LABETTE COMMUNITY COLLEGE BRIEF SYLLABUS

SPECIAL NOTE:
This brief syllabus is not intended to be a legal contract. A full syllabus will be distributed to students at the first class session.

TEXT AND SUPPLEMENTARY MATERIALS USED IN THE COURSE (if any):

Please check with the LCC bookstore http://www.labette.edu/bookstore for the required texts for this class.

COURSE NUMBER:	CHEM 124
COURSE TITLE:	COLLEGE CHEMISTRY I
SEMESTER CREDIT HOUR:	5
DEPARTMENT:	Chemistry
DIVISION:	General Education
PREREQUISITE:	MATH 100 Intermediate Algebra or 1 ½ years of High School Algebra
Recommended Additional Prerequisites:	CHEM 120 Introduction to Chemistry or 1 year of High School Chemistry
REVISION DATE:	April, 2013

COURSE DESCRIPTION:
First course of a two semester study of general chemistry. Course content includes nomenclature, stoichiometry, acids and bases, oxidation-reduction reactions, gas laws, thermochemistry, atomic structure, periodicity, bonding, and molecular structures.

College Chemistry I is recommended for all students in engineering, sciences, and applied science fields.

Overall objectives for this course are:
• To provide a basic knowledge of chemical principles.
• To introduce the terminology used by chemists.
• To develop problem-solving skills.
• To develop an interest in chemistry and chemistry-related subjects.
• To provide the background needed to enroll in College Chemistry II, Organic Chemistry I and II.

COURSE OUTCOMES AND COMPETENCIES: (LECTURE)
The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.
Kansas Regents Shared Number Course CHM 1010

Students who successfully complete this course will be able to:

1. Solve BASIC CHEMICAL CALCULATIONS (chapter 1), Explain ATOMIC STRUCTURE and NAME simple compounds (chapter 2)

- Students will explain the scientific method.
- Students will express calculated values to their correct significant figures
- Students will use dimensional analysis to solve unit conversion and other transformation problems
- Students will compare temperature scales and convert from one temperature unit to another.
- Students will explain and solve density problems.
- Students will describe subatomic particles.
- Students will explain, write, and use the symbols of isotopes.
- Students will explain how the periodic table is arranged, describe, identify and compare metals/nonmetals/metalloids, and identify and compare families of elements

2. Quantify atoms and molecules and solve STOICHIOMETRY problems (chapter 3); Classify CHEMICAL REACTIONS and write chemical equations (chapter 4).

- Students will describe the mole and use Avogadro's number to make conversions.
- Students will explain atomic and molecular weight and use them in calculations.
- Students will calculate percent composition and molecular formulas.
- Students will write and balance chemical equations.
- Students will solve stoichiometry problems.
- Students will compare and write molecular, complete ionic, and net ionic equations
- Students will identify and write the chemical equations for Precipitation Reactions
- Students will identify and write the chemical equations for Acid-Base Reactions
- Students will identify, write and balance the chemical equations for Oxidation-Reduction Reactions
- Students will solve solution stoichiometry problems

3. Explain the behavior of GASES (chapter 5); Explain THERMOCHEMISTRY and the relationship of matter with energy (chapter 6)

- Students will explain the behavior and solve problems using Gas Laws
- Students will explain the Kinetic Molecular Equation
- Students will compare ideal and real gases.
- Students will explain the first law of thermodynamics and explain the relationship of matter with energy.
- Students will explain and calculate ΔH from calorimetry, Hess's Law, and Standard Enthalpies of Formations.

4. Explain ATOMIC STRUCTURE and Periodicity (chapter 7); Describe and Identify BONDING (chapter 8)

- Students will explain Bohr’s Model and Quantum Mechanics
- Students will identify and explain the Periodic Trends
- Students will describe, explain, and compare Ionic Bonding and Covalent Bonding
- Students will draw and explain the Born-Haber Cycle.
- Students will draw Lewis Structures
- Students will predict and draw three-dimensional structures using the VSEPR Theory

5. Explain bonding by the Localized Electron and Molecular Orbital Models (chapter 9)

- Explain hybridization and draw the bonding picture from a given Lewis Structure
- Write molecular electron configurations for diatomic and use it to predict bond order and magnetic properties

CHEMISTRY CORE OUTCOMES CORRELATED WITH STUDENT LEARNING OUTCOMES

Chemistry Core Outcomes are Kansas Board of Regents mandated outcomes for College Chemistry I courses offered at all state colleges and universities in Kansas. This mandate allows for smooth transfer of students from one college to another in Kansas. The Core Outcomes are the underlying driving force for the Student Learning Outcomes listed previously. The table below correlates Chemistry Core Outcomes with the Student Learning Outcomes.

