

KRSN CHM1010 – Chemistry I for Majors and Lab**KRSN CHM1011 – Chemistry I for Majors****KRSN CHM1012 – Chemistry I Lab for Majors**

For specific Institutional Transfer Articulation information visit: kansasregents.org/institutional-transfer-information.

INSTITUTION	COURSE ID	COURSE TITLE	CREDIT HOURS
Allen CC	CHE 125	College Chemistry I	5
Barton CC	CHEM 1806	College Chemistry I	5
Butler CC	CH 110	College Chemistry I	5
Cloud County CC	SC 131	Chemistry I (Inorganic)	5
Coffeyville CC	CHEM 103	Principles of Chemistry I	5
Colby CC	CH 177	Chemistry I (with Lab)	5
Cowley CC	CHM 4220	Chemistry I	5
Dodge City CC	CHEM 111 CHEM 113	College Chemistry I Chemistry I	5 5
Fort Scott CC	CHE 1015	General Chemistry I with Lab	5
Garden City CC	CHEM 109	College Chemistry I	5
Highland CC	PS 111	College Chemistry I	5
Hutchinson CC	CH 105	Chemistry I	5
Independence CC	PHS 1025	College Chemistry I	5
JCCC	CHEM 124 & CHEM 125	General Chemistry I Lecture and General Chemistry I Lab	4 & 1
KCKCC	CHEM 0111	College Chemistry I and Lab	5
Labette CC	CHEM 124	College Chemistry I	5
Neosho County CC	CHEM 215 & CHEM 216	College Chemistry I and College Chemistry I Lab	3 & 2
Pratt CC	CHEM 186	General Chemistry I	5
Seward County CC	CH 1505	College Chemistry I	5
FHTC	CH 125 & CH 126	Chemistry I Lecture and Chemistry I Lab	3 & 2
Manhattan Tech	CHM 110 CHM 110A & CHM 110B	Chemistry I Chemistry IA and Chemistry IB	5 2.5 & 2.5
NCK Tech	Not Offered	Not Offered	
NWKTC	Not Offered	Not Offered	
SATC	Not Offered	Not Offered	
WATC	CHM 125	Chemistry I	5
ESU	CHEM 123 & CHEM 124	Chemistry I and Chemistry I Lab	3 & 1-2
FHSU	CHEM 120 & CHEM 120L	University Chemistry I and University Chemistry I Lab	3 & 2
KSU	CHM 210	Chemistry I	4
PSU	CHEM 215 & CHEM 216	General Chemistry I and General Chemistry I Lab	3 & 2
KU	CHEM 130	General Chemistry I	5
WSU	CHEM 211	General Chemistry I	5
Washburn	CH 151	Fundamentals of Chemistry I	5

Revised 04/04/2018

Chemistry I and Lab/ Chemistry I/ Chemistry I Lab For Majors - CHM1010/CHM1011/CHM1012
CORE OUTCOMES

Course Effective Date: Fall 2012

Outcome Approval Date: Fall 2017

Next Outcome Review Date: Fall 2022

Upon completion of the above listed course, students will be able to do the following:

LECTURE PORTION OF CHEMISTRY

Content of the course will prepare students to:

- I. Explain the processes involved in the scientific method, and be able to apply it to investigate natural phenomena and solve problems.
- II. Explain the design and significance of experiments that led to the adoption of modern atomic theory.
- III. Recognize and interpret isotopic notation; understanding the relationship between average atomic masses and isotopic masses (example: calculating the average mass of an element given isotopic masses and natural abundance).
- IV. Relate atomic mass to composition in terms of subatomic particles.
- V. Descriptive chemistry of ionic and covalent compounds.
 - a. Learn the names and symbols (or formulas) for often-used elements, simple and polyatomic ions, Arrhenius acids and bases, and simple ionic and covalent compounds.
 - b. Describe and identify Arrhenius, Bronsted-Lowery, and Lewis acids and bases.
 - c. Identify conjugate acids and bases.
 - d. Determine the valence electron configuration of the s and p block elements and the 3d metals.
 - e. Determine oxidation states and assign oxidation numbers of atoms in simple ions, and the central atoms of polyatomic ions and covalent compounds.
 - f. Use the valence electron configuration to predict common oxidation numbers of group 1, 2, 13, 16, and 17 elements.
 - g. Define periodic trends in electronegativity, ionization energy and electron affinity, and relate them to the electron configuration of the element.
- VI. Solutions.
 - a. Describe general properties of solutions.
 - b. Understand the forces that affect the aqueous solubility of materials.
 - c. Calculate the molar concentration of a solute.
 - d. Describe procedures for preparing a solution of known molarity.
- VII. Chemical reactions and stoichiometry.
 - a. Classify chemical reactions and predict whether simple chemical reactions will proceed.
 - b. Employ stoichiometric reasoning in evaluating reactions of gases, liquids and solids.
 - c. Perform calculations that employ relationships involving masses, formula units, and the mole relationships.
 - d. Determine empirical and molecular formula from appropriate data.
 - e. Demonstrate the ability to balance chemical equations.
 - f. Discuss solubility rules
 - g. Write net ionic equations based on solubility rules.
 - h. Balance simple acid base reactions
 - i. Define oxidation and reduction.
 - j. Balance simple redox reactions and determine the identity of the oxidizing and reduction agents.
 - k. Determine limiting reagents from stoichiometric data; calculate the maximum product yield, and leftover reagent.
 - l. Calculate theoretical yield from stoichiometric data.
- VIII. Properties of solids, liquids, and gases
 - a. Describe the origins and relative magnitudes of intermolecular forces.
 - b. Relate phase behavior to nature of intermolecular forces.

