COURSE ABBREVIATION          CHEM 1211
CREDIT HOURS                3 semester hours
COURSE TITLE                PRINCIPLES OF CHEMISTRY I
PREREQUISITES              MATH 1113 with a C or better* and exit or exemption from Learning Support reading or ENSL 0090 with a C or better
                          *May be taken as a corequisite
COREQUISITE                CHEM 1211L

CATALOG DESCRIPTION:
First course in a two-semester sequence covering the fundamental principles and applications of chemistry for science majors. Topics to be covered include composition of matter, stoichiometry, periodic relations, and nomenclature.

EXPECTED EDUCATIONAL RESULTS
At the completion of the lecture course, students should be able to:
1. use the mole concept
   define the mole
   use the mole concept to produce formulas and reactions
   balance chemical reactions
   understand stoichiometric relations
2. name simple ionic and covalent compounds and write correct formulas
3. know the structure of the atom
   know the relative charges and masses of subatomic particles
   know what an isotope is
   write electronic configurations for an atom or ion
   use the periodic table and predict periodic properties
4. differentiate between ionic and covalent bonding
5. use models of the covalent bond to predict structure and properties: localized electron, VB,VSEPR, MO
6. Apply the ideal gas laws
   relate kinetic molecular theory to physical states of matter
   use the gas laws to determine pressure, volume and molar quantities in a gas
GENERAL EDUCATION OUTCOMES

I. This course addresses the general education outcome relating to communications as follows:
   1. Students develop their reading comprehension skills by reading the text and handout materials.
   2. Students develop their listening skills through lecture and small group problem solving. Lecture material is presented that is not included in the text or handout material and is included as part of the exams or test.
   3. Students develop their reading and writing skills through the use of problems and activities developed specifically to enhance their understanding of certain principles. Students provide written or oral solutions to these problems in both individual and group format. They must also deal with short-answer type questions on course exams.

II. This course addresses the general education outcome relating to mathematical concept usage and applies the scientific method as follows.
   Students must apply mathematical concepts in the solution of problems designed to illustrate the chemical principle being taught. Analysis of graphically presented material also test their mathematical skills as well as their ability to interpret and communicate qualitative data.

III. This course addresses the general education outcome relating to demonstrating effective individual and group problem solving and critical thinking skills in a variety of situations as follows:
   1. Students learn individual and group problem solving by doing problems both in classroom settings and at home.
   2. Critical thinking skills are encouraged in many ways, one of which is by requesting student response to questions asked during the lecture.

IV. This course addresses the general education outcome relating to recognizing and applying scientific inquiry in a variety of settings as follows:
   1. Students apply the scientific method in the set-up and solution of the problems designed to illustrate the chemical principle being taught.
   2. Students use models that explain basic scientific method phenomenon and relate it to everyday situations.
   3. Students use conceptual and physical models to explore theory and relate it to preexisting concepts.

COURSE CONTENT

Stoichiometry
The Atom
   The Mole Concept
   Chemical Compounds
   Chemical Reactions
   Reactions in solution

Atomic Structure and Chemical Periodicity
   The Bohr Atom

Quantum Theory
Orbital
Quantum numbers
Electronic configurations
The Periodic Table of the Elements
Chemical Bonding and Molecular Structure
  Ionic Bonding
  Covalent Bonding
  Polar covalent bonding
  Electronegativity
  Lewis structures
  Valence Bond theory
  VSEPR theory
Molecular Orbital
Gases
  Boyle's and Charles' Laws
  The Ideal Gas Law
  Kinetic Molecular theory
  Real and Ideal gases
  Dalton's Law of partial pressures
Liquids and Solids
  T-P one component phase diagram
  Intermolecular and intramolecular forces

ASSESSMENT OF EXPECTED EDUCATIONAL OUTCOMES
A. Course Grade
The course grade will be determined by the individual instructor (under the guidelines of the division) using a variety of methods such as quizzes, homework, group projects and exams. Graded activities are designed to measure students' abilities to use higher order thinking skills in their understanding and applying of chemical concepts. A comprehensive final exam is required. This exam must count for no more than 25% of the course grade.

B. Program Assessment
The General Chemistry Program (lecture and laboratory) will be assessed every 3 years in the fall and spring semesters. The committee will monitor the results of the assessment during non-assessment years and make curriculum revisions as necessary. For this program assessment.
  a. Key learning outcomes will be tested using an assessment tool such as the ACS examination for the lecture course
  b. The laboratory course will also be assessed in conjunction with the lecture course using either a standardized tool or one composed by the General Chemistry faculty which has been piloted in previous semesters.

C. Use of Assessment Findings
The Chemistry Curriculum Committee will analyze the assessment data. The committee will use assessment results to determine the effectiveness of the course by seeking answers to the following questions:
  1. Are students performing at a pre-determined minimal level of performance on:
     a. the course as a whole?
b. on individual learning outcomes?
2. Which learning outcomes are students' performance acceptable or above average?
3. Which learning outcomes are students' performance below minimal level of performance?
4. What factors are contributing to student performance on those learning outcomes below minimal level of performance?
5. What changes or modifications in course content or instructional strategies are needed to help improve student performance on learning outcomes below minimal level of performance?

D. Use of Assessment Findings
The Chemistry 1211 Assessment Committee will analyze the results of both the pilot testing and the formal assessment data as well as the attitudinal survey. The committee will use assessment results to determine the effectiveness of the course by seeking answers to the following questions:
1. Are students performing at a pre-determined minimal level of performance on:
   a. the course as a whole
   b. on individual learning outcomes?
2. Which learning outcomes are students' performance acceptable or above average?
3. Which learning outcomes are students' performance below minimal level of performance?
4. What factors are contributing to student performance on those learning outcomes below minimal level of performance?
5. What changes or modifications in course content or instructional strategies are needed to help improve student performance on learning outcomes below minimal level of performance?

May 5, 2004