



School of Arts & Science
CHEMISTRY AND GEOSCIENCE DEPARTMENT

CHEM 120-02
College Chemistry 1
2011F

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

⚡ Please note: this outline will be electronically stored for five (5) years only.
It is strongly recommended students keep this outline for your records.

1. Instructor Information

| | | | | |
|-----|---------------|--|--------------------|---------------|
| (a) | Instructor: | Neil Meanwell | | |
| (b) | Office Hours: | Mon, Wed, Fri: 11.30 am – 12.30 pm. Mon, Tues, Wed: 1.30 pm -2.30 pm. Wed: 10.30 am – 11.30 am. | | |
| (c) | Location: | F 348B | | |
| (d) | Phone: | 370-3448 | Alternative Phone: | (250)729-3838 |
| (e) | Email: | meanwen@camosun.bc.ca or chemhelp@shaw.ca | | |
| (f) | Website: | N/A | | |

Prerequisite: Chem 12 or Chem 110 (minimum C grade)

Important Dates: Monday, October 10th, Thanksgiving Day; Tuesday, November 8th, last day to withdraw without receiving a failing grade for the course; Friday, November 11th, Remembrance Day.

2. Intended Learning Outcomes

Upon completion of this course the student will be able to:

1. Utilize nomenclature rules to name ionic and covalent compounds.
2. Demonstrate an understanding of stoichiometry by balancing chemical equations and performing mathematical calculations involving chemical reactions.
3. Describe the electronic structure of any atom in the periodic table and apply it to explain many of the physical and chemical properties of the elements.
4. Utilize simple bonding theories to explain why elements combine to form the compounds they do and also to explain many of the properties of compounds.
5. Physical properties of bulk matter in the gas, liquid and solid phases.
6. Use standard chemistry lab equipment, including burets, pipets, Buchner filters, and volumetric glassware in the correct manner.
7. Perform many standard laboratory procedures, such as titrations, preparation of standard solutions, the preparation, isolation, and purification of compounds, as well as use spectrophotometers to make analytical measurements.

3. Required Materials (available from the Camosun Bookstore, Lansdowne Campus)

(a) Principal Text: CHEMISTRY, The Central Science: a Broad Perspective[®] by Brown, Lemay, Bursten, Murphy, Langford and Sagatys, 2nd Edition (2010). Publisher: Pearson.

- (b) Other Lab Experiments: Chemistry 120 Laboratory Manual (In-house)
- (c) Safety Glasses (compulsory for laboratory work).

4. Course Content and Schedule

- a) Lectures: Mon (Y 201), Wed (F 306) and Fri (F 206), 12.30 pm to 1.20 pm
- b) Laboratory: Tues (F 356), 10.30 am to 1.20 pm.
- c) Biweekly problem sets¹
- d) Review test.²
- e) Two term tests.³
- f) A 2-hour written midterm test.⁴
- g) A three-hour written final examination at the end of the course on all the material in the course.

Notes

1. These are set from the questions found after each chapter. These problem sets will not be marked but solutions will be posted outside my office at regular intervals during the term.
2. The review test (**week four**) will be on material covered in the first three weeks of the course. It will take place during the lab period of **week four**.
3. Tentatively scheduled for **weeks six** and **thirteen** of the term.
4. The midterm test will be given in **week nine**. It will cover all the material in the course covered during the first eight weeks. It will take place during the lab period of **week nine**.

5. Basis of Student Assessment (Weighting)

- (a) Tests: Review test: 8%; two term tests: 6% each
- (b) Exams: Midterm Exam: 20%; Final Exam: 35%
- (c) Lab work: 25%

Notes: 1) If it is advantageous to the student any term test or midterm mark which is inferior to the final exam mark will be replaced by an equal weighting from the final exam.

2) You must pass the lecture and lab portions separately in order to pass the course.

6. Grading System: Standard Grading System (GPA)

| Percentage | Grade | Description | Grade Point Equivalency |
|------------|-------|-------------|-------------------------|
| 90-100 | A+ | | 9 |
| 85-89 | A | | 8 |
| 80-84 | A- | | 7 |
| 77-79 | B+ | | 6 |
| 73-76 | B | | 5 |
| 70-72 | B- | | 4 |
| 65-69 | C+ | | 3 |
| 60-64 | C | | 2 |

| | | | |
|-------|---|---|---|
| 50-59 | D | Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite. | 1 |
| 0-49 | F | Minimum level has not been achieved. | 0 |

Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy E-1.5 at camosun.ca for information on conversion to final grades, and for additional information on student record and transcript notations.

| Temporary Grade | Description |
|-----------------|--|
| I | <i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family. |
| IP | <i>In progress:</i> A temporary grade assigned for courses that, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. (For these courses a final grade will be assigned to either the 3 rd course attempt or at the point of course completion.) |
| CW | <i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement. |

7. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

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, at Student Services or the College web site at camosun.ca.

