

COURSE OUTLINE
Grading Systems

CAMOSUN COLLEGE
School of Arts & Science
Department

COURSE OUTLINE

CHEM 060
Introduction to Chemistry

This course introduces chemical concepts for understanding life and the environment. Topics include: energy, matter and measurement; elements, atoms and the periodic table; atomic structure; names, formulas and inorganic compounds; periodic properties of elements; chemical bonds; chemical quantities; chemical reactions; stoichiometry; gases; nuclear chemistry. Non-science students may also find this course of interest.

(4 credits)

F, W, P (4,2,0,0,)

Prerequisite: Math 10 or Assessment

The Approved Course Description is available on the web @Camosun.bc.ca

1. Instructor Information

- (a) Howard J. Duncan
- (b) Office Hours: See Timetable on Office Door
- (c) Office Location: F308B
- (d) Phone: 250-370-3445
- (e) E-mail: duncanh@camosun.bc.ca

2. Intended Learning Outcomes

At the end of this course students will possess an enhanced ability to:

1. Utilize the specialized vocabulary and nomenclature of chemistry.
2. Correctly use metric and SI units in performing chemical calculations.
3. Describe the experimental discovery of subatomic particles, summarize the characteristics of electrons, protons and neutrons, and identify their roles as components of atoms.
4. Communicate an understanding of atomic structure, the differences between elements, and the role of the periodic table in organizing elements within a coherent theoretical and empirical system.

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5. Describe and account for the periodic table trends concerning atomic number, atomic radius, ionization energy and electronegativity.
6. Demonstrate an ability to name chemical compounds, and identify and construct chemical formulas.
7. Compare the formation and characteristics of ionic and molecular compounds.
8. Demonstrate an ability to perform mathematical calculations involving chemical formulas, molecular weights, moles, Avogadro's number and Molarity.
9. Balance chemical equations, demonstrate an understanding of the information they provide chemists and solve stoichiometry problems.
10. Identify and account for the general characteristics of the gas state and solve mathematical problems involving Boyle's Law, Charles' Law, Gay-Lussac's Law and Avogadro's Law.
11. Communicate an understanding of radioisotopes, nuclear fission and nuclear fusion.

3. Required Materials

- (a) Chemistry 060 Lab Manual
- (b) Safety Glasses

4. Course Content

Introduction to Energy and Matter: Elements and Compounds; Pure Substances and Mixtures; Physical Properties and Chemical Changes; Energy and Chemical Change.

Measurements: Metric and SI Units; Length and Volume Measurements; Uncertainty in Measurement; Significant Figures; Scientific Notation; Density and Specific Gravity; Measurement of Temperature; Temperature and Heat Energy.

Elements, Atoms and the Periodic Table: Names and Symbols; Abundant and Rare Elements; The Periodic Table of the Elements; Physical Properties of Elements; Atoms; Democritus to Dalton; Dalton's Atomic Theory; Atoms and Subatomic Particles; Isotopes; Atomic Masses of the Elements; Moles; Molar Masses and Chemical Formulas.

Atomic Structure – Atoms and Ions: Discovery of Atomic Structure; The Electromagnetic Spectrum; Excited Electrons and Spectra; Electrons in Atoms; The Quantum Mechanical Model of the Atom; Energy Levels of Electrons; Valence Electrons and Lewis Symbols; Energy Sublevels and Orbitals; Energy Sublevels and the Periodic Table; Electronic Configurations.

Names, Formulas and Inorganic Compounds: Monatomic and Polyatomic Ions; Names and Formulas of Ionic Compounds; Names and Formulas of Binary Nonmetal Compounds;

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Nonmetals; Oxidation Numbers of Atoms in Polyatomic Compounds; Nomenclature of Acids and Salts; Hydrates; Chemicals and Their Uses.

Periodic Properties of Elements: Discovery of Periodicity; The Periodic Table; Atomic and Ionic Size; Ionization Energy; Melting Point and Boiling Point Trends; Density and Conductivity Trends; A Survey of Elements; Transition Metals.

Chemical Bonds: Ionic Bonds; Covalent Bonds; Electronegativity; Polar Covalent Bonds; Metallic Bonding; Conductivity, Solubility and Chemical Bonding; Lewis Electron-Dot Formulas; Water – A Bent Molecule; Ammonia – A Trigonal Pyramidal Molecule; Ammonium Ions and Coordinate Covalent Bonds; Methane – A Tetrahedral Molecule; Molecular Structures and the Periodic Table; Hydrogen Bonding.

Chemical Quantities: Formula Weights and Molecular Weights; Moles and Molar Masses; Avogadro's Number; Composition Calculations; Mass and Mole Conversions; Calculations Involving Avogadro's Number; Molarity; Empirical Formulas and Molecular Formulas.

Chemical Reactions: Chemical Reactions and Chemical Equations; Balanced Chemical Equations; Writing and Balancing Chemical Equations; Classifying Reactions; Combustion; Synthesis Reactions; Decomposition Reactions; Reactions of Metals and Nonmetals; Double-Replacement Reactions; Ionic and Net Ionic Equations; Neutralization.

Stoichiometry – Calculations Based on Chemical Equations: Mole Ratios from Chemical Equations; Mole Calculations; Calculations Involving Moles and Masses; Calculations Involving Molar Solutions; Limiting Reagent Calculations; Percent Yield; Energy Changes during Chemical Reactions.

Gases: The Atmosphere; Kinetic Theory of Gases; Gas Pressure Units and Atmospheric Pressure; Boyle's Law – Gas Pressure and Volume; Charles' Law – Gas Volume and Temperature; Gay-Lussac's Law – Gas Pressure and Temperature; Standard Temperature and Pressure; The Combined Gas Law; Avogadro's Law – Gas Volume and Moles; Molar Volume and Gas Density; The Ideal Gas Law; Dalton's Law of Partial Pressures; Gas Stoichiometry.

Fundamentals of Nuclear Chemistry: Natural Radioactivity; Half-Life; Measuring Radioactivity; Practical Uses of Some Radioisotopes; Nuclear fission – Splitting Atoms; Nuclear Fusion.

5. Basis of Student Assessment

- (a) Lab Reports (10%)
- (b) Comprehensive Midterm Exams: (15%) and (25%)
- (c) Comprehensive Final Exam (50%)

6. Grading System

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A+ = 95 - 100%
A = 90 - 94%
A- = 85 - 89%
B+ = 80 - 84%

B = 75 - 79%
B- = 70 - 74%
C+ = 65 - 69%
C = 60 - 64%

D = 50 - 59%
F = 0.0 - 49%

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Registrar's Office or the College web site at

<http://www.camosun.bc.ca>

ACADEMIC CONDUCT POLICY

There is an Academic Conduct Policy. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.

www.camosun.bc.ca/divisions/pres/policy/2-education/2-5.html