

# Introductory Analytical Chemistry, Chem 2272F, Course Outline

## 1. Course Information

### Course Information

This course emphasizes the quantitative aspects of chemistry. Starting with classical measurements of volumes and masses, the course will develop statistical tools of estimation, confidence, accuracy, and precision in treating experimental data. This includes an introduction to instrumental methods of analysis.

### List of Prerequisites

Prerequisite(s): (Chemistry 1301A/B and Chemistry 1302A/B), or (Chemistry 1301A/B and Integrated Science 1001X). Unless you have either the requisites for this course or written special permission from the Department of Chemistry to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record. This decision may not be appealed. Please see <http://www.registrar.uwo.ca> for more details

## 2. Instructor Information

TA--4 TAs for the weekly labs	TBA			

Your instructor's or lab coordinator's email should only be used for administrative purposes. In order to maximize efficiency and to allow your instructor to respond to administrative concerns as quickly as possible, emails of the following nature will *not* be responded to:

- Questions that can be answered based on the information found in this course outline. Being able to find information yourself is an important soft-skill and an employability outcome.
- Requests for grade increases, extra assignments, make-up labs, etc. (see related sections following).

When emailing your instructor, please use your Western email address and include *Chem 2272F* in the subject line. Messages from a non-Western account or those that do not include *Chem 2272F* may be

blocked by the university's anti-spam system. It is also useful to include your student number somewhere in the message.

Constructive feedback is very valuable to us. Please do not hesitate to contact any one of the instructors if you have any comments or feedback on any aspect of Chem 2272F. We are always trying to improve the course so that we can improve your experience!

### 3. Course Syllabus, Schedule

**Learning Outcomes:** This course emphasizes the quantitative aspects of chemistry: classical measurements and instrumental methods of analysis. **Upon successful completion of this course, the student is expected to demonstrate the ability to:**

- Describe the basic principles and procedures to perform quantitative chemical analysis.
- Execute effective mathematical calculations necessary to achieve correct values in quantitative analysis.
- Conduct laboratory experiments of quantitative and instrument analysis with accuracy and precision.
- Compile professional level lab reports that are logically and concisely written with critical data analysis.
- Evaluate the accuracy of and sources of errors for a given quantitative or instrument analytical method.
- Work productively in the lab and complete the lab reports independently and on time.

#### *Outline of Planned Lecture Topics*

Section	Class Topic	Chapter in Harris
1	Administration, Introduction to Analytical Chemistry, Measurement Basics	0-2
2	Experimental Errors Statistics Quality Assurance Calibration Methods	3-5
3	Introduction to Titrations	7
4	Systematic Treatment of Equilibrium Acid-Base Equilibria Complexation Equilibria Precipitation Titrations Acid-Base Titrations EDTA Titrations	8-12
5	Fundamentals of Electrochemistry Electrodes and Potentiometry Redox Titrations Electroanalytical Techniques	14-17
6	Fundamentals of Spectrophotometry Spectrophotometers Atomic Spectroscopy Molecular Spectroscopy	18, 20, 21

In all of the topics, the primary focus is on the *understanding* of the concepts. Please try to garner a thorough, in-depth understanding of the material, because that is what allows success in chemistry. Accordingly tests and exams will be designed to evaluate your comprehension of the material and your

ability to apply it to new and different scenarios, and not simply your ability to regurgitate memorized facts or substitute numbers into formulas.

### **CHEM 2272F LABORATORY SCHEDULE**

There are 7 experiments in total. For more information, please read the 2025 lab manual.

