Chemistry 1 and Lab for Majors
KRSN CHM1010 – Chemistry I for Majors & Lab
KRSN CHM1011 – Chemistry I for Majors
KRSN CHM1012 – Chemistry I Lab for Majors

INSTITUTION	COURSE ID	COURSE TITLE	CREDIT HOURS
Allen County CC	CHE 125	College Chemistry I	5
Barton County CC	CHEM 1806	College Chemistry I	5
Butler CC	CH110	College Chemistry I	5
Cloud County CC	SC131	Chemistry I	5
Coffeyville CC	CHEM 103	Principles of Chem I	5
Colby CC	CH 177	Chemistry I with lab	5
Cowley County CC	CHM 4220	College Chemistry I	5
Dodge City CC	CHEM 111 and CHML111	College Chemistry I and College Chemistry I Lab	5, 0
Ft. Scott CC	CHE 1015	General Chemistry I	5
Garden City CC	CHEM-109	College Chemistry I	5
Highland CC	PS 111	Chemistry I	5
Hutchinson CC	CH105 and CH 105L	Chemistry I and Lab	5
Independence CC	PHS 1025	College Chemistry I	5
Johnson County CC	CHEM 124 and CHEM 125	General Chemistry I and Lab	4, 1
Kansas City Kansas CC	CHEM 111	College Chemistry I	5
Labette CC	CHEM 124	College Chemistry I	5
Neosho County CC	CHEM 215 and CHEM 216	College Chemistry I and College Chemistry I Lab	3, 2
Pratt CC	CHEM 186	General Chemistry 1	5
Seward County CC	CH 1505	College Chem. I	5
Flint Hills Tech Col	Not Offered	Not Offered	
Manhattan Area Tech Col	CHM 110	Chemistry I	5
North Central KS Tech Col	Not Offered	Not Offered	
Northwest KS Tech Col	SCI 176	Chemistry w/Lab	5
Salina Area Tech Col	Not Offered	Not Offered	
Wichita Area Tech Col	CHM 125	Chemistry I	5
Emporia State U	CHEM 123 and CHEM 124	Chem 1 and Lab	3, 1-2
Ft. Hays State U	CHEM 120 and CHEM 120L	University Chem 1 and University Chem 1 Lab	3, 2
Kansas State U	CHM 210	Chemistry I	4
Pittsburg State U	CHEM 215 and CHEM 216	General Chemistry I and General Chemistry I Lab	3, 2
Univ. of Kansas	CHEM 130	General Chemistry I	5
Wichita State U	CHEM 211	General Chemistry I	5
Washburn U	CH 151	Fundamentals of Chemistry I	5

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Chemistry I & Lab-CHM1010, CHM1011 & CHM1012 CORE OUTCOMES

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 Schroedinger 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.