Western Science

DEPARTMENT OF CHEMISTRY

Chemistry 4491E

Chemical Research Discovery and Scientific Communication

Course Outline 2025-2026

Course Facilitators

[redacted] [redacted] [redacted]

Please email us from your @uwo.ca address. Please put Chem 4491E in the subject line.

Course website: https://westernu.brightspace.com/d2l/home/128762

Students should check Brightspace) on a regular basis for news and updates. This is the primary method by which information and course material will be disseminated to all students in the class. Students are responsible for checking Brightspace on a regular basis.

Statement on the Use of Generative Artificial Intelligence (AI): As this course aims at building and strengthening your individual writing and presentation skills, the use of generative artificial intelligence (AI) tools/software/apps should only be used to fine tune your own writing

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Course Overview

Chemistry 4491E is the capstone course in the Specialization and Honors Specialization in Chemistry modules and, for some, in the Honors Specialization in Biochemistry and Chemistry module. The course provides the student with the opportunity to integrate the breadth of knowledge gained in prerequisite courses and apply it towards a hands-on chemistry experience while doing an independent research project under the direction of a faculty member. The course involves experiential learning of advanced laboratory, computational and/or analytical skills needed to do research in an active chemistry research group. Importantly, the course also includes workshops focused on self-marketing and other professional skills. The course culminates with the writing of a thesis summarizing the year's work. The thesis is then presented and defended in a conference-like atmosphere to a panel of faculty and peers. The course experience wraps up with constructive revisions of the thesis suggested by faculty and submission of a final revised copy.

Expectations. The following are course-specific conditions that are required to pass the course:

A) A minimum of 15 hours/week dedicated to the course. Activities include, but not limited to, preparation for experiments/calculations, performance of research, collection of data, analysis of results, participation in the group research activities, reading the literature, and

communication of research results under the direction of your assigned mentor and/or supervisor. Please note that Friday, February 27, 2026 marks the end of your laboratory work. This is to allow enough time to write your thesis and prepare your final oral presentation. Urgent and critical make-up experiments are allowed under the agreement of your supervisors.

B) Attendance at the Chem 4491E Professional Skills unit presentations. In general, presentations are given on [redacted]. The tentative specific schedule is given below. Some dates and times may be subject to change. Participation in each is required for course credit. Failure to attend can result in an F in Chem 4491E. ***Reserve this time in your schedule weekly.***

C) Submission of the written thesis and oral presentation and evaluation of your research project.

Initiation Meeting: [redacted]**.** The course initiation meeting will include a discussion of the course outline, expectations in research and required Laboratory Safety courses followed by a mixer where students can discuss research projects with potential faculty supervisors in an informal setting (see scheduling in tables for details).

Laboratory Safety: Students are required to complete a series of on-line laboratory safety training courses, including, but not limited to:

- WHIMIS
- Laboratory Safety and Hazardous Waste Management
- Worker Health and Safety Awareness
- AODA - Accessibility in Service
- Western Safe Campus Community Certification
- Cyber Safety Awareness at Western

In addition, your supervisor will provide details about group-specific safety training.

Learning Outcomes

- You will build on your project hypothesis/direction of research and, depending on the nature of the project, you will design and plan experiments, and/or modelling and computations. You will then execute this plan using the most appropriate methods.
- You will develop a basic understanding of research in the specific area of your project by reading the scientific literature.
- You will integrate skills and knowledge learned during the core chemistry sub-discipline courses and apply them to your independent research project in an active research group.
- You will apply the knowledge acquired during your chemistry module and/or new knowledge acquired during your research project to interpret your results and to rationalize them in the context of your hypothesis.
- As a part of an active research group, you will develop skills for working within a team.
- You will refine your scientific writing skills through the writing of a thesis.

- You will refine your communication skills through regular, active participation in research group activities, mentorship activities (WuCHEM), and through oral presentations and defense of your honour thesis.
- You will develop professional career skills, such as self-marketing skills, job application skills, interviewing and networking skills, and advanced library skills, through a series of active learning/participatory events.

Research Schedule. Important dates for in-person research progress evaluations, thesis and oral presentation components.

Event	Date and place for in-person event
Introduction to 4491 and Mixer Course facilitators will introduce the course and expectations**.** This will be followed by a meet-and-greet with potential 4491 supervisors	[redacted] Meet-and-greet at [redacted] with faculty [redacted]
Project Selections Due	Friday, September 5 by 5:30 pm, Electronic submission in Brightspace.
Release of project assignments	Monday, September 8 by 5:30 pm on Brightspace. Probably sooner.
Start of research	Tuesday, September 9. Students are responsible for contacting their assigned thesis supervisors to get started!
Your research media post on LinkedIn	First one Due no later than Nov. 14 Second Due no later than February 20
Mid-Year presentation:	[redacted] Peer-evaluated presentations. Aimed at clearly and effectively communicating your project in an impactful way
Thesis Introduction Due	Friday, December 5 by 5:00 pm. Students are responsible for submitting a copy via Brightspace and a copy directly to the supervisor. (Please note this will be extended)
Final Day in Lab for Experimentation	Friday, February 28
Mentorship Report	Due March 2

SOUSCC	[redacted] University of Toronto Mississauga. All day. (not mandatory but worth it!)
Submission of Thesis	**For those NOT participating in SOUSCC:** Monday, March 30 by 5:00 pm, Electronic ***For those participating at SOUSCC: Friday***, April 3 by 5:00 pm, Electronic submission of thesis via Brightspace. ***Hard Deadline***
Thesis Oral Presentation CHEM4491 Day	[redacted] **BOOK off this day.** We will only need 3 -5 hrs. Aiming for morning 9-1.
Final Thesis Submission	Thursday, April 30, 2026, 5:00 pm, Final revised thesis* to be uploaded via Brightspace *If revisions requested.

