



## COURSE OUTLINE

### 1. **Course:** CHEM 315, Analy Chem: Intro Instrument Analy - Winter 2021

Lecture 01: TR 12:30 - 13:45 - Online

Instructor	Email	Phone	Office	Hours
Dr Jurgen Gailer	jjgailer@ucalgary.ca	210-8899	SB 405	TR 2:00-3:00pm (On-line/Zoom)

#### **In Person Delivery Details:**

**Laboratories** (Lab experiments) will **run in-person in SA 169 and 259**. Check your Student Centre to see rooms and times for which you are registered. Students will attend their registered lab section based on the schedule that will be set during the first week of class and posted to the course D2L site.

Completion of the Lab experiments is required in order to pass the course - if it is not possible for you to attend on-campus sessions, contact the course instructor immediately (before January 21 or within 2 days of enrolling in the course, whichever is earlier).

#### **Re-Entry Protocol for Labs and Classrooms:**

To limit the spread of COVID-19 on campus, the University of Calgary has implemented an Instructional Space Re-Entry Protocol that must be followed. Details are found in the [Covid-19 Protocol for Class and Lab re-entry.pdf](#) document. **Online Delivery Details:**

This course is being offered online in real-time via scheduled meeting times, you are required to be online at the same time.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

This course has a registrar scheduled, synchronous final exam. The writing time is 2 hours + 50% buffer time.

Recorded lectures will be made available to students synchronously via D2L (i.e. Tuesday and Thursday from 12:30 to 1:45 pm). Students that miss a class because of legitimate reasons (e.g. IT problems, health issues, taking care of a relative/child) will be provided with a link to the missed lecture to catch up. For some aspects of this course (Group Project) real-time meetings (Zoom Meeting) will be scheduled during regular course times and students are required to be online at the same time. If students have questions/inquiries about certain aspects of the course they can e-mail the instructor and he will respond within 24 h except on weekdays and holidays.

#### **Course Site:**

D2L: CHEM 315 L01-(Winter 2021)-Analy Chem: Intro Instrument Analy  
[piazza.com/ucalgary.ca/winter2021/chem315](https://piazza.com/ucalgary.ca/winter2021/chem315)

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

### 2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

**Prerequisite(s):**  
Chemistry 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:

Component(s)	Weight %	Date
<b>In-class Quizzes (4)</b> (30 min + 50% buffer time)	30%	February 9, March 9, March 25, April 13
<b>Group Project</b>	5%	April 15
<b>In-person Laboratory Experiments (7)</b>	35%	See D2L
<b>Laboratory Notebook</b>	5%	April 15
<b>Final Exam</b> (2 hours + 50% buffer time)	25%	To be scheduled by the Registrar

The quizzes and final exam are both **synchronous** online assessments. For any synchronous assessment, time will be adjusted for SAS students if needed. As well, accommodations for students facing a significant barrier to writing the assessment during the scheduled time will be done on a case-by-case basis, e.g. *different time zones, caregiving responsibilities, ability to secure an appropriate test-taking environment*. If any student expects to have difficulty completing a synchronous activity during its scheduled time slot, please contact the course instructor as early as possible to discuss alternate arrangements.

The group project (5 students per group) will involve the analysis of a research paper that was published in analytical chemistry-related journals. Up to three synchronous zoom lecture slots will be dedicated to this group project. Every group will submit a 2 page summary of the research paper that they selected at the end of the term in which answers to key questions have to be answered. Further details about the group project will be provided in the course orientation on January 12th.

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
<b>Minimum % Required</b>	95 %	90 %	85 %	80%	75%	70 %	65 %	60%	55%	50 %	45 %

This course will have a final exam that will be scheduled by the Registrar. [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 2 hours.

The final exam will be administered using an on-line platform. Per section [G.5](#) of the online Academic Calendar, timed final exams administered using an on-line platform, such as D2L, will be available on the platform where the additional time will be added to the beginning of the registrar scheduled exam. E.g. If an exam is designed for 2 hours and the final exam is scheduled from 9-11am in your student centre, the additional time will be added to the start time of the exam. This means that if the exam has a 1 hour buffer time,

- a synchronous exam would start at 8 am and finish at 11am.

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In order to receive the prerequisite requirements (i.e. a grade of C- or higher) for further Science courses, a student must meet **ALL** of the following requirements.

1. Perform and submit results for at least five of the seven Laboratory experiments in-person lab activities
2. Achieve a minimum 50% average on the Laboratory experiments
3. Achieve a minimum 50% weighted average on the examinations (4 Quizzes and 1 Final Exam)

This means that if a student scores below 50% on the exam average, OR does not achieve the minimum Lab grade, OR misses more than two lab experiments (for any reason), the maximum grade they can obtain in CHEM 315 is a D+.

#### 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, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

There is **no make-up Lab section in CHEM 315**. If you are unable to attend your scheduled Lab section, notify the course instructor as soon as possible. All make-up labs must be performed in the same 2-week cycle as the missed lab. As such, as much notice as possible is needed in order to find available space to perform make-up exams for excused absences. A minimum of **48 hours** notice (after the missed lab) for emergency absences or illness is required, and **10 business days** ADVANCE notice (before the missed lab) for scheduled absences such as doctor's appointments. Due to scheduling and restrictions on lab occupancy, it may not be possible to make up a missed experiment even if sufficient notice is supplied. In such cases the weight of the missed lab activity will be distributed over the remaining Lab experiments. Please note the course policies on minimum number of labs completed in Section 3.

