UNIVERSITY OF CALGARY
FACULTY OF SCIENCE

Department of Chemistry
Science B 605
403 220-5385
chem.info@ucalgary.ca

COURSE OUTLINE

1. **Course:** CHEM 311, Analytical Chemistry: Quantitative Analysis - Fall 2022

   Lecture 01 : MWF 13:00 - 13:50 in ENA 201

Instructor	Email	Phone	Office	Hours
Dr Hans Osthoff	hosthoff@ucalgary.ca	403 220-8689	SB 205	online only, by appointment

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

In Person Delivery Details:

Lectures will be held in-person as scheduled in your Student Centre.

Midterm examinations will be held in-person during class time.

Laboratories will run in-person in either SA-169 or SA-259 - check your Student Centre for the room and time for the laboratory section for which you are registered.

The final examination will be held in-person and as scheduled by the registrar.

Re-Entry Protocol for Labs and Classrooms:

To limit the spread of COVID-19 on campus, the University of Calgary has implemented safety measures to ensure the campus is a safe and welcoming space for students, faculty and staff. The most current safety information for campus can be found here. **Online Delivery Details:**

This course does not follow a scheduled meeting pattern.

Laboratories: The laboratory manual will be posted on D2L.

Each week, asynchronous online material will be posted on D2L in the form of a weekly "**checklist**". This checklist consists of reminders of what tasks should be completed before and after each laboratory experiment and contains links to relevant videos, demonstrating, for example, proper laboratory techniques such as weighing or pipetting. Students are responsible for completing these tasks on your own time and schedule but ideally during the same week that you perform a particular lab or experiment. The checklist may also include reminders about reading assignments and/or practice questions and pre-recorded videos.

Course Site:

D2L: CHEM 311 L01-(Fall 2022)-Analytical Chemistry: Quantitative Analysis

https://d2l.ucalgary.ca/d2l/home/472344

Note: Students must use their U of C account for all course correspondence.

Equity Diversity & Inclusion:

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

The Chemistry EDI Committee acknowledges there are persistent barriers that prevent such accessibility and hinder our progress towards EDI. Our representatives (faculty, postdocs, graduate and undergraduate students) are committed to addressing any concerns and work towards proactive solutions that enact necessary change within the department. To submit anonymous questions, comments or concerns regarding EDI related issues,

please reach out to our Associate Head EDI, Belinda Heyne (bjmheyne@ucalgary.ca)

2. **Requisites:**

See section 3.5.C in the Faculty of Science section of the online Calendar.

Prerequisite(s):
Chemistry 201 or 211; and 203 or 213; and one of Mathematics 249, 265 or 275.

As per the recommended course sequence posted on https://www.ucalgary.ca/student-services/degree-guide/science/chemistry, it is recommended to have taken Statistics 327 or Statistics 205 prior to Chem 311.

3. **Grading:**

The University policy on grading and related matters is described in F.1 and F.2 of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

Course Component	Weight	Due Date (duration for exams)	Modality for exams	Location for exams
Laboratory analyses [5][1]	30%	Ongoing		
Laboratory notebook [2][2]	6%	Ongoing		
Tophat[3]	5%	Ongoing		
Homework[4]	5%	Ongoing		
Midterm 1[5]	12%	Oct 17 2022 at 01:00 pm (50 Minutes)	in-person	In class
Midterm 2[6]	12%	Nov 18 2022 at 01:00 pm (50 Minutes)	in-person	In class
Registrar Scheduled Final Exam[7]	30%	Will be available when the final exam schedule is released by the Registrar	in person	Will be available when the final exam schedule is released by the Registrar

[1] Students will submit results for 7 analyses via D2L (see schedule in lab manual) which will be graded from 1.0 (lowest) to 5.0 (highest). The top 5 analysis grades will be used when calculating the average grade for this course component, i.e., if a student does not require an excused absence, the lowest 2 analysis grades will be dropped when calculating the average.

[2] The notebook will be handed in and graded twice during the term - the week of Oct 10-14, and the week of Nov 28 - Dec 2, 2022.

[3] Participation in in-class Tophat quizzes is voluntary. If a higher percentage is achieved on the final exam, the weight of the tophat grading component will be automatically added to that of the final exam.

[4] Voluntary component. At the conclusion of each chapter, homework questions will be posted on the course text companion web site (https://achieve.macmillanlearning.com/courses/x7uyqt) that are due within week (see D2L for schedule). Students may either purchase a license for home use or access Achieve at no cost at the TFDL. The weight of this component will be automatically shifted to the final exam, if a higher percentage is achieved on the final.