STUDENT CONDUCT POLICY

There is a Student Conduct Policy **which includes plagiarism**. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, at Student Services and on the College web site in the Policy Section.

8. Brief Summary of Course Material with Chapter References

1. Introduction and Review (6 Lectures) (Chapters 1, 2, and 3)

Classification of matter, units of measurement, significant figures, atoms, protons, neutrons, electrons, isotopes, atomic masses. Compounds, stoichiometry, formulas, nomenclature formula weights, molecular weights, percent composition by mass, the mole, molar mass, chemical equations, reaction stoichiometry, limiting reagent, percent yield. Reactions in aqueous solution including precipitation, acid-base and oxidation-reduction, solution concentration and solution reaction stoichiometry.

2. Electronic Structure of Atoms and the Periodic Properties of the Elements (9 Lectures) (Chapter 5)

Light, quanta and photons, atomic spectra and energy levels, wave properties of electrons. Atomic orbitals, quantum numbers, electron spin, electronic structure of the hydrogen atom. Many-electron atoms, electron configurations of atoms and ions, relationship to the periodic table. Periodicity of atomic properties, atomic and ionic radius, ionisation energy, inert pair effect, electron affinity. Chemistry and the periodic table, s-block, p-block, and d-block.

3. Chemical Bonding (9 Lectures) (Chapters 7 and 8)

Ionic bonds, Lewis symbols, lattice enthalpies, properties of ionic compounds. Covalent bonds, atoms to molecules, octet rule and Lewis structures. Polyatomic species, Lewis structures, resonance and formal charge. Exceptions to the octet rule. Ionic versus covalent bonds, correcting the ionic and covalent models. Molecules: shape, size, and bond strength. Shapes of molecules and ions, VSEPR theory. Charge distribution in molecules, polar bonds and polar molecules. Bond strengths and bond lengths. Orbitals and bonding.

4. Gases (3 Lectures) (Chapter 9)

Nature of gases, states of matter, molecular nature of a gas, pressure. Gas laws, ideal gas law, reaction stoichiometry, gas density, Gas mixtures. Molecular motion, diffusion, effusion, kinetic model of gases, molecular speeds. Real gases, limitations of ideal gas law, Joule-Thomson effect.

5. Intermolecular Forces, Liquids and Solids (6 Lectures) (Chapter 10)

Comparison of liquids and solids, intermolecular forces, ion-dipole, dipole-dipole, London dispersion forces, hydrogen bonding. Properties of liquids, phase changes, heating curves, critical temperature and pressure, vapour pressure, boiling point. Phase diagrams, structures of solids.

6. Solutions (3 Lectures) (Chapter 11)

Solution process, solubility, factors affecting solubility, Henry's law, colligative properties.

7. Chemistry of the Environment (3 Lectures) (Chapter 20)

Structure of Earth's atmosphere, ozone layer and its depletion, tropospheric pollution, greenhouse effect and photochemical smog. Oceans and freshwater.

9. Laboratory Schedule

Chem 120-02 Laboratory Schedule Fall 2011

| Week Number (Tuesday) | Experiment # and Title |
|----------------------------------|---|
| 1. (6 th September) | #1 Introduction: Safety in the Chemistry Laboratory |
| 2. (13 th September) | #2 The Densities of Liquids and Solids |
| 3. (20 th September) | #3 Stoichiometry of Chemical Compounds |

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|---------------------------------|---|
| 4. (27 th September) | No lab - Review Test |
| 5. (4 th October) | #4 The Spectrophotometric Determination of Nickel in Aqueous Solution |
| 6. (11 th October) | No lab - Lecture |
| 7. (18 th October) | #5 Colorimetric Determination of Iron in a Vitamin Tablet using 1,10-Phenanthroline |
| 8. (25 th October) | #6 Determination of Copper using Atomic Absorption Spectroscopy |
| 9. (1 st November) | No lab - Midterm |
| 10. (8 th November) | #7 Determination of the Total Hardness of Water using EDTA |
| 11. (15 th November) | #9 The Preparation of Potassium Tris(oxalato)ferrate(III) |
| 12. (22 nd November) | #10 Analysis and Uses of Potassium Tris(oxalato)ferrate(III) |
| 13. (29 th November) | #8 Molecular Shapes (VSEPR) |
| 14. (6 th December) | No Lab - Review |