COURSE SYLLABUS

COURSE TITLE: CHEM-259: QA in Environmental Chemistry

CLASS SECTION: 001

TERM: W24

COURSE CREDITS: 3

DELIVERY METHOD(S): In Class

Camosun College campuses are located on the traditional territories of the Lək̓ʷəŋən and W̱SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.
Learn more about Camosun's Territorial Acknowledgement.

For COVID-19 information please visit https://legacy.camosun.ca/covid19/index.html

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable explanation in advance, you will be removed from the course and the space offered to the next waitlisted student.

INSTRUCTOR DETAILS

NAME: Blair Surridge

EMAIL: surridgeb@camosun.bc.ca

OFFICE: F348C

HOURS: Monday & Wednesday: 1:00 to 2:00 Friday: 10:30 to 11:20

As your course instructor, I endeavour to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me. Camosun College is committed to identifying and removing institutional and social barriers that prevent access and impede success.

CALENDAR DESCRIPTION

A working chemistry lab is used as a model for quality assurance (QA) practices. These include planning and preparing for the collection of field samples, laboratory analysis, data management and data analysis. The data collected from two field trips are incorporated into a final report.

PREREQUISITE(S):

One of:

- CHEM 213
- CHEM 220
- CHEM 224

CO-REQUISITE(S):

See Prerequisites

EXCLUSION(S):

Not applicable

COURSE LEARNING OUTCOMES / OBJECTIVES

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

Overview of Environmental Monitoring
1. Develop a program of quality assurance/quality control (QA/QC) protocols for a field and laboratory lake monitoring study.
2. Identify and avoid potential sources of contamination of samples through the application of quality control and quality assurance methods.

Preparation for Field Monitoring [Two approximately half day field trips (on a Saturday or a Sunday) are required to collect water and sediment samples.]
1. Prepare and calibrate water sampling instruments and equipment.
2. Prepare sampling containers for the collection of water and sediment samples to be used for laboratory analysis.

Laboratory Techniques and Quality Control/Quality Assurance
The laboratory component will feature hands-on analysis of the samples collected during the field component. Students will work in groups of two. A list of equipment that will be used includes:
1. Atomic Adsorption spectrophotometer (copper in sediments)
2. UV/VIS spectrophotometer (phosphorus in water)
3. Ion selection electrodes (calcium in water)
4. Titration apparatus (dissolved oxygen in water)
5. pH meters

At the end of this laboratory component students will be able to:
1. Identify and use appropriate QA/QC procedures for tracking field and lab samples and the resultant data.
2. Use laboratory equipment and procedures, including quality assurance monitoring of data
3. Develop and interpret standard curves and laboratory control charts.
4. Interpret percent recovery data

Data Analysis and Reporting for Chemistry
1. Use the spreadsheet Excel for organizing, copying and deleting data, and preparation of tables and graphs for report presentation.
2. Use graphical packages with Excel to produce linear regressions, vertical profile plots of field data and control charts of laboratory quality assurance data.
3. Perform basic statistical analysis on field and laboratory data including standard deviation, limit of quantification, limit of detection, mean, median and mode and comparison of two sets of data (students t-test).
4. Prepare a scientific data report of professional quality on the combined results of the field and lab data collected during the course.

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

(a)	Course Manual	Contains Information regarding lab-testing protocols as well as data analysis material. No lab notebook is needed.
(b)	Lab Work	Lab coat and Safety Glasses
(c)	USB Thumb Drive 8 GB min.	Recommended only
(d)	Calculator	Scientific Calculator

COURSE SCHEDULE, TOPICS, AND ASSOCIATED PREPARATION / ACTIVITY / EVALUATION

The following computer lab schedule and lab schedule are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

COMPUTER LAB SCHEDULE

(8:30am to 10:20pm every Tuesday in E100)

The computer lab component will include some lecture material on environmental chemistry and quality assurance. However, the main thrust will be a series of tasks which constitute the different data applications that are to be used in the preparation of the final report. In general, a different task will be covered during each week but time for data entry and report preparation will also be provided. You are upload a copy of each assignment to the d2l box. NOTE: Make sure all material is backed up. Full names on all materials please. Typically, labs are due one week after it is assigned.

