



## *HLC Accreditation Evidence*

Title: College Chemistry Syllabus

Office of Origin: VP\_ College Chemistry

**BARTON COMMUNITY COLLEGE**  
**COURSE SYLLABUS**

**I. GENERAL COURSE INFORMATION**

Course Number: CHEM 1806  
Course Title: College Chemistry I  
Credit Hours: 5 Credit Hours  
Prerequisites: 1802 Fund of General Chemistry or High School Chemistry and Algebra II or equivalent  
Division/Discipline: Academic Division/Chemistry  
Course Description: This course stresses the conceptual and mathematical approach to understanding general chemistry and prepares the student to follow a science oriented four-year program. It provides students with the necessary tools to handle problems of both a theoretical and practical nature. The students taking this course are usually declared Chemistry, Physics, Engineering, Pre-Med, etc., majors.

**II. INSTRUCTOR INFORMATION**

**III. COLLEGE POLICIES**

Students and faculty of Barton Community College constitute a special community engaged in the process of education. The College assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom.

Plagiarism on any academic endeavors at Barton Community College will not be tolerated. The student is responsible for learning the rules of, and avoiding instances of, intentional or unintentional plagiarism. Information about academic integrity is located in the Student Handbook.

The College reserves the right to suspend a student for conduct that is detrimental to the College's educational endeavors as outlined in the College catalog, Student Handbook, and College Policy & Procedure Manual. (Most up-to-date documents are available on the College webpage.)

Anyone seeking an accommodation under provisions of the Americans with Disabilities Act should notify Student Support Services via email at [disabilityservices@bartonccc.edu](mailto:disabilityservices@bartonccc.edu).

**IV. COURSE AS VIEWED IN THE TOTAL CURRICULUM**

College Chemistry I is an approved general education course at BCC, which can be used to fulfill degree requirements as a breadth laboratory science course in the natural/physical science. In addition, it is required (or recommended) to be taken by students enrolled in Chemistry, Physical Science, Biological

Sciences, Medical Lab Technician, and pre-professional programs (e.g. Pre Dentistry, Pre-Forestry, Pre-Medicine, Pre-Pharmacy, Pre-Wildlife, Pre-Chiropractic, Pre-Veterinarian, Pre-Engineering, etc.)

The learning outcomes and competencies detailed in this course syllabus meet or exceed those specified for this course by the Kansas Core Outcomes Groups project, and as approved by the Kansas Board of Regents –[http://kansasregents.org/transfer\\_articulation](http://kansasregents.org/transfer_articulation).

This course transfers well and may be used to help fulfill credit and course requirements for general education at all Kansas Regents institutions. However, general education requirements vary among institutions, and perhaps even among departments, colleges, and programs within an institution. Also, these requirements may change from time to time and without notification. **Therefore it shall be the student's responsibility to obtain relevant information from intended transfer institution during his/her tenure at BCC to insure that he/she enrolls in the most appropriate set of courses for the transfer program.**

## V. ASSESSMENT OF STUDENT LEARNING

Barton Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton, as a learning college, in finding ways to improve student learning.

### Course Outcomes, Competencies, and Supplemental Competencies:

- A. Explain the design and significance of experiments that led to the adoption of modern atomic theory.
  1. Recognize and interpret isotopic notation; demonstrate the relationship between average atomic masses and isotopic masses.
  2. Relate atomic mass to composition in terms of subatomic particles.
  3. Relate spectroscopic observation of atoms to quantum mechanical theories.
  4. Explain the distinction between classical and wave mechanics.
  5. Describe the radial and angular dependence of solutions to the Schrodinger equation for hydrogen atoms (s, p, d orbitals).
  6. Using the Aufbau principle, write the electron configuration of atoms with many electrons.
  
