CAMOSUN COLLEGE
School of Arts & Science
Department of Chemistry & Geoscience

CHEM-100-002
Introductory Chemistry
Winter 2018

COURSE OUTLINE

The course description is online @ http://camosun.ca/learn/calendar/current/web/chem.html

Ω *Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.*

1. Instructor Information

(a) Instructor	Jamie Doran, Ph.D.			
(b) Office hours	Monday, 4:50 to 5:20 PM Tuesday, 4:50 to 5:20 PM Wednesday, 2:00 to 3:20 PM Thursday, 2:00 to 3:20 PM Friday, 2:00 to 3:20 PM			
(c) Location	Room 350C, Fisher Building, Lansdowne Campus			
(d) Phone	(250) 370-3441	**Alternative:**		
(e) E-mail	jdoran@camosun.ca			

2. Intended Learning Outcomes

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

1. Use dimensional analysis, metric and SI units in performing chemical calculations.
2. Utilize the specialized vocabulary and nomenclature of chemistry and name chemical compounds, and identify and construct chemical formulas.
3. Summarize the characteristics of electrons, protons and neutrons, and identify their roles as components of atoms, ions and isotopes, including radioisotopes.
4. Describe 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. Compare the formation and characteristics of ionic and molecular compounds.
7. Perform mathematical calculations involving chemical formulas, molecular weights, moles, Avogadro's number and molarity.
8. Balance chemical equations, including use of the mole concept, and solve stoichiometry problems.
9. Account for the general characteristics of the gas, liquid, and solid states.
10. Conduct experiments in basic chemistry, utilizing common chemistry laboratory equipment with an enhanced knowledge and practice in basic lab skills.

3. Required Materials

(a) Text

Course Text Package & Laboratory Manual

Chemistry 100 Course Notes, Additional Problem Sets & Laboratory Manual, 2017 Edition. Camosun College Publications. This course package is *required* for this course. A copy may be purchased from the Lansdowne Campus book store.

(b) Other

General Materials and Supplies

Safety glasses	Safety glasses *are* ***required*** when handling hazardous chemicals. Each student is required to provide her or his pair of safety glasses. Students lacking safety glasses when they are required *will not be permitted* to be in the laboratory.
Lab coats	Lab coats are *highly recommended* for all experimental work in the laboratory. Each student has to provide her or his own lab coat.
Latex gloves	Latex or other 'non-allergenic' gloves are available if a student has certain allergies and are to be used when appropriate to protect the skin from potentially allergenic chemicals.
Calculator	A scientific calculator is *required* at times in the laboratory, in lecture, and during term tests and the final exam. Each student is *required* to provide her or his own scientific calculator. Cell phone-based, tablet-based or computer-based calculators cannot be used during tests or the final exam.

4. Course Content and Schedule

Credits	4 credits
In-class workload	4 h of lectures per week. 2 h lab period per week. The experiments conducted are outlined in the laboratory schedule below.
Out-of-class workload	6 hours per week
Number of weeks	14 weeks
Pre-requisite	One of: Principles of Math 10, or Foundations of Math & Pre-calculus 10, or MATH 053, or MATH 057 or Math 072; or Math 135, or Math 137, or assessment.

Course Times and Locations

Lectures	Tuesday 10:30 to 11:20 AM Fisher Building, Room F360 Wednesday 10:30 to 11:20 AM Fisher Building, Room F360 Thursday 10:30 to 11:20 AM Fisher Building, Room F360 Friday 10:30 to 11:20 AM Fisher Building, Room F360
Laboratory Periods	Monday 8:30 to 10:20 AM Fisher Building, Room F354

Please see the laboratory schedule below.

Lecture Outline

A detailed outline of the lecture material is provided in the Table of Contents of *Chemistry 100 Notes*. Notably, this book has been designed specifically for this course to present many relevant examples of the chemistry of life and the environment including those intended to stimulate interest and curiosity.