WEEK or DATE RANGE	ACTIVITY or TOPIC
1	**Introduction to Excel.** Data entry, copying and deleting formulas; simple math; use of Formula Wizard; confirmation of data entry. **Assignment 1.** Preparation of Excel file; entry of lab data; use of formulas for calculations.
2	**Introduction to Graphs.** Organization of Data (x and y columns); introduction to Chart Wizard; graphing a linear regression (e.g., 00a standard curve). **Assignment 2.** Preparation of a standard graph from a given set of standard. Use of the trend line formula to determine the concentration of several unknown solutions.
3	**Preparation of Control Charts.** Principles behind control charts; data entry; preparation of a control chart from a given set of data. **Assignment 3**. Preparation of a Control Chart from selected copper standards from 2001 data set

WEEK or DATE RANGE	ACTIVITY or TOPIC
4	**Chem 259 Data Entry Protocols.** Data entry of examples of laboratory data following Chem 259 data protocols. **Assignment 4.** Completion of data entry and formulas.
5	**Preparation of depth profile graphs.** Setting up the x and y data columns; plotting the down and up data (two profiles in single graph); plotting the mean values for each parameter against depth; plotting of several parameters on one graph. **Assignment 5.** Preparation of a depth profiles.
6	**Control Chart** Based on present dry run data. **Assignment 6.** Submit a full-sized control chart for calcium, total phosphorus, dissolved oxygen and total copper, based on the combined data of all groups from this year's Dry Run data.
7	**Reading Break**
8	**Basic Statistics.** Standard deviation, limit of quantification, limit of detection; calculation of mean, median and mode; calculation of standard deviation, LoQ and LoD from a data set; comparison of two sets of data (students t-test). **Assignment 7.** Determine the LoQ and LoD from the copper standards data file provided. Compare different data sets to determine statistical differences.
9	**Analysis of Variance (Anova)** of simple data set. **Assignment 8.** Determine whether there are differences between a number of water bodies for phosphorus and sediment copper.
10	**Data Entry and Report Preparation.** Draft report preparation. **Assignment 9.** Preparation of the "Methods" sections of the report.
11	**Data Entry and Report Preparation.** Entry of 2024 results. **Assignment 10** Preparation of the "Quality Assurance" Section of the report.
12	**Data Entry and Report Preparation** **Assignment 11.** Presentation of the Field Data from Trip I & II (data tables and graphs).
13	**Data Entry and Report Preparation.** Continued entry of 2024 results and draft report preparation. **Assignment 12.** Data summary tables for calcium, dissolved oxygen, phosphate, percent moisture and copper results from Field Trip I and II
14	**Complete Data Entry and Report Preparation.** **Continued preparation of final report.**

Computer Lab Assignments. A computer lab exercise will be assigned each week which are due the beginning of the chemistry lab on the Monday of the following week. Late assignments will be assigned a penalty of 20% of the lab mark. Labs will not be accepted after 5 weeks' time and a mark of "0" will be given.

Students registered with the Centre for Accessible Learning (CAL) who complete quizzes, tests, and exams with academic accommodations have booking procedures and deadlines with CAL where advanced noticed is required. Deadlines scan be reviewed on the CAL exams page. http://camosun.ca/services/accessible-learning/exams.html

CHEMISTRY LAB SCHEDULE

(8:30am to 12:20pm every Monday in F354)

Week	Date	Group	Activity
1	Jan. 8	ALL	- Introduction to field and lab activities and QA/QC. -Review of the course book (discuss pre lab#1) - Environmental monitoring strategies
2	Jan. 15	ALL	- selection of student groups. - Pipetting, cleaning, and calibrating - Field protocols; introduction to field equipment. - Field mobilization for Trip I: check lists; bottle preparation; instrument calibration.
3	Jan. 22 (Dry Run)	A B C	- Introduction to Methods: Copper in sediments (Atomic Adsorption). - Introduction to Methods: Phosphate (UV/VIS Spectrophotometer). - Introduction to Methods: Ca; Dissolved Oxygen.
4	Jan. 29 (Dry Run)	C A B ALL	- Introduction to Methods: Copper in sediments (Atomic Adsorption). - Introduction to Methods: Phosphate (UV/VIS Spectrophotometer). - Introduction to Methods: Ca; Dissolved Oxygen. - Prepare for Trip I.
4	Feb.3		- **Field Trip I (Saturday)** - Group A to carry out wet weight measurements of sediments; dry sediments from Trip I
5	Feb. 5 (Dry Run)	B C A	- Introduction to Methods: Copper in sediments (Atomic Adsorption). - Introduction to Methods: Phosphate (UV/VIS Spectrophotometer). - Introduction to Methods: Calcium; Dissolved Oxygen.
6	Feb. 12 (Trip I)	A B C	- Digestion of sediments for copper analysis and AA (Trip I) - Analysis of water samples for phosphates from Trip I; dry sediments (Trip I) - Analysis of water samples for dissolved oxygen, and calcium (Trip I) - Wet weight measurements of sediments; dry sediments from Trip I

