

CAMOSUN COLLEGE - CHEMISTRY & GEOSCIENCE DEPARTMENT

Chemistry 060 Sections 003 & 003IE

INTRODUCTION TO CHEMISTRY

Fall Semester 2004

Course Description

This course introduces chemical concepts for understanding life and the environment. Topics include atomic structure, the periodic table of elements, molecules and chemical bonding, chemical formulas and reactions, stoichiometry, gases, liquids, solutions, and organic chemistry. Non-science students will also find this course interesting.

Semester offered:	Fall
Credits:	4 credits
In-class workload:	4 h of lecture per week 2 h laboratory period every other week
Estimated out-of-class workload:	6 h per week
Number of weeks:	14 weeks
Pre-requisites:	Math 10 or assessment

Intended Learning Outcomes

At the end of this course, students will be able to:

1. Utilize the specialized vocabulary and nomenclature of chemistry.
2. 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.
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.

Instructor

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 Office hours: Regular office hours are posted on the office door.
 Students are welcome whenever the door is open.

Lecture times & locations

Wednesday 1:30 to 3:20 Fisher Bldg., Rm. F334

Thursday 1:30 to 3:20 Fisher Bldg., Rm. F338

Laboratory time & location

Friday 1:30 to 3:20 Fisher Bldg., Rm. F300

*The lab periods are offered every other week.

Textbook

Chemistry 060 Notes, 1997 Edition. Author: Les Waye.
 Camosun College Press.

Laboratory Manual

Chemistry 060 Laboratory Manual, 1999 Edition.
 Author: Les Waye. Camosun College Press.

Other requirements

Safety glasses Safety glasses are **absolutely required** for participation in the labs.

The cost of a good, comfortable pair is about \$15 at the campus bookstore or local, safety supply stores. Inexpensive and useful, but typically uncomfortable, safety glasses can be purchased for less at most lumber and hardware stores.

Lab Coats A lab coat or equivalent covering is required for experimental work.

Calculator A basic calculator is required for use in lectures, in the laboratory, and during all tests including the final exam.

Lecture Outline

A detailed outline of the lecture material is provided in the Table of Contents of *Chemistry 060 Notes* by Les Waye. The primary goal of this offering of the course is to provide a thorough understanding of all key aspects of the curriculum rather than cover each and every aspect of chemistry presented in the book per se. Therefore, to some degree, the emphasis of this offering of the course is tempered by the nature, interests and needs of students in the class. That said, to meet the learning outcomes of this course, the following general lecture outline applies.

- 1. Measurements and Calculations:** SI units; unit conversions; scientific notation; significant figures; calculations involving density; calculations involving energy.
- 2. Introductory Terminology:** scientific method; elements, compounds and mixtures; metals and nonmetals; atoms and molecules; protons, neutrons and electrons; atomic masses and isotopes.
- 3. Chemical Formulas and Names:** Formulas and naming for molecular compounds; meaning of ionic formulas and naming ionic compounds; polyatomic ions; naming acids.
- 4. Calculations Based Upon Formulas:** Molecular mass; percentage composition; the mole; Avogadro's Number.
- 5. Stoichiometry:** Balancing equations, problems based upon equations; limiting reactant; percentage yield; exothermic and endothermic reactions.
- 6. Periodic Table and Electron Distributions:** Chemical families; electron levels and orbitals; electron dot structures; trends in atomic radii and ionization energies.
- 7. Chemical Bonding:** Formation of ionic compounds; formation of molecular compounds; electron dot formulas; electronegativity and bond polarity; molecular geometry and polarity.
- 8. Gases:** Why are gases gaseous?; factors affecting gas volume; absolute temperature; standard conditions; molar volume; partial pressure; gas stoichiometry.
- 9. Liquids and Solutions:** Why are liquids liquid?; hydrogen bonding; vapour pressure and boiling point; solubility; solution concentration; electrolytes; pH scale.
- 10. Organic Chemistry:** Why so many organic compounds?; structural formulas and isomers; hydrocarbons; alcohols; addition and substitution reactions.
- 11. Radioactivity:** Radioactive substances; alpha, beta, and gamma rays; production of radioisotopes; half-life and dating; medical applications.

