General Education Satisfier Course

CHEM 151 General College Chemistry I

Course Information
Division: Science/Mathematics
Contact Hours: 90
Lecture Hours: 45
Lab Hours: 45
Total Credits: 4

Prerequisites
MATH 151 or qualifying score on accepted placement tests and CHEM 150 or one year of high school Chemistry

Course Description
A study of the basic principles of general chemistry including classification and characterization of chemical particles, chemical bonding and molecular structure, chemical reactions, oxidation-reduction processes, reaction stoichiometry, inorganic nomenclature, and the qualitative behavior of common metals and their cations. Course requires laboratory work.

This course is approved as a General Education competency satisfier.

General Education Goal: Critical Thinking
Competency: Understand the elements of scientific inquiry and scientific principles in a natural science college laboratory course setting.
Learning Outcome: Students will use the scientific method to define a problem, utilize appropriate methods to solve the problem, and propose and evaluate a solution to the problem.

General Education Learning Objectives
A. Observe and describe natural phenomena and formulate hypotheses.
B. Plan and implement scientific experiments to test hypotheses.
C. Utilize scientific laboratory skills for data collection within a college laboratory setting.
D. Evaluate experimental data and propose solutions based on this data.
E. Evaluate the proposed implications of a solution.

Course Outcomes
In order to evidence success in this course, the students will be able to:

1. Define and apply the steps of the Scientific Method.
   Applies to General Education Objectives
   A. Observe and describe natural phenomena and formulate hypotheses.
   B. Plan and implement scientific experiments to test hypotheses.

2. Show how experimentation led to an understanding of the structure of the atom.
   Applies to General Education Objectives
   A. Observe and describe natural phenomena and formulate hypotheses.
   B. Plan and implement scientific experiments to test hypotheses.
   D. Evaluate experimental data and propose solutions based on this data.
   E. Evaluate the proposed implications of a solution.
3. Determine empirical formulas from experimental data.

   Applies to General Education Objectives
   B. Observe and describe natural phenomena and formulate hypotheses.
   C. Plan and implement scientific experiments to test hypotheses.
   D. Evaluate experimental data and propose solutions based on this data.
   E. Evaluate the proposed implications of a solution.

4. Predict a limiting reagent using initial masses and the theoretical yield.

   Applies to General Education Objectives
   A. Observe and describe natural phenomena and formulate hypotheses,
   B. Plan and implement scientific experiments to test hypotheses.
   C. Utilize scientific laboratory skills for data collection within a college laboratory setting.
   D. Evaluate experimental data and propose solutions based on this data.
   E. Evaluate the proposed implications of a solution.

5. Show how the kinetic theory explains Boyle’s, Charles’, Avogadro’s, and Dalton’s laws.

   Applies to General Education Objectives
   A. Observe and describe natural phenomena and formulate hypotheses,
   B. Plan and implement scientific experiments to test hypotheses.
   D. Evaluate experimental data and propose solutions based on this data.
   E. Evaluate the proposed implications of a solution.

6. Calculate enthalpy changes with respect to the stoichiometry of chemical equations.

   Applies to General Education Objectives
   A. Observe and describe natural phenomena and formulate hypotheses,
   B. Plan and implement scientific experiments to test hypotheses.
   D. Evaluate experimental data and propose solutions based on this data.
   E. Evaluate the proposed implications of a solution.

7. Show how the quantum mechanical model provides the basis for an understanding of the electron structure of the atom.

   Applies to General Education Objectives
   A. Observe and describe natural phenomena and formulate hypotheses,
   B. Plan and implement scientific experiments to test hypotheses.
   D. Evaluate experimental data and propose solutions based on this data.
   E. Evaluate the proposed implications of a solution.
8. Show how the electron structure of the atom provides the basis for an understanding of chemical bonding.
   Applies to General Education Objectives
   A. Observe and describe natural phenomena and formulate hypotheses.
   B. Plan and implement scientific experiments to test hypotheses.
   D. Evaluate experimental data and propose solutions based on this data.
   E. Evaluate the proposed implications of a solution.

9. Show how Lewis structures can be used to predict molecular geometry and physical properties of molecules.
   Applies to General Education Objectives
   A. Observe and describe natural phenomena and formulate hypotheses.
   B. Plan and implement scientific experiments to test hypotheses.
   D. Evaluate experimental data and propose solutions based on this data.
   E. Evaluate the proposed implications of a solution.

10. Use qualitative analysis techniques in the laboratory to determine the verity of a hypothesis.
    Applies to General Education Objectives
    A. Observe and describe natural phenomena and formulate hypotheses.
    B. Plan and implement scientific experiments to test hypotheses.
    C. Utilize scientific laboratory skills for data collection within a college laboratory setting.
    D. Evaluate experimental data and propose solutions based on this data.
    E. Evaluate the proposed implications of a solution.