

General Chemistry I Fall 2011
CHEM 1311

Professor Arthur L Meyer

Office- SAC 1329 / NRG 2219 Office Hours (NRG) M,W 800-1030a // (SAC) T,TH by appointment

Web Site: www.professormeyer.com email- ameyer@austincc.edu

COURSE DESCRIPTION

Covers the fundamental facts, laws, principles, theories, and concepts of chemistry necessary for further work in science or science-related subjects. Stresses atomic structure, periodic properties of matter, chemical bonding, and molecular geometry of organic and inorganic molecules, states of matter, stoichiometry, and properties of solutions.

PREREQUISITES

High school chemistry or the equivalent

Intermediate algebra (note: College Algebra is required for General Chemistry 2)

REQUIRED MATERIALS

Calculator- scientific type, **no internet or phone calculators**

Homework Notebook- separate from your lecture notebook- see format below.

TEXTS

Departmental: Chemistry, *The Molecular Nature of Matter and Change*. 6th ed. Silberberg. McGraw Hill 2011.

In addition to the departmental text, there are excellent used textbooks on the market, including

Chemistry, *The Central Science*, Brown, LeMay, et. al. Pearson/Prentice Hall Publishing, 2009.

General Chemistry, Whitten, Davis, et. al., Eighth Edition, Saunders College Publishing, 2007

INSTRUCTIONAL METHODOLOGY

Lectures will be presented in PowerPoint format. Class Handouts are posted on the website and are to be printed out in advance of lectures. They contain all of the PowerPoint slides with some of the details and notes missing ... for you to fill in. All in-class practice problems are contained in the Class Handouts.

HOMEWORK

Homework is to be kept in a separate notebook and is to be turned in at the end of the semester for a grade. Bring your homework notebook to my office when seeking help during office hours. See section on how to keep your notebook.

CLASS PARTICIPATION Students are expected to work all problems as done in class, showing class participation. Points will be deducted if a different method is used (for example, if the text shows a different method, the method shown in class is the one to use.)

COURSE EVALUATION/GRADING SCHEME

A=90-100 B=80-89 C=70-79 D=60-69 F<60 3 Quizzes = 70%; Final Exam = 25%; Homework = 5%

COURSE POLICIES

There are no make-up or retest quizzes or exams given

One quiz grade may be replaced by the grade on the final exam.

The final exam will be comprehensive, covering all chapters (including reading assignments)

Failure to take the final exam will result in a grade of "F" assigned for the course.

Attendance is required (the student is responsible for all announcements made in class.)

No recording devices allowed, except for documented special needs students

Shut off all cell phones, beepers, watch chimes. Repeated offenses will have points deducted

COURSE RATIONALE

This course covers the fundamental facts, laws, principles, theories and concepts of chemistry necessary for further work in science or science-related subjects.

COMMON COURSE OBJECTIVES

See <http://www3.austincc.edu/catalog/descchem.htm>

Statement on Scholastic Dishonesty- See Student Handbook/College Catalog -latest edition

Statement on Students with Disabilities- See Student Handbook/College Catalog -latest edition

Statement on Academic Freedom- See Student Handbook/College Catalog -latest edition

Student Discipline Policy- See Student Handbook/College Catalog -latest edition

COURSE OUTLINE

Unit 1 Matter and Measurement

- Energy and Energy Changes
- Characterizing Matter
- Units of Measurement and Significant Figures
- Dimensional Analysis
- Temperature Scales and Heat Calculations

Unit 2 Formulas and Stoichiometry

- Dalton's Atomic Theory and Forms of Matter
- Atomic Mass
- % Composition
- The Mol Concept
- Empirical Formulas
- Nomenclature of Ionic Compounds

Unit 3 Equations and Reaction Stoichiometry

- Meaning of a Balanced Equation
- Mass Calculations and % Yield
- Limiting Reagents
- Solutions- Molarity and Dilution
- Stoichiometry of Equations Involving Molarity
- Gases- Measuring Pressure and The Ideal Gas Equation
- Stoichiometry of Equations Involving Gases

Unit 4 Reactions in Aqueous Media

- Ionization and Arrhenius Theory
- Ionic Equations- Double Displacement Reaction
- Acid Nomenclature and Neutralization Reactions
- Introduction to "Redox" Equations
- Single Displacement Reactions- Activity Series

Unit 5a Atomic Structure

- Sub-atomic Particles- Discovery and Measurement
- The Nucleus
- Isotopes and Abundance
- Radioactivity- Radioactive Emissions
- Nuclear Stability- n/p Ratios

Unit 5b Modern Atomic Theory

- Electromagnetic Radiation- Wavelength, Frequency and Energy
- The Photoelectric Effect- Particle/Wave Dualism
- The Bohr Model- Atomic Spectra
- Wave Nature of the Electron
- Quantum Theory- Electron Configurations and Energy Diagrams
- Quantum Numbers

Unit 6 Periodicity

Periodic Properties and the Periodic Table

Atomic Size

Ionization Energies

Electron Affinity

Formation of Ions

Electronegativity

Unit 7 Bonding

Ionic Bonding

Lattice Energy

Covalent Bonding- orbital overlap

Lewis Structures- Simple and Mathematical Methods

Isomers

Resonance Structures- Formal Charge, Selection Criteria

Polar Covalent Bonds

Unit 8 Molecular Structure

Molecular Shapes- VSEPR theory

Electron Pair Interactions and Shape- LP-LP, LP-BP, BP-BP interactions

Shape and Molecular Polarity

Hybridization Theory- Hybridizing Atomic Orbitals

Expanded Octets and Hybridization

Hybridization and VSEPR

Molecular Orbitals- Sigma and Pi Bonding

Unit 9 Acid Base Theory

Arrhenius Theory of Ionization- Strong and Weak Acids

Bronsted-Lowry Definitions of Acids and Bases

Conjugate Acids and Bases

Lewis Acids and Bases

Unit 10 Liquids and Properties of Solutions

Attractive Forces- Dipole/Dipole-

Hydrogen Bonding

London Forces and Non-Polar Molecules

Properties of Liquids- Vapor Pressure, Boiling Point

Vapor Pressure and Boiling Point- Heat of Vaporization

Clausius Clapyron Equation

Raoult's Law and Vapor Pressure of Solutions

HOMEWORK- Homework assignments are found on the website.

Homework Notebook

Your homework notebook must be in the following format:

1. The notebook must be bound- spiral or composition (no loose leaf notebooks or 3 ring binders!)
2. All pages are to be numbered consecutively (no torn out pages, no additional pages).
3. Each page should be dated and the unit being worked, indicated.

Hint: I should be able to open your homework notebook to any page and know what chapter the homework is from and the date you worked on the assignment.

Exam Dates

Quiz 1 Thursday, September 22

Quiz 2 Thursday October 20

Quiz 3 Thursday, November 17

Final Exam Thursday, December 8