3, Critical Thinking and Problem Solving:** Students will recognize and identify the components of problems or issues, examine them from multiple perspectives and investigate the ways to resolve them using reasoned and supportable conclusions while differentiating between facts, influences, opinions, and assumptions.

ChemV30L, Chemistry for Health Sciences Lab

- **CSLO-1:** Perform laboratory techniques correctly following written protocols and using appropriate safety procedures.
- **CSLO-2:** Analyze the results of laboratory experiments quantitatively.
- **CSLO-3:** Perform experiments with organic compounds and use the results of these experiments to classify and predict the behavior of organic compounds.
- **ISLO-2, Reasoning—Scientific and Quantitative:** Students will locate, identify, collect, and organize data in order to analyze, interpret, or evaluate it using mathematical skills and/or the scientific method.