There are **no deferred quizzes**, however, some accommodations may be made for time zone adjustment and technological issues in submission. If you are unable to write either quiz during the scheduled time, notify the instructor either **10 business days in advance** for scheduled absences, or **within 48 h** of the missed exam for emergency absences so that alternative arrangements can be made. If it is not possible to complete the exam within the exam writing window, the weight of the missed quiz will be shifted to the final exam.

For all other absences or missed deadlines, contact the instructor following the instructions above. Failure to provide timely notice or absences for non-excusable reasons (e.g. late arrival or safety violations in the lab) will result in a grade of 0 for the missed course component.

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

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

#### 6. **Course Materials:**

Recommended Textbook(s):

Daniel C. Harris and Charles A Lucy, *Quantitative Chemical Analysis, 10th Edition: MacMillan Learning*  
MacMillan Learning .

#### **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)
- Masks are required in indoor public areas on campus and in the laboratory. If you will wear a mask in the lab: Non-medical masks made of heat-resistant material - at least 2 (note: many common disposable masks are not suitable - see course D2L for details on material specs and requirements)

#### **Technological Requirements:**

This course will have in-class discussion via Zoom: Use of a webcam and microphone during these sessions will be beneficial.

Specific software that will be used in this course:

- A modern web browser - for accessing D2L and viewing course videos and other content.
- Zoom - for attending lecture and office hours.
- Office 365 suite: (Available to students at no additional cost)
- 1. OneNote - for accessing notes and assignments.
- 2. Excel - full version, not iOS or web version - or equivalent software.
- 3. Word - or equivalent word processor.
- PDF viewer (e.g. Acrobat Reader, Nitro Reader). Preview or in-browser reader is not sufficient.
- A scanner or phone app that can save documents/photos as PDF (e.g. OneDrive app).

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:

**Quizzes and final exams are "open-notes"**. Reference to your course notes, textbook (electronic or paper edition), and select online resources only will be allowed - **use of all other websites, online or offline resources during these exams is prohibited**. A detailed list of allowed resources will be posted to the course D2L at least one week prior to each exam.

All exams are to be completed **individually** by the student submitting the exam.

Other course activities may allow additional resources to be used or collaboration in groups. Please read the instructions for each assignment carefully to determine what resources and degree of communication is allowed.

For any synchronous assessment, time will be adjusted for SAS students if needed.

- 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 for which accommodations are required. An email confirming mutual understanding of the accommodations will suffice.
- For exams requiring a length accommodation, the extra time will be calculated from the base time of the exam.
  - For example: Each Quiz is a 30 min exam with 15 min "buffer" (total time: 45 min). A student with a 25% time accommodation would receive  $30 + (30 \times 25\%) + 15 = 52.5$  min with 15 min "buffer" (total time: 67.5 min) as their adjusted total time for each Quiz.

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.

A form is provided on the course D2L site and should be used when requesting reappraisal of term work.

## 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 [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call [403-210-9355](tel: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](mailto:svsa@ucalgary.ca)) or phone at [403-220-2208](tel:403-220-2208). The complete University of Calgary policy on sexual violence can be viewed at (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>)
- 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](#)  
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

- e. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Chemistry, Dr. Yuen-Ying Carpenter by email [ahugchem@ucalgary.ca](mailto:ahugchem@ucalgary.ca) or phone 403-220-6908. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- 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:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca). SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca). [Student Ombudsman](#), Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca).
- 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 activities will begin the week of **January 21, 2021**.

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 or transfer to your lab notebook the portion of the manual that outlines the procedures you will be doing.

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 Exemptions**

Students repeating the course within the last two years can be exempted from the Laboratory component of the course (See Section 3) if a grade of 75% or higher was obtained on the lab portion. Students choosing to exempt from the laboratory should be aware that the material covered in the laboratory will be integrated into other course assessments; and the lab grade achieved on the previous attempt will be carried forward.

Prior to applying for an exemption, students are encouraged to connect with their course instructor or coordinator to better understand the risks and benefits in their specific course, as well as what access they will (or will not) have to wet lab materials or feedback as an exempt student.

Students applying for a lab exemption should contact the Undergraduate Science Center (science.advising@ucalgary.ca) **no later than Monday January 18, 2021** 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.

### **Topics Covered and Suggested readings:**

Chapter 4 Statistics, sections 4-7 and 4-8  
Chapter 5 Quality Assurance and Calibration Methods  
Chapter 28 Sample Preparation  
Chapter 18 Fundamentals of Spectrophotometry  
Chapter 20 Spectrophotometers  
Chapter 21 Atomic Spectroscopy  
Chapter 22 Mass Spectrometry  
Chapter 23 Introduction to Analytical Separations  
Chapter 24 Gas Chromatography  
Chapter 25 High-Performance Liquid Chromatography  
Chapter 26 Chromatographic Methods and Capillary Electrophoresis

\* Given time constraints, not all indicated Topics may be covered.

### **Course Outcomes:**

- Describe the relevance of instrumental analytical chemistry in modern society
- Identify common pitfalls in the analytical measurement process: sample collection, sample preparation, measurement, quality assurance and quality control (QA/QC)
- Recognize operating principles of analytical measurement processes (i.e., spectroscopy, chromatography, sample preparation)
- Explain the basic operating principle of common building blocks of analytical instruments
- Decide which instrumental techniques are most appropriate to solve an analytical problem
- Develop hands-on skills to execute analytical measurements in order to achieve accurate and precise analytical results (i.e., pipetting, reading a balance)
- Demonstrate hands-on troubleshooting skills with regard to the operation of analytical instruments
- Practice recordkeeping that conforms to professional and ethical standards

Electronically Approved - Jan 07 2021 10:45

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**Department Approval**

Electronically Approved - Jan 07 2021 11:22

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**Associate Dean's Approval**