Week of	Experiment
Sept. 8	Introduction to the Analytical Lab (in lab) Exp. 1: Data Analysis with Excel (online)
Sept. 15	Exp. 2: Titration of an ASA/SA Mixture
Sept. 22	Exp. 3: pH Titration of ASA
Sept. 29	Rotation Week 1: see posted schedule for details
Oct. 6	Rotation Week 2: see posted schedule for details
Oct. 13	Rotation Week 3: see posted schedule for details
Oct. 20	Water Project, Week 1
Oct. 27	Water Project, Week 2
Nov. 3	No Labs - Fall Reading Week
Nov. 10	Water Project, Week 3
Nov. 17	Water Project, Week 4
Nov. 24	Water Project, Week 5
Classes End December 9	

**Lab Evaluation:** Experiments 1-6 are weighted equally and are worth a total 20% of your final course grade. The water project is worth 15% of your final course grade. This totals to the 35% of the lab component in the course.

**Statement on the Use of Generative Artificial Intelligence (AI):** As this course aims at building and strengthening your individual laboratory report writing, the use of generative artificial intelligence (AI) tools/software/apps is **unacceptable** in this course.

Students who arrive unprepared or late for a lab will receive a zero for that lab. No credit will be given for the prelab exercises. Students are deemed late if they arrive after the lab doors have closed. Lab technicians and teaching assistants have the right to eject students from the lab.

Due to limited resources, students are asked to work in pairs or groups of three in the lab. However, each student is expected to learn all aspects of the experiments. Likewise, each student is expected to contribute equally with their highest level of skills and effort. In the event of unequal contributions, the TAs will require the students to work individually for the remaining of the lab.

## Safety and Dress Code

Western is committed to workplace health and safety, and has strict safety regulations. Even your instructor has to follow them! Lab TAs and technical staff will remove students who, in their opinion, do not meet the safety requirements or are not prepared, as described below. **These students, and those who arrive late, will receive a zero for the entire experiment, and no credit will be given for the prelab exercise.**

### Eye Protection

Safety glasses or goggles must be worn by everyone whenever laboratory work, including the getting, cleaning, and returning of glassware, is being performed. Students who wear prescription glasses must wear appropriate safety glasses or goggles over their regular glasses. If you wear contact lenses, you must inform the lab TA that you are wearing contact lenses.

### Lab Coat, Pants, Socks, and Footwear

The Occupational Health & Safety Office at Western mandates “shoulder-to-toe” coverage. A detailed description of the dress code is available in the Lab Manual. For hygienic reasons, we do not rent shoes, socks, pants, or lab coats.

Lab coats must be worn, buttoned up. Students must have a lab coat to enter the laboratory. They may not leave after the video or the prelab talk to get a lab coat or have one delivered.

Students must wear ankle-length pants, socks that cover the ankle, and shoes that cover the whole foot (top, sides, and back) without any “cutout holes.” Shorts, sandals, and capris are among the items of clothing that are not acceptable. No skin may show at the ankles even when you are seated.

## Dates to Note

Date	Event
Thursday, September 12	Last day to make registration changes, such as lecture and lab sections. This is the last day to de-register from the course and remove it from your academic record.
Week of September 8	First week of laboratory rotations
Tuesday, September 30	National Day of Truth and Reconciliation (non-instructional day)
Monday, October 13	Thanksgiving holiday

Week of November 3-9	Fall Reading Week
	Midterm Test (topic cut-off and room details TBA)
Monday, December 1	Last day to drop the course without academic penalty. If you drop the course on or before this date, it will remain on your academic record along with a WDN (withdrawn). If you drop the course after this date, it will result in an automatic F.
	Last day of Chem 2272F lecture

## 4. Course Materials

### Mobile Device or iClicker:

- Audience response systems (“clickers”) will be used to provide immediate feedback on your understanding of course concepts. You will require a web - enabled device (phone, laptop, etc.) or an iClicker (not recommended). Participation marks are awarded for the use of “clickers”. You must use your own “clicker” account and may not submit responses for any other student. The data collected using the devices will not be used for research purposes without your consent.

