

**1. Department, Course Number, and Course Title:**

**CHEMISTRY AND BIOCHEMISTRY**

**CHEM 101 GENERAL CHEMISTRY I**

**2. Designation:** Required  Elective   
Lower Division  Upper Division

**3. Course Description:** Physical concepts, stoichiometry, structure of atom, periodic table, chemical bonding.

**4. Prerequisites:** High school chemistry and physics; two years of high school algebra; satisfactory performance on mathematics placement examination given during registration period.

**5. Text and Materials:** Chemistry: Molecular Science, 3<sup>rd</sup> Ed. Moore, Thomson, 2006  
Experiments for General Chemistry, 5<sup>th</sup> Ed. Goldwhite, McGraw-Hill, 2002

**6. Course Objectives:** The topics to be learned are: units of measurement and the scientific method, the structure of the atom, describing and measuring chemical change, energetics of chemical change, elementary aspects of quantum mechanics in order to better understand the nature of chemical bonding, and finally the prediction of three-dimensional structures of small molecules. The lecture discussion of these topics is complemented by laboratory experiments.

Course Outcomes

- A. Knowledge of atomic structure and systems of measurement
- B. Ability to balance equations of reactions.
- C. Use of A and B to predict amounts of product(s) formed or reactants(s) required of a given chemical reaction.
- D. Use of A, B and C to predict energy released or consumed by a chemical process.
- E. To have an understanding of the microscopic nature of matter and the quantization of electromagnetic radiation and atomic and molecular energy levels.
- F. To be able to predict the three-dimensional structures of simple molecules from their chemical formula.
- G. To be able to safely perform qualitative and quantitative experiments in a chemistry laboratory and understand how uncertainty in measurements results in uncertainty in calculated results.

**7. Topics Covered:** (in Order of Presentation)

- Introduction (Ch. 1)
- Molecular nature of matter (Ch. 2)
- Stoichiometry (Ch. 3)
- Aqueous Reactions (Ch. 4)
- Thermochemistry (Ch. 5)
- Atomic structure (Ch.6)
- Periodic Properties (Ch. 7)
- Basic bonding (Ch. 8)
- Bonding theories (Ch. 9)

**8. Class Schedule:** Number of Sessions per week: 3 lectures; 1 recitation; 1 laboratory  
Duration of each session: Lectures and recitation: 50 minutes;  
Laboratory: 2 hours and 50 minute

**9. Contribution of course to meeting the professional component:**

This course is part of the one year (48 quarter units) of Basic Mathematics and Science.  
Science: 5 units

**10. Relationship of course to program objectives:**

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)
- knowledge of current events and societal contemporary issues -- non-engineering related. (abet j)
- knowledge of measurement techniques

Skill outcomes:

- an ability to design and conduct experiments as well as to analyze and interpret data (abet b)
- an ability to communicate effectively (abet g)
- an ability to think in a logical sequential process

Attitudes Outcome:

- a desire to be a flexible and adaptable team player (collaborative attitude)

**11. Prepared by:** Wayne Tikkanen, Professor, Department of Chemistry and Biochemistry, 12/1999  
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