A: LECTURE

Chemistry Core Outcomes Upon successful completion of this course the student will be able to:	**Student Learning Outcomes**
1. Explain the design and significance of experiments that led to the adoption of modern atomic theory.	1. Explain ATOMIC STRUCTURE and NAME simple compounds (chapter 2)
2. Recognize and interpret isotopic notation; understanding the relationship between average atomic masses and isotopic masses.	1. Explain ATOMIC STRUCTURE and NAME simple compounds (chapter 2) 2. Quantify atoms and molecules and solve STOICHIOMETRY problems (chapter 3)
3. Relate atomic mass to composition in terms of subatomic particles.	1. Explain ATOMIC STRUCTURE and NAME simple compounds (chapter 2)
4. Relate spectroscopic observation of atoms to quantum mechanical theories.	3. Explain ATOMIC STRUCTURE and Periodicity (chapter 7)
5. Explain the distinction between classical and wave mechanics.	3. Explain ATOMIC STRUCTURE and Periodicity (chapter 7)
6. Describe the radial and angular dependence of solutions to the Schrodinger equation for hydrogenic atoms (s, p, d orbitals).	3. Explain ATOMIC STRUCTURE and Periodicity (chapter 7)
7. Using the Aufbau principle, write the electron configuration of many electron atoms.	3. Explain ATOMIC STRUCTURE and Periodicity (chapter 7)
8. Relate the names to formulas for simple ionic and molecular compounds.	1. Explain ATOMIC STRUCTURE and NAME simple compounds (chapter 2)
9. Draw Lewis Dot Structures for atoms, simple ionic and molecular compounds.	4. Describe and Identify BONDING (chapter 8)
10. Describe the characteristics of ionic and covalent bonding.	4. Describe and Identify BONDING (chapter 8)
11. Be able to predict the shape of simple molecules and ions using VSEPR theory.	4. Describe and Identify BONDING (chapter 8)
12. Explain how electronegativity differences relate to bond polarity.	4. Describe and Identify BONDING (chapter 8)
13. Determine bond orders and relate them to relative bond strength.	5. Explain bonding by the Localized Electron and Molecular Orbital Models (chapter 9)

14. Relate MO concepts to structural, energetic, spectroscopic, and magnetic properties of molecules	5. Explain bonding by the Localized Electron and Molecular Orbital Models (chapter 9)
15. Explain how the mole concept relates bulk chemical phenomena to atomic/molecular phenomena.	2. Quantify atoms and molecules and solve STOICHIOMETRY problems (chapter 3)
16. Perform calculations that employ relationships involving masses, formula units, and the mole concept.	2. Quantify atoms and molecules and solve STOICHIOMETRY problems (chapter 3)
17. Determine empirical and molecular formula from appropriate data.	2. Quantify atoms and molecules and solve STOICHIOMETRY problems (chapter 3)
18. Demonstrate your ability to balance chemical equations.	2. Quantify atoms and molecules and solve Stoichiometry problems (chapter 3)
19. Write net ionic equations based on solubility rules.	2. Classify CHEMICAL REACTIONS and write chemical equations (chapter 4)
20. Determine limiting reagents from stoichiometric data.	2. Quantify atoms and molecules and solve Stoichiometry problems (chapter 3)
21. Calculate theoretical yield from stoichiometric data.	2. Quantify atoms and molecules and solve Stoichiometry problems (chapter 3)
22. Employ stiochiometric reasoning in calculations of a. solution properties such as molarity b. reaction enthalpies c. properties of gases.	2. Classify CHEMICAL REACTIONS and write chemical equations (chapter 4) 3. Explain the behavior of GASES (chapter 5) 3. Explain THERMOCHEMISTRY and the relationship of matter with energy (chapter 6)
23. Describe, define, and use the following concepts based on principles of energetics: 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	3. Explain THERMOCHEMISTRY and the relationship of matter with energy (chapter 6)

24. Describe and apply the following concepts of the common state: a. General Properties of Gases b. Gas Laws c. Kinetic Molecular Theory d. General Properties of Liquids e. Intermolecular Forces f. General Solubility Rules g. General Properties of Solids	5. Explain the behavior of GASES (chapter 5) 1. Solve BASIC CHEMICAL CALCULATIONS (chapter 1) 4. Classify CHEMICAL REACTIONS and write chemical equations (chapter 4)
26. Describe the general properties of solids, liquids, and gases, using Kinetic Molecular Theory.	3. Explain the behavior of GASES (chapter 5)
27. Calculate the concentration of a solution.	2. Quantify atoms and molecules and solve Stoichiometry problems (chapter 3)
28. Describe and apply the general properties of:	2. Classify CHEMICAL REACTIONS and write

• Solutions • Solution Preparation • Solubility Principles/Rules	chemical equations (chapter 4)
29. Determine oxidation states and assign oxidation numbers.	2. Classify CHEMICAL REACTIONS and write chemical equations (chapter 4)
30. Balance Redox reactions and determine oxidation/reduction agent.	2. Classify CHEMICAL REACTIONS and write chemical equations (chapter 4)
31. Describe and group elements according to the Periodic Trends.	3. Explain ATOMIC STRUCTURE and Periodicity (chapter 7)
32. Balance and classify the types of chemical reaction.	2. Classify CHEMICAL REACTIONS and write chemical equations (chapter 4)

STUDENT COMPETENCIES (LABORATORY)

These Student Learning Outcomes and Competencies are the same as Chemistry Core Outcomes mandated by the State of Kansas Board of Regents.

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

1. Work in the laboratory in accordance with good laboratory practices.
   - Dress in an appropriate manner as to promote safety in the laboratory, wearing a lab coat and goggles when anyone is working with chemicals in the laboratory.
   - Follow written directions accurately.
   - Work safely and effectively, using equipment and chemical carefully and correctly.
   - Demonstrate use of required techniques.
   - Dispose of waste products in a proper manner.

2. Gather and record qualitative and quantitative data accurately.
   - Acquire data using balances and volumetric glassware.
   - Make and record visual observations.
   - Use computers, when appropriate, as data acquisition tools.
   - List or describe experimental assumptions made and any deviations from the written experimental procedures.

3. Handle and evaluate data in logical, productive, and meaningful ways.
   - Create notebooks and laboratory reports that are clear, understandable, and accurately represent the data collected.
   - Display computer data in a spreadsheet or graphically, as appropriate.
   - Correlate observations with chemical or physical processes.
   - Carry out suitable calculations with quantitative data, recognizing when data and calculations are within a reasonable range.
   - Use observations of experimental data to present relevant conclusions pertaining to the experimental procedure.

4. Correlate laboratory work with principal topics in College Chemistry I lecture.