Required Syllabus Information – all must be included in the course syllabus

CHE 111
Course Title: Gen College Chem I/Lab: SC1
Course Credits: 5
Course Description: Focuses on basic chemistry and measurement, matter, chemical formulas, reactions and equations, stoichiometry. This course covers the development of atomic theory culminating in the use of quantum numbers to determine electron configurations of atoms, and the relationship of electron configuration to chemical bond theory. The course includes gases, liquids, and solids and problem-solving skills are emphasized through laboratory experiments.

GT Pathways Requirements:

Guaranteed Transfer (GT) Pathways Course Statement:
The Colorado Commission on Higher Education has approved CHE 111 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT- SC1 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to http://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html.

NATURAL & PHYSICAL SCIENCES (N&PS) CONTENT CRITERIA – GT-SC1

1. The lecture content of a GT Pathways science course (GT-SC1)
    a. Develop foundational knowledge in specific field(s) of science.
    b. Develop an understanding of the nature and process of science.
    c. Demonstrate the ability to use scientific methodologies.
    d. Examine quantitative approaches to study natural phenomena.

2. The laboratory (either a combined lecture and laboratory, or a separate laboratory tied to a science lecture course) content of a GT Pathways science course (GT-SC1)
    a. Perform hands-on activities with demonstration and simulation components playing a secondary role.
    b. Engage in inquiry-based activities.
    c. Demonstrate the ability to use the scientific method.
    d. Obtain and interpret data, and communicate the results of inquiry.
    e. Demonstrate proper technique and safe practices.

COMPETENCIES & STUDENT LEARNING OUTCOMES FOR GT-SC1

Inquiry & Analysis:

4. **Select or Develop a Design Process**
    a. Select or develop elements of the methodology or theoretical framework to solve problems in a given discipline.
5. **Analyze and Interpret Evidence**

a. Examine evidence to identify patterns, differences, similarities, limitations, and/or implications related to the focus.
b. Utilize multiple representations to interpret the data.

6. **Draw Conclusions**
    a. State a conclusion based on findings.

Quantitative Literacy:

1. Interpret Information
    a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).
2. Represent Information
    a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).

SYSTEM REQUIREMENTS:

REQUIRED COURSE LEARNING OUTCOMES

1. Recognize, define, and apply the vocabulary, symbolism, and nomenclature of chemistry.
2. Interpret the computed outcome of a chemical calculation to determine its validity.
3. Apply knowledge of chemical principles to real world situations.
4. Analyze and evaluate experimental observations, statements, and data using deductive reasoning and problem solving skills.
5. Use experimental observations and data to formulate predictions, propose trends, and identify patterns of physical or chemical behavior.
6. Synthesize and apply multiple chemical principles to solve complex problems, including stoichiometry, dimensional analysis, solution concentration, and gas laws.
7. Convert descriptive, conceptual, and experimental information into mathematical equations, graphs, diagrams, and tables and use these results to formulate conclusions and to discuss implications and limitations.
8. Convert mathematical equations, graphs, diagrams, and tables into descriptive or conceptual explanations, and use these results to formulate conclusions.
9. Demonstrate problem solving ability by selecting or developing the methodology or theoretical framework to solve a variety of chemistry problems.
10. Use the principles of atomic theory, bonding theory, periodic properties, gas laws, and chemical reactivity to formulate predictions, propose trends, and identify patterns of physical or chemical behavior.
11. Write and speak clearly and logically in presentations, essays, and/or lab reports about topics related to chemistry.
12. Demonstrate the ability to select and apply appropriate forms of technology to solve problems or compile information in the study of chemistry.
13. Perform hands-on chemistry activities and labs with observations of demonstrations and simulations playing a secondary role.

REQUIRED TOPICAL OUTLINE

I. Foundations of chemistry
    a. Measurements
    b. Dimensional analysis
    c. Matter, classification of matter, physical and chemical changes,
II. Properties of matter
    a. Scientific method
III. Atomic theory and structure
    a. History of the atom
    b. Modern atomic theory - quantum mechanics approach
    c. Electronic configuration and orbitals of atoms
    d. Periodic table and periodicity
    e. Nomenclature of inorganic compounds
IV. Chemical bonding and molecular geometry
    a. Types of chemical bonding
    b. Periodic table and chemical bonding
    c. Polyatomic ions
    d. Octet rule, exceptions to octet rule
    e. Lewis structures
    f. VSEPR theory and valence bond theory
    g. Molecular geometry and polarity
V. Stoichiometry
    a. Chemical equations
    b. Types of chemical reactions
    c. Balancing chemical equations
    d. The mole
    e. Stoichiometry, limiting reactants, and percent yield
    f. Determination of molecular and empirical formulas
    g. Solution calculations
    h. Concentrations of solutions
    i. Solution stoichiometry
VI. Gases
    a. Description of the gas state
    b. Kinetic molecular theory
    c. Gas laws
    d. Gas stoichiometry
VII. Thermochemistry
    a. Thermochemistry terminology
    b. The first law of thermodynamics
    c. Calorimetry
    d. Hess's law

REQUIRED TOPICAL OUTLINE IN EITHER CHE 111 OR CHE 112

I. Thermochemistry

a. Thermochemistry terminology
b. The first law of thermodynamics
c. Calorimetry
d. Hess's law

II. Condensed states (Intermolecular forces)
a. Description of the liquid state
b. Description of the solid state
c. Intermolecular forces
d. The phase diagram
e. Vapor pressure

RECOMMENDED TOPICAL OUTLINE

I. Chemical bonding and molecular geometry
a. Molecular orbital theory

II. Condensed states (Intermolecular forces)
a. Crystal solids

CCCOnline Course Policies: http://www.ccconline.org/ccconline-course-policies/

Effective Implementation date: Spring 2018, 201830