[5] Each midterm has a base weighting of 10%, with the remaining 4% assigned to the higher scoring of the two exams. If a student is unable to write one midterm, causing the weight of that midterm to be shifted to the final exam, the “flexible” 4% will be assigned to the remaining midterm.

[6] Each midterm has a base weighting of 10%, with the remaining 4% assigned to the higher scoring of the two exams. If a student is unable to write one midterm, causing the weight of that midterm to be shifted to the final exam, the “flexible” 4% will be assigned to the remaining midterm.

[7] In-person, synchronous assessment, scheduled by the registrar. Note that the weights of the in-class participation or homework components are automatically shifted to the final exam (to the advantage of the student), if a higher percentage is achieved.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	92 %	86 %	82 %	78%	74%	70 %	66 %	62%	58%	54 %	50 %

This course will have a Registrar Scheduled Final exam that will be delivered in-person and on campus. The Final Examination Schedule will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 3 hours.

In order to achieve the prerequisite requirements (i.e., C) for further Science courses, a student must meet ALL of the following requirements:

1. Perform and submit no less than four of the seven graded laboratory analyses, and
2. Achieve a minimum 50% weighted average in the laboratory component (taken as the Lab Analyses + Lab Notebook combined), and
3. Achieve a minimum 50% weighted average on the examinations (midterms and final).

This means that if a student scores below 50% weighted average in either the laboratory or the examination components, or misses more than two of the graded lab exercises (for any reason), then the maximum grade they can obtain in CHEM 311 is a D^+.

The University of Calgary offers a flexible grade option, Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade

4. **Missed Components Of Term Work:**

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, one possible arrangement is that the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course. This option is at the discretion of the coordinator and may not be a viable option based on the design of this course.

There are no deferred midterm examinations. Students who are unable to write either midterm during the scheduled time should notify the course instructor 10 business days in advance for scheduled absences, or within 48 hours of the missed exam for illness or emergency. For absences reported in advance, if an alternate writing time is available, you will be notified. The weight of a missed midterm will be shifted to the final exam (see also the note on Midterms under Grading).

There are no make-up lab sections. One absence from lab (for any reason) will be excused at the end of term. Please notify the instructor of your absence: if it is possible to complete the lab in an alternate section, you will be notified. For a second or further absence, contact the instructor as early as possible (10 business days in advance for scheduled absences, or within 48 hours of an emergency or illness) to arrange an accommodation if possible.

5. **Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME ACTIVITY.

6. **Course Materials:**

Required Textbook(s):

Daniel C Harris and Charles A Lucy, *Quantitative Chemical Analysis*: MacMillan.

QCA is currently in its 10th edition. Older editions of the textbook (e.g., the 9th edition) may be used.

For in-person examinations:

- A non-programmable scientific calculator (similar to Sharp El-520X or Casio FX300MS)

Required laboratory materials:

- Lab coat (full length / knee length).
- Safety glasses or goggles - CSA approved, with side shields.
- Hardcover, permanently bound laboratory notebook (such as the blue and black "lab notes" and "physics notes" books available from the Bookstore).

To prevent the spread of COVID-19, students and staff are encouraged to wear a non-medical mask.

Technological requirements:

See general requirements at https://elearn.ucalgary.ca/technology-requirements-for-students/.

Specific software that will be used in this course:

- Office 365 suite: (Available to students at no additional cost)
  - Excel – full (desktop) version, not iOS/mobile or web version – or equivalent software.
  - Word – or equivalent word processor.
- PDF viewer (e.g. Acrobat Reader, Nitro Reader). Preview or in-browser reader are not recommended.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC ELearning online website.

7. **Examination Policy:**

Examination format will follow the official lecture format: as lecture time is scheduled as in-person, examinations are therefore also written in-person during the scheduled times. All examinations are to be completed individually by the student submitting the exam.

Midterm and final exams are closed-book. A non-programmable scientific calculator may be used. A data sheet is provided for use during the exam. A single handwritten data sheet may also be used, and must be handed in with the exam. See D2L for restrictions and requirements for the format and content of the handwritten data sheet.

Any student with academic accommodations must be registered with Student Accessibility Services (see Section 12(e) below), and have reviewed their accommodations as described on the SAS documents with the course coordinator within the first 15 days of the semester or at least 10 business days before any scheduled activity or which accommodations are required. An email confirming mutual understanding of the accommodations will suffice.

Students should also read the Calendar, Section G, on Examinations.

