Date: Spring 2011

I. Course Prefix and Number: CHM 122
   Course Name: General Chemistry I
   Credit Hours and Contact Hours: 4 Credit Hours - 6 Contact Hours

Catalog Description:
Second semester of a two-course sequence suitable for transfer students in science or engineering. Topics include periodic properties of the elements, VSEPR, intermolecular forces, solutions, chemical kinetics and equilibrium, and acid and bases. Polymers, esterification, and thermodynamics are briefly covered.
Prerequisites: CHM 121 with a C or better and MAT 151 with a C or better or placement into Math Level 3 or higher.

II. Course Outcomes and Objectives

Student Learning Outcomes:

Upon completion of the course the participant will be able to:

1. Explain basic chemical concepts and how they relate to everyday experiences.
2. Demonstrate proficiency in problem solving methodology and critical thinking skills.
3. Explain and demonstrate how scientists use the scientific method to explore physical phenomena. The scientific method includes: observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence, and employment of mathematical and interpretive analysis.
4. Apply scientific data, concepts, and models in problem solving.
5. Work effectively with others in teams.
6. Access information for life-long learning. (This includes use of the text books, libraries, and the Internet)
7. Assess limitations of what they know, and know how to seek further knowledge pertinent to the subject matter.
8. Use of the instruments and laboratory techniques of this discipline.

Relationship to Academic Programs and Curriculum:

This course is a college level course that fulfills elective mathematics/science course requirements for all A.A., A.S., and A.A.S. degree programs. Each student should verify the appropriateness of this course for his/her program with his/her advisor.

College Learning Outcomes Addressed by the Course:

☐ writing ☐ ethics/values
☐ oral communications ☐ citizenship
III. Instructional Materials and Methods

Types of Course Materials:

Textbook: Selected by department.

Scientific Calculator: Specified by instructor.

Supplementary material: Specified by instructor.

Methods of Instruction

1. Lecture
2. Discussion
3. Demonstration
4. Group activities
5. Laboratories
6. POGIL (Process Oriented Guided Inquiry Learning) activities are also used for group activities in some of the classes.

IV. Assessment Measures

Student Learning Outcomes will be assessed through a variety of activities. The Science/Technology department believes that each instructor should determine the grading system and evaluation methods that will be used in their sections of the course. Any grading system used in the course must be consistent with the College Catalog. These methods must be communicated to students the first week of the semester in writing. Possible evaluation methods include quizzes, tests, laboratory reports, collected assignments, group activities, et. al. Such evaluations and related assignments will develop a student’s ability to read problems
carefully, perform mathematics and use problem-solving techniques. Course policies with respect to attendance, late work, plagiarism, etc. must be communicated to the student.

IV. General Outline of Topics covered

A. PERIODIC PROPERTIES OF THE ELEMENTS
   1. Electron configurations
   2. Periodic trends in the size, effective nuclear charge, electron affinities, ionization energy, metallic and nonmetallic properties.
   3. Periodic chemical behavior in groups

B. CHEMICAL BONDING and LEWIS STRUCTURES
   1. Lewis structures
   2. Ionic bonding: Lewis structures and lattice energies
   3. Lewis structures of molecular compounds
   4. Bond energies and bond length
   5. VSEPR and molecular shapes

C. LIQUIDS, SOLIDS, and INTERMOLECULAR FORCES
   1. Dispersion, dipole-dipole, hydrogen bonding, and ion-dipole forces
   2. Surface tension, viscosity, and capillary action
   3. Vaporization and vapor pressure
   4. Heating curves

D. SOLUTIONS
   1. Concentrations
   2. Solubility-Intermolecular forces

E. CHEMICAL KINETICS
   1. Rates of reaction
   2. Rate law -Determining order
   3. Effect of temperature on rate
   4. Reaction mechanism
   5. Catalysts

F. CHEMICAL EQUILIBRIUM
   1. Dynamic equilibrium
   2. Equilibrium constant
   3. Heterogeneous equilibria
   4. Reaction quotients
   5. Le Chatelier's Principle

G. ACID and BASES
   1. Arrhenius and Bronsted-Lowry
   2. Ionization constant
   3. Autoionization of water
4. pH
5. Acid-base properties of salts
6. Acid Rain
7. Buffers-range and capacity

H. ORGANIC CHEMISTRY
   1. Carbon
   2. Functional groups
   3. Etherification
   4. Amides
   5. Polymers (Condensation and addition)

I. BIOCHEMISTRY
   1. Proteins and amino acids
   2. Protein structure (molecular models)
   3. Antioxidants

J. ENVIRONMENT
   1. Acid rain
   2. Ozone
   3. Pollution
   4. Toxic materials