1. **Measurements and Calculations:** SI & other scientific units; SI prefixes; metric conversions; measurements, scientific notation, & significant figures; density calculations; calculations involving energy changes.

2. **Introductory Terminology:** scientific method; physical & chemical changes; elements, compounds and mixtures; metals and nonmetals; atoms and molecules; protons, neutrons and electrons; ions and isotopes; atomic masses.

3. Chemical Formulas and Names: composition of chemical compounds; formulas and naming of molecular compounds; meaning of ionic formulas and naming of ionic compounds; compounds containing polyatomic ions; formulas and names of acids.

4. Calculations Based Upon Formulas: molecular mass; formula mass; percentage composition; the mole; grams to moles and moles to grams conversions; moles of molecular of ionic compounds; Avogadro's Number.

5. Stoichiometry: balancing chemical equations; stoichiometry - problems based upon chemical equations; limiting reactant calculations; percentage yield calculations; calculations involving exothermic or endothermic chemical reactions.

6. Periodic Table and Electron Distributions: chemical families; electron levels and orbitals (sublevels); electron distribution in atoms; electron dot formulae; trends in atomic radii (size), ionization energies & chemical reactivity.

7. Chemical Bonding: formation of ionic compounds; formation of molecular compounds; electron dot formula representations; electronegativity and bond polarity; molecular geometry and polarity.

8. Gases: general nature of gases; factors affecting gas volume; Boyle's Law - gas pressure & volume; absolute temperature scale; Charles' Law - gas temperature & volume; STP standard conditions of gas temperature and pressure; molar gas volume; partial pressures of gases; gases and diving; gas stoichiometry.

9. Liquids and Solutions: general properties of liquids; hydrogen bonding; vapour pressure and boiling point; solubility; solution concentration & diluting solutions; electrolytes, dissociation equations & ion concentrations in solution; pH scale; solution stoichiometry.

10. Organic Chemistry: why so many organic compounds?; structural formulas and isomers; naming of hydrocarbons & alcohols; optional: addition and substitution reactions in organic chemistry.

11. Radioactivity: Radioactive substances; alpha, beta & gamma rays & associated decay; optional: production of radioisotopes; half-life and dating; medical applications.

Laboratory Schedule *(Potentially subject to a small change in the order of later experiments to coordinate course sections.)*

Please familiarize yourself in advance with the lab practices and safety information presented on pages 5 & 6 of the Laboratory Manual. Successful completion of a safety quiz following the laboratory safety orientation is required to participate in the experiments.

Week 1. *Monday, January 8th*	**Course Organization, and *Laboratory & Safety Orientation***
Week 2. *Monday, January 15st*	**Experiment 1. *Density***
Week 3. *Monday, January 22rd*	**Experiment 4. *Heat of Combustion***
Week 4. *Monday, January 29th*	**Experiment 3. *Separating Mixtures*** **Experiment 5. *Recycling Copper, Part 1*** *(brief)*
Week 5. *Monday, February 5th*	***Term Test #1***
Week 6. *Monday, February 12th*	***BC Family Day Holiday***
Week 7. *Monday, February 19th*	**Experiment 5. *Recycling Copper, Parts 2 to 5***

Week 8. *Monday, February 26th*	**Experiment 5. *Recycling Copper, Part 6 (completion)*** **Experiment 15. *Accuracy and Precision of Experimental Results***
Week 9. *Monday, March 5th*	**Experiment 7. *Copper & Silver Nitrate Reaction***
Week 10. *Monday, March 12th*	***Term Test #2***
Week 11. *Monday, March 19th*	**Molecular Models: Geometry & Polarity**
Week 12. *Monday, March 26th*	**Experiment 10. *Volume of a Gas***
Week 13. *Monday, April 2nd*	**Easter Monday Holiday**
Week 14. *Monday, April 9th*	***Lab wrap-up.***