- c. Compare general properties of solids, liquids and gases; including density, compressibility, heat capacity, and randomness intermolecular forces.
- d. Describe phase transitions and phase diagrams (e.g. triple point and critical point).
- e. Understand general properties of gases.
 - 1. Describe properties and temperatures of gasses to kinetic molecular theory.
 - 2. Understand and employ ideal gas laws.
- f. Understand general properties of liquids.
- g. Understand general properties of solids.
 - 1. Compare and contrast properties of ionic, molecular and metallic solids.
- IX. Describe, define, and perform calculations involving the following basic concepts of thermodynamics:
 - a. Heat capacity.
 - b. Calorimetry.
 - c. Heat/Work/Energy.
 - d. Enthalpy/Standard states.
 - e. Hess's Law.
 - f. Heat of formation.
 - g. Phase changes/Energy.
 - h. Use of other thermodynamic cycles in the determination of thermodynamic quantities, such as the lattice energy of an ionic solid.
- X. Conceptually and quantitatively relate spectroscopic observation of atoms to quantum mechanical theories.
 - a. Describe the historical development of and distinction between classical and wave mechanics.
 - b. Describe the radial and angular dependence of solutions to the Schrodinger equation for hydrogen-like atoms (s, p, d orbitals).
 - c. Describe the behavior of photons and electrons during electronic transitions between principle quantum levels and calculate the wavelength and frequency of light involved in these transitions.
 - d. Using the Aufbau principle, write the electron configuration of many electron atoms and monatomic ions.
 - e. Relate quantum mechanical theory to the organization of the periodic table and the periodic properties of elements.
- XI. Molecular Bonding and Structure.
 - a. Describe the characteristics of ionic and covalent bonding.
 - b. Draw Lewis dot structures for atoms, simple ionic and molecular compounds.
 - c. Predict the shape of simple molecules and ions using VSEPR theory.
 - d. Explain how electronegativity differences relate to bond polarity.
 - e. Identify polar and non-polar molecules.
 - f. Understand valence bond descriptions of molecular structure and bonding.
 - g. Understand hybridization, including sp^3 , sp^2 and sp hybridization.
 - h. Predict hybridization from VSEPR structures.
 - i. Determine bond orders and relate them to relative bond strength.
 - j. Describe the MO theory description of bonding and antibonding orbitals.
 - k. Relate MO theory to concepts such as the structural, energetic, spectroscopic, and magnetic properties of molecules.

LABORATORY PORTION OF THE CHEMISTRY I COURSE

Upon successful completion of this course the student will be able to:

- I. Work in the laboratory in accordance with good laboratory practices
 - a. Dress in an appropriate manner as to promote safety in the laboratory, wearing appropriate laboratory attire and goggles when anyone is working with chemicals in the laboratory.
 - b. Follow written directions accurately.

- c. Work safely and effectively, using equipment and chemical carefully and correctly.
 - d. Demonstrate use of required techniques.
 - e. Dispose of waste products in a proper manner.
 - f. Know how to find and understand MSDS's for the chemicals used in a particular laboratory.
- II. Gather and record qualitative and quantitative data accurately
- a. Acquire data using balances and volumetric glassware.
 - b. Make and record visual observations.
 - c. Use computers, when appropriate, as data acquisition tools.
 - d. List or describe experimental assumptions made and any deviations from the written experimental procedures.
- III. Handle and evaluate data in logical, productive, and meaningful ways
- a. Create notebooks and laboratory reports that are clear, understandable, and accurately represent the data collected.
 - b. Display computer data in a spreadsheet or graphically, as appropriate.
 - c. Correlate observations with chemical or physical processes.
 - d. Carry out suitable calculations with quantitative data, recognizing when data and calculations are within a reasonable range.
 - e. Use observations of experimental data to present relevant conclusions pertaining to the experimental procedure.
- IV. Correlate laboratory work with principle topics in Chemistry I lecture.