COURSE ABBREVIATION  Chem 1151

CREDIT HOURS  3 semester hours

COURSE TITLE  Survey of Chemistry I

PREREQUISITE  Exit or exemption from Learning Support mathematics and exit or exemption from Learning Support Reading or ENSL requirements with a "C" or better.

COREQUISITE  Chem 1151L

CATALOG DESCRIPTION:
Chem 1151 Survey of Chemistry I: This course is intended for students in physical education, business, humanities, social sciences, and allied health students (Nursing, Dental Hygiene, Health Information Technology) planning to pursue baccalaureate degrees. The primary topics covered are measurements, nomenclature, atomic bonding, states of matter, solutions, equilibria, acids, bases, and pH. This course lays the foundation for understanding of biochemical processes.

ENTRY LEVEL COMPETENCIES
Upon entering this course the student is expected to be able to:
1. Place large and small numbers in exponential notation and use the rules for adding, subtracting, multiplying and dividing numbers with exponents.
2. Manipulate simple algebraic equations for problem solving
3. Extract relevant information required to solve problems and identify the desired goal.

GENERAL EDUCATION OUTCOMES
I. This course addresses the general education outcome relating to communication as follows.
   1. Students develop their reading comprehension skills by reading the text and handout materials.
   2. Students develop their learning skill 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 chemistry 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 demonstrating effective individual and group problem solving and critical thinking skills in variety of situations as follows:
   1. Students learn individual and group problem solving and critical thinking skills by doing
problems both in the classroom settings during the lecture.

2. Critical thinking skills are encouraged in many ways, one of which is by requesting student response to questions asked during the lecture.

III. 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 the basic scientific phenomenon and relate it to everyday situations.
3. Students use conceptual and physical models to explore theory and relate it to preexisting concepts.

EXPECTED EDUCATIONAL RESULTS:
Upon successful completion of this course, the student should be able to:
1. use the appropriate metric units and prefixes for mass, length, and volume and make conversions from one unit to another.
2. use the periodic table as a tool to extract relevant information concerning atomic structure and to predict chemical behavior (including isotopes and the role of nuclear chemistry in medicine).
3. for any given atom or molecule/ionic unit:
   a. predict the bond type
   b. draw Lewis dot structure
   c. determine the number of bonds formed by hydrogen and the row two elements
   d. determine the polarity and geometry of the molecules
   e. determine the relationship between polarity and physical properties of a compound
   f. write the formula from the name of a compound and vice versa
4. balance chemical equations, solve simple stoichiometric problems, and identify the energy changes that accompany the reaction
5. use the kinetic theory to explain macroscopic behavior of the three physical states of matter on a molecular level
6. describe solutions in qualitative and quantitative terms and solve concentrations and dilution used in clinical chemistry
7. state factors affecting the rate of a chemical reaction and use the concepts of chemical equilibrium to predict the direction and degree of completion of chemical reactions:
8. for acids and bases;
   a. compare and contrast properties
   b. given the hydrogen ion and hydroxide concentration of a solution, calculate pH or vice-versa
   c. state the role of buffers and their mechanisms for maintaining homeostasis in body fluids
   d. relate acid or base strength to the strength of its conjugate base or acid
   e. relate pKa to the strength of an acid
COURSE CONTENT
Topics

  Matter, Measurements, and Calculations
  Atoms and Molecules
  Electronic Structure and the Periodic Law
  Forces Between Particles
  Chemical reactions
  Solutions and Colloids
  Reaction Rates and equilibrium
  Acids and Bases
  The States of Matter (if time permits)
  Nuclear Chemistry (if time permits)

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 student’s 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. DIVISIONAL ASSESSMENT
Chemistry 1151 will be assessed every 5 years in the fall. The committee will develop a time-line to monitor the assessment process during the five year cycle to ensure that assessment activities are occurring in order to have sufficient data to undertake a formal assessment at the end of the cycle. Assessment will consist of:

  a. An attitudinal survey addressing students’ career and professional goals and perceptions of the quality and usefulness of the course.
  b. A set of objective test items keyed to expected learning outcomes. These items will be balanced with respect to content and level of cognitive demand using a process described in the document Designing Assessment Instruments: A Guide for DeKalb College Faculty.
  c. A pilot administration of the objective assessment instrument. The results of the pilot assessment will be used to determine how well the test items are functioning in terms of discrimination, difficulty, and test reliability. The information obtained from item analysis will be used to eliminate or rewrite test items not functioning properly. The revised assessment instrument will be administered during the assessment cycle at a time established by the committee.
C. USE OF ASSESSMENT FINDINGS

The Chemistry 1151 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 outcome?
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 are modifications in course content or instructional strategies needed to help improve performance on learning outcomes below minimal level of performance?

Approved Date: March 30, 2001
Review Date: March 31, 2004