Laboratory Outline

Although an outline of laboratory experiments is presented in the *Chemistry 060 Laboratory Manual*, 1999 Edition, all experiments described in the lab manual will not be conducted due to time constraints. A schedule of experiments to be conducted in a given week is provided below.

Laboratory reports are due in the following experimental lab period. The lab manual has been revised to allow students to hand in the completed pages taken directly from the lab manual. Each lab partner must hand in a separate report even if each person shared equally in the work. There will not necessarily be a report required for each laboratory session. On some occasions a formal laboratory report will be required. Instruction in the preparation of formal reports will be provided.

The class will be split approximately in half, with each section of the class attending the laboratory experiments on alternate weeks. Everyone attends the Midterm Exam in the same period unless justification for absence is presented in writing.

Laboratory Schedule

Friday, September 10th or Friday, September 17th
Orientation to the Laboratory & Laboratory Safety

Friday, September 24th or Friday, October 1st.
Experiment 1 – Density

Friday, October 8th or Friday, October 15th.
*Experiment 3 - Separating Mixtures
 & Begin Experiment 5 – Recycling Copper, Part 1*

Friday, October 22nd
 Review period.

Friday, October 29th
 Midterm Exam.

Friday, November 5th or Friday, November 12th.
Experiment 5 – Recycling Copper, Parts 2 - 6

Friday, November 19th or Friday, November 26th.
*Experiment 5 - Recycling Copper, completion of Part 6
 & Experiment 15 – Accuracy & Precision of Experimental Results*

Friday, December 3rd &
 Friday, December 10th.
(No experiment) Review of course material in preparation for final exam.

Attendance

Of course, attendance in lectures is up to each individual. Hence, students are free to leave a given lecture at any time and return at any time. Obviously, all students are equally responsible for the material whether they choose to attend the lectures or not.

The lectures have been scheduled into one hour and 50 minute periods. There will be a 10 minute break at about the middle of each lecture period.

Attendance for tests and exams is mandatory. If a quiz or exam is missed due to illness or for another justifiable reason (submitted in writing), a make-up test or exam may be scheduled, or the value of that quiz or midterm exam may be added to the value of the final exam.

Attendance in the laboratory section of the course is **mandatory**. No laboratory session can be missed without an acceptable reason submitted in writing (e.g. a note from medical doctor).

Course evaluation

Quizzes: These will compose **20%** of the final grade. There will be five quizzes each of equal value. The best four grades will be counted and the lowest quiz mark will be discarded.

Quiz 1. Chapters 1 & 2

Quiz 2. Chapters 3 & 4

Quiz 3. Chapter 5

Quiz 4 Chapters 6 & 7

Quiz 5 Chapters 8 & 9

Quizzes will be typically scheduled a few days following the completion of classes concerning the Chapter(s) to be tested. Attempts will be made to schedule quizzes on days when students do not have other exams.

Midterm Exam This will compose **20%** of the final grade, and will test material from Chapters 1 to 5. It is scheduled for May 29th in the Friday period normally used for a lab experiment.

Laboratory Reports These will compose **25%** of the final grade. Each lab report will have equal value. There will not be a laboratory report required for all experiments conducted.

Students **must attend** the laboratory portion of the course.

Students **must pass** the laboratory portion of the course in order to pass the course.

Final Exam This will compose **35%** of the final grade. The final exam will cover all of the material presented in the lecture portion of the course, but there will be an emphasis on material from Chapter 5 to Chapter 11. The date and place of the final exam will be announced by College during the semester.

Grade scale

The percentage marks for the course will be converted to grades according to the following scale established by the School of Arts & Science.

A+ = 95% to 100%

A = 90% to 94%

A- = 85% to 89%

B+ = 80% to 84%

B = 75% to 79%

B- = 70% to 74%

C+ = 65% to 69%

C = 60% to 64%

D = 50% to 59%

F = 0% to 49%