### Chemistry 2272F Course Textbook is required: *Quantitative Chemical Analysis*, 10th Ed., **Daniel C. Harris** and **Charles A. Lucy**

The ebook with Achieve (\$112) or looseleaf book with Achieve (\$173.40), lab manual (\$56.00), and lab notebook (\$16.05) are required and available at the Western bookstore at the following link:

<https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2025A&courses%5B0%5D=001> UW/CHE2272F

### ·Achieve Course Access Info:

- Course URL:** <https://achieve.macmillanlearning.com/courses/9mqnot/mycourse>
- Achieve Course ID:** 9mqnot
- Students who purchase Achieve will have access to the eBook for the duration of their education of 4 years by [following these instructions!](#)

### ·Chemistry 2272F computer software: *Microsoft Excel for data analysis*

### ·Chemistry 2272F Laboratory Manual (2025 edition) is required

Old editions may not be used. Students must bring this year’s edition to every experiment.

### ·Lab Coat

For your protection, a proper lab coat is required. Designer lab coats, which are often sold as hospital scrubs or consultation coats, are not acceptable, because they are too short or do not offer sufficient protection to the upper body.

### ·Safety Glasses

Safety glasses may also be purchased through the ChemClub. If you wear glasses, it is important that the safety glasses fit over them properly. The safety glasses should sit close to your forehead.

• **Use of electronic devices:** Only basic scientific calculators are permitted on all tests and exams. All other electronic devices (cell phones, laptops, tablets, cameras, etc.) are prohibited. Students found in possession of prohibited devices will receive a mark of ZERO for the entire test or exam.

Students are responsible for checking the course Brightspace site (<https://westernu.brightspace.com>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class and where all course material will be posted.

If students need assistance with the course OWL site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

**[Achieve Student Checklist](#) - this is a 'go-to HUB' for students:**

- Contains information for students including registering for your course, how to use Achieve, FAQs, tech support etc.

#### **Tech Support Options:**

- **Via Online Form** - available 24/7  
- <https://macmillan.force.com/macmillanlearning/s/contactsupport>
- **Via Chat** - within the [knowledge base](#)
- **Via phone** - 800.936.6899 (times in EST): available Monday-Thursday 8:00am to 3:00am; Friday 8:00am to 12:00am, Saturday 12:00pm to 8:00pm, Sunday 12:00pm to 3:00am.

## **5. Methods of Evaluation**

Tests and exams are necessary to assess your mastery of core concepts. Your overall course grade, out of 100, will be calculated as follows:

Component	Notes	%
Laboratory	20% Exp 1-6, 15% water project	35
iClicker (participation)	Online iClicker	5
Midterm Test	Thursday, October 23, 6:30–8:30 pm	20
Final Exam	Scheduled by the Registrar, 3.00 hours	40

**To obtain credit for the course, all three requirements below must be met:**

1. Obtain a minimum of 50% on the overall course grade, as calculated above.
2. Obtain a minimum of 50% on the laboratory component. This mark is calculated from all experiments. A missed experiment is assigned a mark of zero unless it has been “excused” (see section on Missed Course Components).

3. Miss no more than two experiments, whether excused or not.

Students who fail to meet requirement #2 or #3 will receive a course grade no greater than 40% (even if the calculated course grade is higher) and will not receive credit for the course.

★★ THERE ARE NO MAKE-UPS FOR LABS★★

- Exam are multiple choice questions.

	Marked on participation only. The score you receive will be based on the percentage of questions answered:
iClicker	80% or more = 5; 70–79% = 4; 60–69% = 3; 40–59% = 2; 30–40% = 1; Less than 30% = 0 There is NO makeup for iClicker questions

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## 6. Missed Course Components

### General information about missed coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs*, posted on the Academic Calendar:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/academic\\_consideration\\_Sep24.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf),

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](#).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:

[https://registrar.uwo.ca/academics/academic\\_considerations/](https://registrar.uwo.ca/academics/academic_considerations/)

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Practical in-class laboratory practice
- Midterm/Presentation/Group Project designated by the instructor as the one assessment that always requires documentation when requesting Academic Consideration.

