THREE RIVERS COMMUNITY TECHNICAL COLLEGE

Chemistry 111: General Chemistry
Instructor: Brent A. Maynard
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Telephone: 885-2373
Office Hours: Thames Valley: Monday 13:30-14:30
Wednesday 13:30-14:30
Thursday 17:00-18:00

Note: Students are encouraged to see the instructor for help. Instructor is available at other times as well as during office hours.

Course Description: CHEM 111 GENERAL CHEMISTRY 1
4 SEMESTER HOURS

Study of fundamental principles, theories, and laws of chemistry. Topics include atomic theory and the structure of the atom, the aggregated states of matter, kinetic molecular theory, chemical bonding, stoichiometry and periodicity, solutions, and colloids. Three hour lecture; one three hour laboratory period. OFFERED IN FALL SEMESTER ONLY.

Prerequisites: High school chemistry and MATH 109 or MATH 141, or CHEM 103 and MATH 109 or 141

Textbooks: Lecture: Chemistry 7th Edition
Raymond Chang
McGraw-Hill
Lab: Chemical Principles in the Laboratory, 7th edition
Slowinski, Wolsey and Masterton

Computation of Grades:

1. Quizzes will be given approximately once a week. Quizzes are announced. The average of all quizzes is equal to a one hour exam.
2. The average of lab reports will equal a one hour exam.
3. During the semester 2 or 3 one hour exams will be given.
4. The final exam will have a value equivalent to two one hour exams. FINAL EXAM IS CUMULATIVE!
5. Final grade = (quiz average + lab average + exam 1 + exam 2 + exam 3 + 2xfinal) divided by 6.

Course Objectives:

1. Be familiar with scientific notation, significant digits, and the metric system.
2. Understand atomic structure, isotopes and the ZXA notation.
3. Know chemical nomenclature for inorganic compounds.
4. Be able to determine percent composition and molecular and empirical formula.
5. Be able to balance equations and do stoichiometric calculations for chemical reactions including reactions in solution and gaseous phase.

Stoichiometric calculations include:
- Limiting reactant
- Theoretical yield
- Percent yield
- Amount non-limiting reactant left over

6. Be able to use:
   - Molarity
   - Percent by mass
   - Parts per million
7. Have an understanding of ionic, covalent, and coordinate covalent bonding.
8. Have a basic understanding of quantum mechanics and atomic orbitals and how it relates to the periodic chart.
9. Be familiar with Lewis dot structures.
10. Have a basic understanding of molecular geometry.
11. Know the difference between pi and sigma bonding.
12. Be able to do acid-base and redox titration calculations.
13. Be able to do calculations using the ideal gas law and universal gas law.
14. Have an understanding of gas behavior and pressure.
15. Understand energy, enthalpy, and the first law of thermodynamics.

Attendance is recorded. There is no formal attendance policy, however, numerous unexcused absences will result in the lower grade being given in a borderline situation.

Tentative Schedule (subject to change)

Chapter 1
- Scientific Method
- Metric System
- Significant digits
- Scientific notation
- Density
- Classification of matter

Chapter 2
- Atomic structure
- Atomic number, mass number, neutron number, and the ZAX notation
- Ions
- The periodic table
- Molecular and empirical formulae
- Nomenclature

Chapter 3
- Atomic mass
- Molar mass
- Percent composition
- Determination of empirical and molecular formulae
- Equation balancing
- Stoichiometry
  - Theoretical yield
  - Percent yield
  - Limiting reactant

Chapter 4	Electrolyte Precipitation reactions Acid base neutralization Oxidation-reduction reactions Gravimetric analysis Acid-Base titrations Redox titrations
Chapter 12	Concentration units: Molarity Percent by mass Parts per million (ppm)
Chapter 7	Nature of light Bohr model of the atom Basic quantum mechanics Quantum numbers and atomic orbitals Atomic orbitals and the periodic chart Electron configuration and Auf-ban principle
Chapter 8	Development of the periodic table Periodic properties Variation in properties on the periodic chart Ionization energy Electron affinity Atomic and ionic diameter Electronegativity
Chapter 9	Ionic bonding Covalent and coordinate covalent bond Octet rule Lewis dot structures Resonance structures
Chapter 10	Dipole moments Molecular geometry Pi and sigma bonding
Chapter 11	Hydrogen bonding Van der Waals forces Polarity vs non-polarity and the prediction of solubility
Chapter 5	Kinetic theory of gases Ideal and universal gas laws Dalton’s law of partial pressure Vapor pressure Stoichiometry with gas phase reactions Deviation from ideal behavior

Tentative Lab Schedule

1. Orientation and safety
2. Density
3. Recrystallization
4. Nomenclature
5. Percent compositon or empirical formula determination
6. Precipitation reactions
7. Identification of carbonates
8. A series of chemical reactions
9. Chemical synthesis and percent yield
10. Acid-Base titration
11. Redox titration
12. Qualitative analysis
13. Gas-laws