University of Arkansas – Fort Smith
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General Syllabus

CHEM 1303 Chemical Principles

Credit Hours: 3 Lecture Hours: 3 Laboratory Hours: 0

Prerequisite: MATH 0304 Beginning and Intermediate Algebra or higher level MATH or exemption by placement.

Effective: 2018~2019

I. Course Information

A. Catalog Description

Covers the fundamental principles of chemistry as well as the mathematical manipulations required to solve chemistry problems. (ACTS: CHEM 1004; must have CHEM 1303/1301)

II. Student Learning Outcomes

A. Subject Matter

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

1. Use the concepts of precision and accuracy in measurement with the metric system.
2. Describe the structure of atoms and explain how the structure determines the reactivity of elements.
3. Describe the structure of molecules and explain how the structure determines the reactivity of molecules.
4. Describe and explain the bonding of atoms to each other.
5. Define the physical states of matter in terms of structure, and describe the influence energy has on these states.
6. Solve mathematical relationships involving the pressure, volume, temperature, and molar quantity of gases.
7. Identify and write formulae for covalent and ionic compounds.
8. Write chemical equations to illustrate the basic classes of chemical reactions.
9. Work problems relating to concentration of solutions.
10. Explain the effects that different kinds of particles have on the solution process and the properties of solutions.
11. Distinguish between acids and bases in terms of physical and chemical properties.

12. Recognize the biologically important molecules and explain their biological functions on the basis of their structure.
13. Demonstrate a greater appreciation for the chemical orchestration that is physical life.

B. University Learning Outcomes

Chemical Principles Laboratory enhances student abilities in the following areas:

Analytical Skills
Critical Thinking Skills: Students will identify a problem or issue and will research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, recency, and bias relevant to the problems/issues. The student will generate solutions/analysis of problems/issues evaluated and will assess and justify the solutions and/or analysis.

Communication Skills (written and oral)
Students will communicate proficiently. Students will compose coherent documents appropriate to the intended audience and effectively communicate orally in a public setting.

Ethical Decision Making
Students will model ethical decision-making processes. Students will identify ethical dilemmas and affected parties and will apply ethical frameworks to resolve a variety of ethical dilemmas.

Global & Cultural Perspectives
Students will reflect upon cultural differences and their implications for interacting with people from cultures other than their own. Students will demonstrate understanding or application of their discipline in a global environment and will demonstrate how their discipline impacts or is impacted by different cultures.

III. Major Course Topics

A. Chemistry and the Scientific Method
B. Matter and Measurement; Unit Conversions; Mathematical Manipulations
C. Matter and Energy
D. Atoms; Energy Sublevels and Orbitals; Nuclear Power
E. The Atomic Nucleus
F. Chemical Bonds
G. Naming Ionic and Covalent Compounds
H. Chemical Reactions and Stoichiometry
I. Gases
J. Liquids and Solids
K. Oxidation and Reduction Reactions
L. Solutions
M. Acids and Bases

N. Inorganic Chemistry
O. Equilibrium Calculations
P. Introduction of Organic Compounds
Q. Lipids
R. Proteins
S. Enzymes and Vitamins
T. DNA, RNA, and Hormonal Action