1. **Course:** CHEM 315, Analy Chem: Intro Instrument Analy - Winter 2020
   Lecture 01: TR 12:30 - 13:45 in ENE 241

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Email</th>
<th>Phone</th>
<th>Office</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Jurgen Gailer</td>
<td><a href="mailto:jgailer@ucalgary.ca">jgailer@ucalgary.ca</a></td>
<td>210-8899</td>
<td>SB 405</td>
<td>TR 2:00-3:00pm</td>
</tr>
</tbody>
</table>

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</table>

   **Course Site:**

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

   **Prerequisites:**
   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:

<table>
<thead>
<tr>
<th>Component(s)</th>
<th>Weighting %</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes (5, in-class)</td>
<td>30%</td>
<td>announced in Orientation on January 14th</td>
</tr>
<tr>
<td>Laboratory</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Laboratory Notebook</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
<td>to be scheduled by the Registrar</td>
</tr>
</tbody>
</table>

   Each piece of work (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.

   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.

<table>
<thead>
<tr>
<th>Minimum % Required</th>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 %</td>
<td>90 %</td>
<td>85 %</td>
<td>80 %</td>
<td>75 %</td>
<td>70 %</td>
<td>65 %</td>
<td>60 %</td>
<td>55 %</td>
<td>50 %</td>
<td>45 %</td>
<td>40 %</td>
</tr>
</tbody>
</table>

   Depending on the final overall performance of the class, the minimum percentage for any particular letter grade may be lowered. An average grade of 50% or higher in the laboratories and a weighted average of 50% or higher on examinations is required to attain a letter grade of C- or higher. The Faculty of Science requires a minimum grade of C- in any course to be used as a prerequisite. This course has a registrar scheduled final exam.

   This course has a registrar scheduled final exam.
4. **Missed Components Of Term Work:**

In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see Section M.1; for more information regarding the use of statutory declaration/medical notes, see FAQ). Absences must be reported within 48 hrs.

The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.3 of the University Calendar.

In the event that a student misses a quiz or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see Section N.1; for more information regarding the use of statutory declaration/medical notes, see FAQ). Absences must be reported within 48 hrs.

The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.3 of the University Calendar.

In the event that a student missed a quiz (e.g. due to illness), the instructor needs to be notified within 48 hrs. The student will be allowed to write a make-up quiz within 7 days of the date of the quiz if a legitimate reason is given. If the student cannot write the make-up quiz then the percentage weight the missed quiz will be pro-rated among the remaining components of the course OR will be transferred to the final examination (see Section E.3 of the University Calendar).

If a student missed an experiment or a make-up lab for non-legitimate reasons (e.g. vacation) and did not perform the experiment, the contribution of that experiment in the final course grade will be zero.

One make-up lab opportunity is provided for students that missed one experimental lab for legitimate reasons.

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

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

6. **Course Materials:**

D.C. Harris, Quantitative Chemical Analysis: W.H. Freeman and Company.

- Determination of Aluminum by EDTA titration
- Spectrophotometric Analysis of Trace Iron
- Copper by Electrogravimetry
- Copper by Atomic Absorption Spectroscopy
- Vitamins by High Performance Thin Layer Chromatography
- Analgesics by High-Performance Liquid Chromatography
- Chlorocarbons by Gas Chromatography
- Tartaric Acid in Wine by Ion Chromatography
- Fluoride by Ion-Selective Electrode

7. **Examination Policy:**

No aids are allowed on tests or examinations.

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.

In this course, the quality of the student’s writing in laboratory reports will be a factor in the evaluation of those reports.
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 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 15 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 immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. 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.

Term-work: A student who feels that a piece of graded term work (term paper, essay, test, etc.) has been unfairly graded, may have the work re-graded. The student shall discuss the work with the Instructor within 15 days of either being notified about the mark, or of the item's return to the class. If not satisfied, the student shall immediately submit the Reappraisal of Term work Grade form to the Associate Head of Chemistry, Dr. Farideh Jalilehvand (ahugchem@ucalgary.ca), who will arrange for a reassessment of the work if, and only if, the student's argument is valid. Note: Students should attempt to present their rational as effectively and as fully as possible. Mere dissatisfaction with a decision is not sufficient grounds for the appeal of a grade, or other academic decision. See sections I.1 and I.2 of the University Calendar.

Final exam: A student wishing a reappraisal of the final grade should contact the instructor. If not satisfied, the student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

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 support 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 Center**: The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call 403-210-9355.

   c. **Sexual Violence**: The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about
their experience, so they can get the support they need. 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.

d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offense that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student’s own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**

e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.

f. **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. Farideh Jalilehvand by email ahugchem@ucalgary.ca or phone 403-220-5353. 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.

g. **Safewalk:** Campus Security will escort individuals day or night (See the Campus Safewalk website). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

h. **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.

i. **Student Union Information:** VP Academic, Phone: 403-220-3911 Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: 403-220-3913 Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: ombuds@ucalgary.ca.

j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.

k. **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.

l. **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 13th. 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). Students 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. Students repeating the course within the last two years can be exempted from the Laboratory Component of the Course if a grade of 75% or higher was obtained. The lab grade achieved on the previous attempt will be carried forward. Such students must contact the Chemistry Undergraduate Program Administrator in the Chemistry Main Office, SA 229 before the drop date (January 23).

**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.

**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
- Chapter 14 Fundamentals of Electrochemistry
* 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)
- make sense of the theory that is the foundation of the analytical measurement process
- 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
- demonstrate hands-on troubleshooting skills with regard to the operation of analytical instruments

**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