



## COURSE OUTLINE

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

Ω Please note: the College electronically stores this outline for five (5) years only.  
It is **strongly recommended** you keep a copy of this outline with your academic records.  
You will need this outline for any future application/s for transfer credit/s to other colleges/universities.

### 1. Instructor Information

(a)	Instructor:	Daniel Donnecke		
(b)	Office Hours:	Wednesdays 10:30 - 11:20 am		
(c)	Location:	Tec 232/Tec 230		
(d)	Phone:	250 370 4447	Alternative Phone:	
(e)	Email:	donnecked@camosun.bc.ca		
(f)	Website:			

### 2. Intended Learning Outcomes

(No changes are to be made to these Intended Learning Outcomes as approved by the Education Council of Camosun College.)

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

1. Use the Lewis model of the atom in conjunction with the periodic table to predict the chemical and physical properties of elements, including chemical bonding and the formation of compounds.
2. Write balanced chemical equations for chemical reactions including reduction-oxidation reactions, and determine stoichiometric quantities of reactants in those reactions.
3. Determine properties of pure chemicals and of mixtures of chemicals based on solid, liquid and gaseous phases, and interpret solid and liquid phase diagrams for engineering materials.
4. Apply the principles of thermodynamics to determine rates of chemical reaction, chemical equilibrium, and energy changes in chemical transformations.
5. Apply the principles of electrochemistry to determine corrosion potential and inhibition, and electrolytic processes.
6. Apply the principles of organic chemistry to the structure and naming of organic compounds, in particular polymers, and identify properties associated with specific functional groups.

### 3. Required Materials

(a) No text is required, but it is highly recommended that you have a first year university chemistry text, either used or from the library. Brown Le May "Chemistry the central science" is a good book. Petrucci "General Chemistry" is an excellent book. Older editions are fine.

#### (b) Lab Manual online (D2L)

You need to print this manual out and bring it to each lab. It contains the procedures for the experiments and instructions on the lab write-up.

### 4. Course Content and Schedule

**Lectures** in **Tec 173**: Monday, Tuesday, Wednesday, Thursday 12:30 – 13:20 (section X01A and X01B) and 11:30 – 12:20 (section X02A and X02B).

**Laboratory** in **Tec 230**: Wednesday from 14:30 - 16:20 (section X02A and X02B alternate weeks) and Tuesday 14:30 - 16:20 (section X01A and X01B alternate weeks).

## Detailed outline

Week	Activity
1	<b>Easter Monday</b> , college closed Matter, atoms, molecules, chemical reactions, mole, stoichiometry Periodic Table, Ionic and covalent bonding Lab safety <b>both sections attend!</b>
2	Polar bonds, molecular shape, polar molecules Lewis structures <i>Lab 1 Stoichiometry</i>
3	<b>Term Test 1</b> ; Gases, liquids, solids Mixtures, solutions <i>Lab 1 Stoichiometry</i>
4	States of matter, Phase changes <i>Lab 2 Distillation</i>
5	Thermochemistry, thermodynamics, $\Delta H$ , $\Delta S$ , $\Delta G$ <i>Lab 2 Distillation</i>
6	<b>Midterm</b> , Aqueous equilibrium, pH <i>No labs during midterm week.</i>
7	Oxidation/reduction, Electrochemistry Corrosion <i>Lab 3 Heat of combustion</i>
8	<b>Victoria Day</b> College closed <b>Term Test 2</b> ; Organic chemistry, nomenclature <i>Lab 3 Heat of combustion</i>
9	Organic chemistry, functional groups Organic chemistry, functional groups, reactions <i>Lab 4 Aspirin</i>
10	<b>Term Test 3</b> ; Organic reactions; polymers Polymers <i>Lab 4 Aspirin</i>
11	Polymers Composites, ceramics Review
Week 12: Final Examination Period	