5. Basis of Student Assessment (Weighting)

(a) Assignments

Laboratory Reports
Attendance in the lab periods is mandatory. No laboratory experiment can be missed without an acceptable reason submitted in writing, such as a letter from a Medical Doctor. Laboratory reports are due in the laboratory period following completion of an experiment, unless otherwise stated. The laboratory manual has been designed to allow students to hand in the completed pages that appear in the manual. Each lab partner must hand in a separate report even though lab partners typically share equally in experimental work. The value the lab reports contribute to the final grade is **20%.**

(b) Quizzes
Five quizzes of equal value will be held at appropriate times during the lecture schedule. The best four marks over the five quizzes will be used to calculate a total mark out of 20, as they contribute 20% to the final grade.

Quiz 1. Chapters 1 & 2
Quiz 2. Chapters 3 & 4
Quiz 3. Chapter 5
Quiz 4. Chapters 6 & 7
Quiz 5. Chapters 8 & 9

Typically, quizzes will be scheduled a few days to a week following the completion of lectures concerning the Chapter(s) from which material is to be tested. Attempts will be made to schedule quizzes on days when students do not have other tests or exams.
If any quiz is missed due to illness or similarly justifiable reason, with accompanying documentation, the percentage value of that quiz will be added to the value of the final exam. Alternatively, an option to write a make-up quiz may be available.

(c) Term Tests
There are two term tests. Each test will contribute to **15%** of the final grade. The delineation of material students will be responsible for in each case will be provided in class about one week before the date of the test.

Term test 1 is scheduled for Monday, February 5th in the laboratory period (8:30 am to 10:20 am) in F354. If F360 is available, the location will change to this room.

Term test 2 is scheduled for Monday, March 12th in the laboratory period (8:30 am to 10:20 am) in F354. If F360 is available, the location will change to this room.
If either term test is missed due to illness or similarly justifiable reason, with accompanying documentation the percentage value of that term test (15%) will be added to percentage value of the final exam.

(d) Final Exam
The final exam is a comprehensive exam of the material covered in the lecture portion of the course with an emphasis on material that follows Chapter 3. The value this exam contributes to the final grade is **30%**.
The time and location of the Chem 100 final exam will be published by the College during the Semester.
Attendance at the final exam is mandatory. Appropriate documentation must accompany an explanation for absence if an I-grade is to be issued.

6. Grading System

[X] Standard Grading System (GPA)

[ ] Competency Based Grading System

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

Please refer to the required textbook, required course package and supplementary materials described above.

8. College Supports, Services and Policies

Immediate, Urgent, or Emergency Support
If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ http://camosun.ca/about/mental-health/emergency.html or http://camosun.ca/services/sexual-violence/get-support.html#urgent

College Services
Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at http://camosun.ca/

College Policies
Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at http://camosun.ca/about/policies/. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

A. GRADING SYSTEMS *http://camosun.ca/about/policies/index.html*

The following two grading systems are used at Camosun College:

1. 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		1
0-49	F	Minimum level has not been achieved.	0

2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course, practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

B. 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 at http://camosun.ca/about/policies/index.html for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	*Incomplete*: 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	*In progress*: A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	*Compulsory Withdrawal*: 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.

Please Note:
Students may not use recording devices in the classroom without the prior permission of the instructor or The Centre for Accessible Learning. The instructor's permission is not required when the use of a recording device is sanctioned by the College's Centre for Accessible Learning in order to accommodate a student's disability, and when the instructor has been provided with an instructor notification letter which specifies the use of a recording device. Such recordings made in the classroom are for the student's personal use only, and distribution of recorded material is prohibited. Recordings made during the course would include statements, questions and comments made by students in the class, and these are not to be disseminated or repeated in any manner based on the recordings.
Otherwise, please have cell phones turned off and put away while in lectures. Thank you.

Camosun College is a scent-free institution. Please refrain from wearing scents. Thank you.