- B. Relate the names to formulas for simple ionic and molecular compounds.
  1. Draw Lewis Dot Structures for atoms as well as simple ionic and molecular compounds.
  2. Describe the characteristics of ionic and covalent bonding.
  3. Predict the shape of simple molecules and ions using VSEPR theory.
  4. Explain how electronegativity differences relate to bond polarity.
  5. Determine bond orders and relate them to relative bond strength.
  6. Relate MO concepts to structural, energetic, spectroscopic, and magnetic properties of molecules.

- C. Explain how the mole concept relates bulk chemical phenomena to atomic/molecular phenomena.
1. Perform calculations that employ relationships involving masses, formula units, and the mole concept.
  2. Determine empirical and molecular formula from appropriate data.
  3. Demonstrate the ability to balance chemical equations.
  4. Write net ionic equations based on solubility rules.
  5. Determine limiting reagents from stoichiometric data.
  6. Calculate theoretical yield from stoichiometric data.
  7. Employ stoichiometric reasoning in calculations involving solution properties such as molarity, reaction enthalpies, and properties of gases.
- D. Describe, define, and use many concepts based on principles of energetics.
1. Demonstrate calculations based on heat capacity of a substance.
  2. Describe the theory of Calorimetry and perform calculations concerning its use.
  3. Describe the relationship between heat, work, and energy.
  4. Perform calculations to determine the enthalpy of a standard state.
  5. Calculate enthalpy of a reaction using the principles of Hess's Law.
  6. Perform calculations using the heat of formation.
  7. Define phase changes in terms of energy.
- E. Describe and apply several concepts of the common state.
1. Describe the general properties of gases.
  2. Perform calculations with the ideal and non-ideal gas laws.
  3. Define the kinetic molecular theory.
  4. Describe the general properties of liquids.
  5. Identify intermolecular forces of compounds based on the components of the compound.
  6. Demonstrate an understanding of the use of the general solubility rules.
  7. Describe the general properties of solids.
- F. Describe the general properties of solids, liquids, and gases, using Kinetic Molecular Theory.
1. Calculate the concentration of a solution.
  2. Describe and apply the general properties of:
    - i) solutions
    - ii) solution properties
    - iii) solubility principles/rules
  3. Determine oxidation states and assign oxidation numbers.
  4. Balance Redox reactions and determine oxidation/reduction agent.
  5. Describe and group elements according to the Periodic Trends.
  6. Balance and classify the types of chemical reaction.
- G. Work in the laboratory in accordance with good laboratory practices.
1. 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.
  2. Follow written directions accurately.

3. Work safely and effectively, using equipment and chemical carefully and correctly.
  4. Demonstrate use of required safety and common laboratory techniques.
  5. Dispose of waste products in a proper manner.
- H. Gather and record qualitative and quantitative data accurately.
1. Acquire data using balances and volumetric glassware.
  2. Make and record visual observations.
  3. Use computers, as appropriate, as data acquisition tools.
  4. List or describe experimental assumptions made and any deviations from the written experimental procedures.
- I. Handle and evaluate data in logical, productive, and meaningful ways.
1. Create a notebook and laboratory reports that are clear, understandable, and accurately represent the data collected.
  2. Display computer data graphically or in a spreadsheet, as appropriate.
  3. Correlate observations with chemical or physical processes.
  4. Carry out suitable calculations with quantitative data, recognizing when data and calculations are within a reasonable range.
  5. Use observations of experimental data to present relevant conclusions pertinent to experimental the procedure.
  6. Correlate laboratory work with principal topics in College Chemistry I lecture by discussing the results obtained in the context of the competencies identified above in outcomes A-F.

## **VI. INSTRUCTOR'S EXPECTATIONS OF STUDENTS IN CLASS**

## **VII. TEXTBOOKS AND OTHER REQUIRED MATERIALS**

## **VIII. REFERENCES**

## **IX. METHODS OF INSTRUCTION AND EVALUATION**

Since laboratory activities are integral to the learning outcomes of this lab science course, students must pass the laboratory portion of the class in order to successfully complete (“pass”) the course.

## **X. ATTENDANCE REQUIREMENTS**

## **XI. COURSE OUTLINE**