When a student mistakenly submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

**Accommodation for students with disabilities.** Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. In cases where a student misses a piece of work for reasons related to the disability on file with Accessible Education, the student should request accommodation by contacting Accessible Education instead of the Academic Counselling Office.

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

#### Missed Labs

**There are no make-ups for in-person labs, and it is not possible to reschedule them.** Students who miss a lab session (defined as a standalone lab experiment/introduction or one experimental session of the water project) do not need to apply for academic consideration, and the weight of the missed work will be shifted to other sessions. However, at least 8 lab sessions must be attended in total. Students who fail to meet this requirement will have to apply for a grade of incomplete (INC) at the Dean's Office and complete the missed lab work the next time the course is offered. Students who complete fewer than 8 lab sessions and do not have an INC will receive a course grade of not greater than 40%, even if the calculated grade is higher. Tests and exams will contain questions related to the theoretical aspects of the experiments. You are responsible for the material pertaining to the missed labs.

**Late lab report submissions:** The policy on late lab report submissions is detailed in the Laboratory Manual.

#### Missed Midterm Exam

If you are unable to write the midterm test and are granted academic consideration, the weight of the midterm test will be shifted to the Final Exam. If you are not excused, you will receive a mark of ZERO.

#### Missed Final Exam

When you miss the Final Exam and their Academic Consideration has been granted, you will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under [Special Examinations](#)), especially for those who miss multiple final exams within one examination period.

**All requests for academic consideration must go through your faculty's Academic Counselling Office, so please contact them and *not your instructor*.**

## 7. Additional Statements

### 7.1 Religious Accommodation



When conflicts arise with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible, but not later than two weeks prior to the writing of the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays - <https://www.edi.uwo.ca>

## **7.2 Academic Accommodation Policies**

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

## **7.3 General Academic Policies**

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

**Use of @uwo.ca email:** In accordance with policy, [https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf), the centrally administered e-mail account provided to students will be considered the individual's official university email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

### **Requests for Relief** (formally known as “appeals”)

Policy on Request for Relief from Academic Decision:

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/requests\\_for\\_relief\\_from\\_academic\\_decisions.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf)

Procedures on Request for Relief from Academic Decision (Undergraduate):

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/undergrad\\_requests\\_for\\_relief\\_procedure.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf)

Procedures on Request for Relief from Academic Decision (Graduate):

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/graduate\\_requests\\_for\\_relief\\_procedure.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/graduate_requests_for_relief_procedure.pdf)

## **7.4 Scholastic Offences**

Policy on Scholastic Offences:

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_offences.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_offences.pdf)

Procedures on Scholastic Offences (Undergraduate):

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/undergrad\\_scholastic\\_offence\\_procedure.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf)

Procedures on Scholastic Offences (Graduate):

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/graduate\\_scholastic\\_offence\\_procedure.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/graduate_scholastic_offence_procedure.pdf)

## **Use of Electronic Devices During Assessments**

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This

includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at your desk, on your person, or within reach during an assessment will be treated as a *scholastic offence*, even if the device is not in use.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your responsibility to review and comply with these expectations.

### Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is **not permitted** in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations.

Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a **scholastic offence**.

If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is your responsibility to seek clarification before using any AI tools in academic work.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

### 7.5 Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, exam conflicts, and many other academic-related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts at:

[https://www.uwo.ca/health/student\\_support/survivor\\_support/get-help.html](https://www.uwo.ca/health/student_support/survivor_support/get-help.html).

To connect with a case manager or set up an appointment, please contact [support@uwo.ca](mailto:support@uwo.ca).

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at

[http://academicsupport.uwo.ca/accessible\\_education/index.html](http://academicsupport.uwo.ca/accessible_education/index.html)

## ***Chemistry on Social Media***

Find the Department of Chemistry at Western on Facebook and Twitter!

- Facebook: @ChemistryatWestern
- Twitter: @westernuchem