Week	Date	Group	Activity
7	Feb. 19	ALL	- Reading Break. No lab this week
8	Feb. 26 (Trip I)	C	- Digestion of sediments for copper analysis and AA (Trip I)
		A	- Analysis of water samples for phosphates; dry sediments (Trip I)
		B	- Analysis of water samples for dissolved oxygen, and calcium (Trip I)
			- Wet weight measurements of sediments; dry sediments from Trip I
8	Mar. 2		- Field Trip II (Saturday)
			- Wet weight measurements of sediments; dry sediments from Trip II
9	Mar. 4 (Trip I)	B	- Digestion of sediments for copper analysis and AA (Trip I)
		C	- Analysis of water samples for phosphates; dry sediments (Trip I)
		A	- Analysis of water samples for dissolved oxygen, and calcium (Trip I)
		ALL	- Prepare for Trip II.
10	Mar. 11 (Trip II)	A	- Digestion of sediments for copper analysis and AA (Trip II)
		B	- Analysis of water samples for phosphates; dry sediments (Trip II)
		C	- Analysis of water samples for dissolved oxygen, and calcium (Trip II)
			- Wet weight measurements of sediments; dry sediments from Trip II
11	Mar 18 (Trip II)	C	- Digestion of sediments for copper analysis and AA (Trip II)
		A	- Analysis of water samples for phosphates; dry sediments (Trip II)
		B	- Analysis of water samples for dissolved oxygen, and calcium (Trip II)
			- Wet weight measurements of sediments; dry sediments from Trip II
12	Mar. 25 (Trip II)	B	- Digestion of sediments for copper analysis and AA (Trip II)
		C	- Analysis of water samples for phosphates (Trip II)
		A	- Analysis of water samples for dissolved oxygen, and calcium (Trip II)
			- Wet weight measurements of sediments; dry sediments from Trip II
13	Apr. 1	ALL	-no lab Easter Monday
14	Apr. 8	ALL	- Glassware cleaning and group pictures!!

EVALUATION OF LEARNING

DESCRIPTION	WEIGHTING
Final Report	35%
Computer Lab Assignments	35%
Chemistry Lab Quality and Routine (includes attendance, group work, datsheets, data entry, & technique)	20%
Chemistry Lab Assignments includes: prelabs & lab 1)	10%
	100%

If you have a concern about a grade you have received for an evaluation, please come and see me as soon as possible. Refer to the Grade Review and Appeals policy for more information. http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf

COURSE GUIDELINES & EXPECTATIONS

(1) 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. There are marks for attendance

(2) Final Report. Each student will prepare a separate report. An outline and all relevant data compiled in several spread sheet files will be provided. Relevant background papers and reports are available on a sign-out basis from the instructor. Sections of the report will be assigned as computer lab exercises to facilitate the preparation of the final version. Student must hand in a satisfactory final report in order to pass Chem 259 following instructor's guidelines and the report format provided.

NOTE: A printed version of the report is tentatively due on April 12, 2024 end of day. This will be confirmed in class. DO NOT BE LATE WITH THE REPORT. A grade based on course performance (without the report) will be submitted if a report is not handed in.

(3) Chemistry Lab Exercises. Before each dry run lab, a pre-lab assignment must be handed in. At the end of each lab period, the data sheets are to be correctly filled out and placed in the data binder and the data entered into the database. No original data sheets are to leave the lab!! Marks will be deducted for incorrect or absent data sheets or data entry - these will be assigned to the group responsible.