## Detailed Lecture Outline

Week	Activity
1	<p>Matter, atoms, molecules, basic chemical reactions, review mole concept, stoichiometry, limiting reactant and % yield.</p> <p>Mendeleev's Periodic Table, cathode rays, Rutherford and Moseley's contributions, metals, non-metals and metalloids, chemical families, ionic and metallic bonding.</p> <p>Trends in ionization energy, atomic and ionic radii and electron affinity.</p> <p>Valence electrons, shell structure of the atom, Bohr's model. Octet rule. Sharing of electrons. Covalent bonding. Lewis structure of simple diatomic molecules.</p>
2	<p>Electronegativity, polar bonds, dipole moments, partial charges.</p> <p>Lewis structures of polyatomic molecules and ions, resonance structures and formal charges, equivalent and non-equivalent resonance structures, the "best" Lewis structure, resonance hybrids, shape of molecules, VSEPR, resultant dipole moments, polar molecules,</p>
3	<p><b>Term Test 1;</b> Gases, liquids, solids Mixtures, solutions</p> <p>Van der Waals forces including dipole - dipole interactions, ion-dipole interaction (solvation of ions) and London dispersion forces.</p> <p>Instantaneous dipole, induced dipole, polarizability, melting and boiling points of molecular species, energy changes associated with states of matter, viscosity, surface tension, vapour pressure, colligative properties, Henry's and Raoult's law.</p>
4	<p>Ideal gases, gas laws, reactions involving gases, diffusion, effusion, kinetic molecular gas theory, molar volume, real gases, Van der Waals equation, Joule Thomson effect, Linde process</p> <p>Phase changes, phase diagrams, vaporization, boiling, condensing, melting solidifying, subliming, artificial diamonds, supercritical fluids.</p>

5	Thermochemistry, define system (closed, open, isolated) and surroundings. Total energy and free energy of a system. Spontaneous and non-spontaneous processes, entropy,
<b>Midterm</b>	
6	Aqueous chemistry and equilibrium, dissociation and ionizing, pH of strong acids and strong bases, pH of weak acids and weak bases, pH of salts, an introduction to buffers
7	Oxidation/reduction, Electrochemistry, Voltaic cells, standard hydrogen electrode, electrochemical series, cell potential at standard and non-standard state, Nernst equation, Corrosion and corrosion protection, batteries and fuel cells
<b>Term Test 2;</b>	
8	Organic chemistry, nomenclature
9	Organic chemistry, functional groups (olefins, alcohols, carboxylic acids, amines) Organic chemistry, functional groups, reactions (esters, amides, polymerization)
<b>Term Test 3;</b>	
10	Polymers: polyethylene, polyvinylchloride, rubber, neoprene, Teflon, polyester, nylon,
11	Inorganic polymers,: Silicones, silicates, carbon nano-tubes, Ceramics and composites, Review
Week 12: Exam week	

## 5. Basis of Student Assessment (Weighting)

(This section should be directly linked to the Intended Learning Outcomes.)

### Evaluation

### Grading as in Camosun College Calendar

Laboratory (4)	12%
Term Tests(3)	18%
Midterm	20%
Final	50%
<b>Total</b>	<b>100%</b>

Term Tests will cover sections of the course while the midterm and the final will cover all the material up to the midterm and the final respectively. Problem sets which will help you prepare for exams will be posted on D2L approximately biweekly. These problem sets will not be graded but answer keys will be published. A lab that is missed without a valid reason such as a doctor's note or incomplete because no report was handed in by the beginning of the following lab period receives a mark of zero. If you miss a term test or the midterm because you were ill or had a serious emergency of which you have informed me before or immediately after the exam and provided acceptable proof you will be granted a rewrite at a time convenient to both of us. You must pass the lab and the final exam to pass the course.

(d) Other (e.g., Attendance, Project, Group Work)

## 6. Grading System

(No changes are to be made to this section unless the Approved Course Description has been forwarded through the Education Council of Camosun College for approval.)

### 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](http://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 <sup>rd</sup> 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](http://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 the College web site in the Policy Section.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED