



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

CHEM-224-001
Analytical Chemistry
Fall 2019

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	Blair Surridge http://camosun.ca/learn/school/arts-science/bios/surridge-chem-bio.html
(b) Office hours	Tues 1:00 – 2:00, Tuesday and Thursday
(c) Location	Office #: F 348C Fisher Building Lansdowne Campus
(d) Phone	250-370-3201 Alternative: 250-661-6701
(e) E-mail	SurridgeB@camosun.bc.ca
(f) Website	See D2L

2. Intended Learning Outcomes

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

1. Define and calculate the mean, median, mode, variance and standard deviation for a series of replicate analyses. Estimate the population mean from analysis of a small number of trials. Test for the rejection or retention of suspect data. Explain and use the least squares procedure to graph experimental data.
2. Describe and explain the procedures for gravimetric and titrimetric analyses: obtain data that falls within the established margins of error for the methods.
3. Derive and apply the Beer-Lambert law and use internal and external standards to ensure the validity of the analysis. Distinguish between absorption, emission, fluorescence and phosphorescence. Obtain absorption and emission spectra from various sources and perform a complete quantitative analysis on the samples provided. Explain and use light scattering techniques to estimate the turbidity of solutions.
4. Distinguish between the major modes of radioactive decay and between the activity of the sample and the dose received by the absorber. Estimate the age of fossils and artifacts via carbon and argon dating techniques and the concentrations of trace materials using neutron activation and isotope dilution techniques.
5. Identify and describe the mode of operation for the four major types of electrode. Distinguish between constant current and constant potential coulometry and use them to estimate the concentrations of particular ions in solution. Distinguish between normal and pulsed polarography and analyze polarograms obtained from mixtures of metal ions.
6. Describe, explain and apply the techniques of solvent extraction, distillation, sublimation, and the major forms of chromatography to the separation of a mixture.
7. Discuss the basis for improvements in the signal to noise ratio of a measurement. Distinguish between the Fourier transform and continuous wave methods of recording data. Explain the process of analogue to digital conversion.
8. Construct a null point hypothesis; use one or two tailed significance tests to reject or retain the hypothesis. Use a paired t test to compare two different methods of analysis for the same sample.

3. Required Materials

Lecture	<ul style="list-style-type: none"> ◆ <u>Text</u> "Quantitative Chemical Analysis" 9th Edition, by Daniel C. Harris (Freeman and Company) <p>Note: eTextbook and softcover versions are available</p> <ul style="list-style-type: none"> ◆ Chem 224 Lecture Note Package
Laboratory	<ul style="list-style-type: none"> ◆ Chem 224 Lab Manual ◆ Safety glasses ◆ Lab coat ◆ A small hard covered laboratory notebook
Sapling Learning Homework	<ul style="list-style-type: none"> ◆ Purchased for ~\$45 through Sapling Website or at the bookstore https://www.saplinglearning.ca/ibiscms/login/ <p><u>Note:</u> If you plan to take John Lee's Chem 220 then you should purchase the 2 course pass (it will save you ~\$30). This can be done at the bookstore now.</p>
In Library On Reserve	<ul style="list-style-type: none"> ◆ "Fundamentals of Analytical Chemistry" 8th addition, by Skoog, West, Holler, and Crouch

4. Course Content and Schedule

Lectures:

Monday	2:30 to 3:50 pm in Fisher Building, F262
Wednesday	2:30 to 3:50 pm in Fisher Building, F262

Unit	Topic	Textbook Reference* (Select topics only)
1	Analytical process, measurement, experimental error, and statistics	Ch. 0, 1, 3, and 4
2	Classical methods (Gravimetric and Titration) & Quality Assurance	Ch. 5 & 27
3	Electrochemical Methods	Ch. 14 and 15
4	Spectrochemical Methods	Ch. 18, 19, 20, and 21
5	Methods of Separation	Ch. 23, 24, and 25 (parts of 22)
6	Methods of Calibration and Quality Assurance	Ch.5 Covered in the Lab #2 and throughout the course

- note we will not be covering the sections given in the text in completely. (Specifics are given in the class lecture notes)

Chem. 224 Lab Schedule Friday 9:30 to 12:20pm in F354

(note: your lab group **must** consist of no more than 2 students to maximize time on lab instrumentation and equipment)

Week	Lab Date	Lab No.
I	Sept 6 th	Lab # 1, Introduction & skills assessment
II	Sept 13 th	Lab # 2, External Standard Calibration and Isotopic Dilution Methods of Quantitation
III	Sept 20 th	Lab # 3, Analysis of Halide Ions Using Silver Nitrate
IV	Sept 27 th	Lab # 4 Part B Ion Selective Electrodes (Part A will not be done)
V	Oct 4 th	Lab # 5 UV/Vis Spectroscopy Group A
VI	Oct 11 th	Lab # 5 UV/Vis Spectroscopy Group B
VII	Oct 18 th	Special Lab Project Time – Standards Preparation
VIII	Oct 25 th	Midterm (2 hours)
IX	Nov 1 st	Lab # 7, Grp A: Chromatography Part 1 and Part 2
X	Nov 8 th	Lab #7 Grp B: Chromatography Part 1 and Part 2
XI	Nov 15 th	Lab # 7, Grp A: Chromatography Part 1 and Part 2 (Remaining)
XII	Nov 22 nd	Lab #7 Grp B: Chromatography Part 1 and Part 2 (Remaining)
XIII	Nov 29 th	Special Lab Project Time (Analysis of Real Samples)
XIV	Dec 6 th	Lecture Wrap-up plus Final Exam Review (Room TBA)

5. Basis of Student Assessment (Weighting)

Labs	20%
Special Project Lab ¹ (Done in week XIII and XIV)	5%
Sapling Homework ² /Quizzes ³	25% (15% sapling & 10% quizzes)
Midterm (Units I, 2, & 3 ⁴)	15% (Week VII In Laboratory Period)
Final Exam (comprehensive)	35% (TBA ~Week XV, 3 hours in Dec)

1. Out of class time needed for researching your analysis. Most of the lab work will be done in week XIII and XIV however; some other time may be needed for the analysis.
2. This online homework software will provide practice questions, which are interactive and are not meant to replace the more traditional end of chapter homework questions. Marks are given for correctness and completing each assignment. Sapling Learning can be purchased online (<https://www.saplinglearning.ca/ibiscms/login/>). See D2L for more instructions. Due dates for each assignment will be provided by your instructor and can be found on the Sapling Learning website.
3. Expect to have a minimum of 4 quizzes (you will have one week notice regarding each quiz)

4. Expected to cover units 1-3 – an outline will be provided ahead of time for the midterm and the final exam.

Additional Notes:

- (1) Student must pass the lab and lecture component of the course to obtain credit for Chem 224. All labs are to be attended and individual lab reports completed following the format provided in the lab manual.
- (2) Immediate contact must be made with instructor for missed labs due to illness or family emergencies for arrangements to be made. This should be done by email. For more information see lab manual.
- (3) A test score that is not as high as that of the December final exam will be dropped automatically and its weight redistributed to the final exam. For example, if a low score is obtained on your midterm then your final exam will then be 55% of the course grade!
- (4) This will be written in one of the classes. No one is allowed to write exams late and there will be no exceptions. Early exam is a privilege and not a right; thus, at full discretion of the instructor. In the event that the midterm is missed the marks will be weighted to the final exam as per point 3) above.

Important:

Students may not use recording devices in the classroom without the prior permission of the instructor. However, the instructor's permission is not required when the use of a recording device is sanctioned by the College's Resource Centre for Students with Disabilities 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. Recordings made in the classroom are for the student's personal use only, and distribution of recorded material is prohibited. Cell phones should be turned off while in class.

6. Grading System

- Standard Grading System (GPA)
- Competency Based Grading System

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

IMPORTANT DATES

Week

- III Sept. 17: Fee deadline
- VI Oct. 14: Thanksgiving Monday-College Closed
- XI Nov. 11 (Monday): In lieu of Remembrance Day – College Closed
- XIV Exam Period for Winter 2019 begins

Use this link to check out scholarships and bursaries

<http://camosun.ca/learn/calendar/current/pdf/financial-assistance.pdf>

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	<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 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	<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.