Mandatory Professional Skills Presentation Schedule

NB: *tentative* dates – any changes will be announced via email (Brightspace). Slides of all presentations will be uploaded on Brightspace after all lectures.

Event	Date and Location
Introduction to 4491 and Mixer The course Coordinators will introduce the course and its expectations. This will be followed by a meet-and-greet with potential 4491 supervisors.	[redacted] [redacted] Meet-and-greet with faculty [redacted]
Library Session TBA (XX@uwo.ca) NOTE: Please register for your SciFinder account BEFORE this class session. Registration details here: https://guides.lib.uwo.ca/chemistry	[redacted] **Scifinder, Academic Integrity, Research/Bibliography Management** Sign up for Scifinder. *Bring a laptop computer with you.*

Applying to Graduate Schools & Applying for Graduate Scholarships	[redacted]
Self-Marketing on Paper: Resumes and Cover Letters	[redacted] Guests: TBA
Self-Marketing On-line: Tips and Tricks for Appropriate Use of Social Media and LinkedIn Workshop	[redacted] *Bring a laptop computer with you.* Guests: TBA
How to Write a Scientific Introduction	[redacted] Guest: Professor J. Blacquiere
Mid-Year Presentation	[redacted] Present your thesis background and results to date in less than 5 minutes. Practice with your groups beforehand.
Sign-up for the Mock Interview	Choose Job Posting (Record Job ID # for future use) Select and Open Interview Timeslot Complete by **Friday, December 5**
Apply for the Mock Job	Submit Resume and Cover Letter (Job Application) Complete by **Tuesday January 6, 11:59 p.m.** *Please contact* [redacted] *if you have difficulties* ***Hard Deadline:*** *must include complete LinkedIn profile*
Self-Marketing in Person: Networking Interview Skills Workshop	[redacted]
Mock Interview Day [redacted] *includes interview and networking meeting	[redacted] Interview Times TBA followed by the networking meeting – [redacted] Location TBA

Thesis Writing Prep: How to Write an Impactful Results and Discussion Section	[redacted]
CHEM4491 Presentation Day	[redacted] Times to be announced in early 2026.

Course Evaluation

Assuming the minimum requirements as outlined above are met, the final grade in the course (out of 100%) will be determined as follows:

Mid-year Presentation: 5%

You will give a **5-Minute oral presentation** (one slide maximum) to practice clear and concise scientific communication skills, persuasion, and audience engagement. The slides should only aid you in telling a verbal story about the impact your research has. The goal of this exercise is to get thinking about how to write an impactful thesis introduction and to gain experience with scientific entrepreneurship communication. The presentation will be followed by questions from the course coordinators and the audience. The presentation will be graded by your peers.

Mid-year and Year End Research Social Media Project (2.5% for each post) 5%

In a format suitable for posting on social media your LinkedIN page (image and short text). Describe your research project or some interesting aspect of it (an experiment, instrumentation). Submit to Brightspace suitable for posting on Chemistry Socials……and on your LINKEDIN.

Chemistry Mentorship and Engagement 5%

The Western Undergraduate Chemistry Education and Mentorship (WuCHEM) program aims to create camaraderie and inclusivity within the Chemistry Department. All CHEM4491 students are expected to be mentors for junior undergraduate students. Facilitated by the ChemClub, you will be paired up with a mentee to help them navigate their undergraduate experience for this year. You will also be paired with other mentors, including graduate students and professors. This intergenerational mentorship program is an unofficial way for all to express their opinions about our programs, gain a sense of belonging within Chemistry, and to gain experience with networking.

<u>Expectations from CHEM4491 Mentors include:</u>

- Attending the WuCHEM meet-and-greet event (date and time TBA by ChemClub)
- Devising a mentor-mentee expectation plan with mentee(s).
- Facilitating and attending monthly meet-ups with mentee(s) (mandatory) and mentors.
- Writing a one-page report on mentorship progress (Due in late February). This should include reflection on the progress based on your mentor-mentee plan.

Mid-year Preliminary Thesis Introduction: 5%

A preliminary draft of the thesis introduction will be submitted to your supervisor(s) and on Brightspace. The objective of this evaluation element is to ensure that you are thinking about the nature and scope of your research project. The exact length and content of the introduction may change in the final thesis. Typically, an introduction will be 4-6 pages. The introduction will be graded by the supervisor(s). Students are referred to the thesis rubric for guidance.

Mid-year (December) Student Performance Grade: 10%

Assigned by the supervisor(s) based on the student's performance in the research project to date. Students are referred to the student performance rubric for guidance.

Final Student Performance Grade: **25%**

Assigned by the supervisor(s) based on the student's performance in the research project throughout the entire academic year. Students are referred to the student performance rubric for guidance.

Thesis Grade: **(2 x 15% by each thesis examiner)** **30%**

Each student will submit a formal, written thesis by the due date. The thesis will be read and evaluated by two faculty members (who are not supervisors of the project) using the thesis evaluation rubric. The thesis grades are submitted to the coordinators prior to the oral presentation.

Oral Presentation Grade: **2 x 7.5% by each thesis examiner** **15%**

Each student will present a 15-minute formal oral presentation at CHEM4491 day. Your thesis examiners, and any other faculty members present (other than your supervisor(s)), will provide a grade based on the quality of the presentation according to an oral presentation rubric. At the end of the student's presentation, the audience will ask questions for a maximum time period of 15 min.