8. **Approved Mandatory And Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing Across The Curriculum Statement:**

   For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

10. **Human Studies Statement:**

    Students will not participate as subjects or researchers in human studies.

    See also Section E.5 of the University Calendar.

11. **Reappraisal Of Grades:**

    A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

    a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections I.1 and I.2 of the University Calendar

    b. **Final Exam:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

    Students should note the grading policy for lab Report of Analysis submissions provided in the course laboratory manual.

12. **Other Important Information For Students:**

    a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).

    b. **SU Wellness Services:** For more information, see their website or call 403-210-9355.

    c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at 403-220-2208. The complete University of Calgary policy on sexual violence can be viewed here.

    d. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional Code of Conduct and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

       Student Handbook on Academic Integrity
       Student Academic Misconduct Policy and Procedure
       Faculty of Science Academic Misconduct Process
       Research Integrity Policy

       Additional information is available on the Student Success Centre Academic Integrity page

e. **Academic Accommodation Policy:**

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the Request for Academic Accommodation Form and sending it to Associate Head, Undergraduate by email ahugchem@ucalgary.ca preferably 10 business days before the due date of an assessment or scheduled absence.

f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see Legal Services website.

g. **Student Union Information:** SU contact, Email SU Science Rep: sciencerep1@su.ucalgary.ca, Student Ombudsman

h. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

i. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or non-academic misconduct, in addition to any other remedies available at law.

Laboratory Information:

Laboratory activities will begin the week of September 6. It is mandatory that students wear a lab coat and safety glasses at all times when working in the lab. Students wearing inappropriate laboratory attire will not be permitted to conduct experiments for safety reasons. The manual can be found online (course D2L site). You must consult the online laboratory manual prior to attending any of your scheduled lab periods and printout the required portion of the manual that outlines the procedures you will be doing.

Students repeating the course within the last two years can be exempted from the Laboratory Component of the course if their laboratory was completed within the past two years and a grade of 75% or higher was obtained. Students choosing to exempt from the lab should be aware that

- there may be differences between the current labs and those performed in your previous semester
- the material covered in labs may be integrated into non-lab-based course assessments and,
- the lab grade achieved on the previous attempt will be carried forward.

Where applicable, only the "wetlab" component will be carried forward (analysis grades + lab notebook). These grades will be used in place of the equivalent components ("Laboratory analysis" and "Laboratory notebook") for this term when calculating your course grade.

Students exempted from the Laboratory Component will still be evaluated on all other course components.

Prior to applying for an exemption, students are STRONGLY encouraged to connect with their course instructor to better understand the risks and benefits in their specific course, as well as which grades will be carried forward. Instructors can tell you what access you will have (or not have) to lab materials as an exempt student, and how the lab materials may be integrated.

Students applying for a lab exemption should contact the Undergraduate Science Center (science.advising@ucalgary.ca) no later than Monday September 12th, 2022 to apply. Students registering in the

course after this date should contact the USC as soon as possible if they wish to apply for an exemption.

Any student with academic accommodations that may impact their ability to perform experiments in the time and format required must be registered with Student Accessibility Services (See Section 12(e) above) and have reviewed their accommodations as described on the SAS documents with the laboratory coordinator within the first 15 days of the semester or at least 10 business days before any scheduled activity for which accommodations are required. An email confirming mutual understanding of the accommodations and their application to lab will suffice.

Laboratory Safety Course:

All undergraduate students taking chemistry laboratories are required to complete an introductory course (approx. 50 minutes) on laboratory safety. This course is presented in an online format. The Safety Course must be completed before the first laboratory experiment. Students who do not complete the safety lessons will subsequently be denied admission to the laboratories. While it will not count directly to the final grade, the material is considered to be part of the course and is therefore appropriate for inclusion into laboratory pre-labs and exams. Students who have previously completed the Chemistry Safety Course at the University of Calgary in the past five years are NOT required to repeat it.

Course Outcomes:

- Identify sources of uncertainty in chemical measurements, and use appropriate statistical analysis methods to describe and quantify uncertainty.
- Using equilibrium principles, quantitatively and qualitatively describe the composition of solutions (acids and bases, chelation complexes, precipitates, and redox couples).
- Identify, explain, and apply common techniques in quantitative analysis, focussed on titrimetry.
- Describe the effect of concentration on a mixture through changes in chemical activity and electrical potential.
- Perform chemical manipulations with high accuracy and precision.
- Keep laboratory records that conform to professional and ethical standards.

Electronically Approved - Aug 31 2022 00:46

Department Approval