SCHOOL OR DEPARTMENTAL INFORMATION

Week

VII Feb.19: Family Day-College Closed
VII **February 19–February 23** - Reading Break for Winter '24
XV There is no final exam for Chem 259

STUDENT RESPONSIBILITY

Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

SUPPORTS AND SERVICES FOR STUDENTS

Camosun College offers a number of services to help you succeed in and out of the classroom. For a detailed overview of the supports and services visit http://camosun.ca/students/.

Academic Advising	http://camosun.ca/advising
Accessible Learning	http://camosun.ca/accessible-learning
Counselling	http://camosun.ca/counselling
Career Services	http://camosun.ca/coop
Financial Aid and Awards	http://camosun.ca/financialaid
Help Centres (Math/English/Science)	http://camosun.ca/help-centres
Indigenous Student Support	http://camosun.ca/indigenous
International Student Support	http://camosun.ca/international/
Learning Skills	http://camosun.ca/learningskills
Library	http://camosun.ca/services/library/
Office of Student Support	http://camosun.ca/oss
Ombudsperson	http://camosun.ca/ombuds
Registration	http://camosun.ca/registration
Technology Support	http://camosun.ca/its
Writing Centre	http://camosun.ca/writing-centre

If you have a mental health concern, please contact Counselling to arrange an appointment as soon as possible. Counselling sessions are available at both campuses during business hours. If you need urgent support after-hours, please contact the Vancouver Island Crisis Line at 1-888-494-3888 or call 911.

Academic Accommodations for Students with Disabilities

The College is committed to providing appropriate and reasonable academic accommodations to students with disabilities (i.e. physical, depression, learning, etc). If you have a disability, the Centre for Accessible Learning (CAL) can help you document your needs, and where disability-related barriers to access in your courses exist, create an accommodation plan. By making a plan through CAL, you can ensure you have the appropriate academic accommodations you need without disclosing your diagnosis or condition to course instructors. Please visit the CAL website for contacts and to learn how to get started: http://camosun.ca/services/accessible-learning/

Academic Integrity

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf for policy regarding academic expectations and details for addressing and resolving matters of academic misconduct.

Academic Progress

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.1.pdf for further details on how Camosun College monitors students' academic progress and what steps can be taken if a student is at risk of not meeting the College's academic progress standards.

Course Withdrawals Policy

Please visit http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.2.pdf for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit http://camosun.ca/learn/fees/#deadlines.

Grading Policy

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf for further details about grading.

Grade Review and Appeals

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf for policy relating to requests for review and appeal of grades.

Mandatory Attendance for First Class Meeting of Each Course

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable reason in advance, you will be removed from the course and the space offered to the next waitlisted student. For more information, please see the "Attendance" section under "Registration Policies and Procedures" (http://camosun.ca/learn/calendar/current/procedures.html) and the Grading Policy at http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf.

Medical / Compassionate Withdrawals

Students who are incapacitated and unable to complete or succeed in their studies by virtue of serious and demonstrated exceptional circumstances may be eligible for a medical/compassionate withdrawal. Please visit

http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.8.pdf to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence and Misconduct

Camosun is committed to creating a campus culture of safety, respect, and consent. Camosun's Office of Student Support is responsible for offering support to students impacted by sexual violence. Regardless of when or where the sexual violence or misconduct occurred, students can access support at Camosun. The Office of Student Support will make sure students have a safe and private place to talk and will help them understand what supports are available and their options for next steps. The Office of Student Support respects a student's right to choose what is right for them. For more information see Camosun's Sexualized Violence and Misconduct Policy: http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.9.pdf and camosun.ca/sexual-violence. To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-3703841

Student Misconduct (Non-Academic)

Camosun College is committed to building the academic competency of all students, seeks to empower students to become agents of their own learning, and promotes academic belonging for everyone. Camosun also expects that all students to conduct themselves in a manner that contributes to a positive, supportive, and safe learning environment. Please review Camosun College's Student Misconduct Policy at http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf to understand the College's expectations of academic integrity and student behavioural conduct.

Changes to this syllabus: Every effort has been made to ensure that information in this syllabus is accurate at the time of publication. The College reserves the right to change courses if it becomes necessary so that course content remains relevant. In such cases, the instructor will give the students clear and timely notice of the changes.