

**COURSE OUTLINE**  
Grading Systems

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**CAMOSUN COLLEGE**  
*School of Arts & Science*  
*Department*

**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

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**Teacher:**

Howard J. Duncan

Office hours: See Timetable on Office Door

Location: F308B

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**Required Materials:**

Textbook: Fundamentals of Chemistry (Ralph Burns)

Chemistry 060 Lab Manual

Safety Glasses

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#### Course Outline:

**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; 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

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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.

#### Student Assessment:

Lab Reports (10%)

Two Midterm Exams (15% and 25%)

Comprehensive Final Exam (50%)

#### Grading System:

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 = Less than 49%