Chemistry 502 - Course Information

Course requirements

This is a 6-credit course to be completed in two consecutive semesters (Fall-Winter or Spring-Summer). Typically, students take this research course during their fourth year (in a 4-year degree) in the Chemistry Honours program and have completed the following chemistry courses: CHEM 201, 203, 311, 315, 351, 353, 371, 373, 471, 431, 433, 453, and BCEM 341, whilst maintaining a GPA of 3.30 (Honours requirement). The BSc Honours in Chemistry recommend course sequence is found here. However, the course is also open to all CHEM majors by permission of the supervisor and department. Inter-department and/or inter-faculty applications are encouraged and will be considered on a case-by-case basis.

Time Commitment

Estimated time commitment is an average of 9 hours per week (on the project as a whole, which can include lab work, reading, writing, etc.), plus the time required to meet with the Supervisor(s) and/or group to discuss progress.

When completed in Fall-Winter semesters, September will primarily involve reading the literature and writing your literature review and proposal. Active research should commence no later than mid-October. It is common for research experiments to continue over the December holiday break, particularly as the exam period in December often precludes carrying out much research. Whenever you are carrying out laboratory research work, be sure that someone else is present in your lab or in a nearby lab, in case of emergency or accident, and follow all lab safety protocols. Depending on the project, active research should slow down by March, at which point your primary focus should be writing the final report.

This is an Independent Study Project course with only occasional meetings (frequency TBD) on Wednesday’s at 4pm. Students are expected to schedule the required amount of time to complete the course into their schedule. Regularly scheduled classes have precedence over any out-of-class activity; therefore, it is the responsibility of each student to coordinate their research work around their scheduled classes.

Enrolment Procedure

It is the responsibility of the student, in consultation with a supervisor, to decide on a project topic idea for this course. This is to be done in advance of initiating enrolment into the course.

Have a project idea but unsure who to approach as possible Supervisor? Students who have a project in mind but are unsure which faculty members would be potential supervisors should view the research themes carried out by faculty members in Chemistry here.

Meeting with potential Supervisor:

1. Bring a current unofficial copy of your transcript.
2. Be sure to discuss with your potential supervisor the following:
   • Options for research projects and expectations.
   • Prepare your Project Title and Description (250 word max), needed for webform submission to enrol.
   • Research timelines and milestones.
   • Committee requirements (need one additional faculty member). After consultation with your supervisor, select an additional faculty member to serve on your supervisory committee and ask that person if they are willing to act in that capacity. This individual should have research interests that are related to your project and will be available to provide advice to you over the course of your project. Inform the course coordinator of the committee member selection by Friday, September 16th, 2022.

Once the prospective Supervisor has indicated their willingness to supervise you on your project. Complete the webform (https://science.ucalgary.ca/usc-independent-research-course-application) no later than 10 working days before the add/swap deadline for the term (10 working days before is September 2nd, 2022).

If approval is granted, you will be enrolled into the course by staff in the USC and you will be notified by email. If approval is denied at this point, you will be notified by e-mail.
Evaluation criteria for CHEM 502:

10% Literature Review/Proposal - due Friday, October 14\textsuperscript{th}, 2022. An approximately 10-page (typed, 12-point font, double-spaced with figures) summary that highlights the 'problem being addressed' via a critical assessment of published literature and the relevant research carried out on your topic of interest, as well as a section concerning your goals/objectives/hypotheses and how these relate to past work. In addition, a section that details the methods, approaches and/or techniques that you anticipate using during your research. A pdf of the review/proposal must be emailed to your Supervisor, Committee member and the Course Coordinator by the due date.

20% Research Progress Meeting - must occur on or before the last day of exams, December 21\textsuperscript{st}, 2022. In December, a meeting scheduled by you, must be held between with your supervisor, your committee member, and course coordinator (if schedule permits) to assess your progress during the first semester. A brief progress report must be given in the form of a 15-20 minute presentation. The format of the presentation can be either a ‘chalk talk’ style or ‘PowerPoint’ style, which should be determined in consultation with your supervisor. The presentation should include: the objectives of your project and description of what you have done and observed to date, and a brief description of the work you plan to carry out in the remaining months. Be prepared to discuss your work with your committee members.

20% Final Oral presentation - To be scheduled prior to Wednesday, April 26\textsuperscript{th}, 2023. The oral presentation must be scheduled prior to the final day of the Winter Session Final Examinations period at a time convenient for you and the members of your committee, including the course coordinator, and open to the department unless the work contains confidential information. It is critical that the date for your oral presentation be decided as soon as the winter 2023 final exam schedule is published. The 30-minute presentation will be followed by a discussion period, during which time the supervisory committee can ask about the project to a maximum time of 1 hour (includes presentation and questions). The presentation is to meet with current standards of professionalism, utilizing PowerPoint, or similar, presentation software.

25% Final Written Report - due Wednesday, April 12\textsuperscript{th}, 2023. A written report (email pdf) must be submitted to your supervisor, your committee member, and course coordinator by the last day of classes in the Winter session. The report must be in typed form (double spaced and appropriately indented) and all figures and tables must be clearly and carefully drafted. The report should be written in the style of a paper for a scientific journal in the appropriate discipline, but perhaps be somewhat more detailed. Your supervisor will provide details about the appropriate format you should follow. Common example templates can be accessed from either ACS or RSC publishing "instructions/guidelines for authors". More details on this will be provided at a meeting to discuss issues concerning the content and style of the report, and how to find and comply with the journal requirements. The Final Written Report is one of the key outcomes of the course and should be considered similar to a final examination. It must be handed in by the prescribed date or you will lose marks (10% deducted, for each day late).

25% Research Work. It is anticipated that your commitment to Chemistry 502 averages to about nine hours per week over the Fall and Winter terms. Students are graded in this component of Chemistry 502 by their supervisor based on the following scheme: time commitment, consistency of effort, safety, independence, initiative, creativity and other contributions to the project and their overall research skills out of 25.

Each piece of work (review/proposal, progress meeting, final oral, final written report and research work) submitted by the student will be assigned a numeric 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 is as follows:

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<th>Grade</th>
<th>A+</th>
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<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
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CHEM 502 - Course Learning Outcomes

After completion of a CHEM 502 project, successful students will have...

- proposed a scientific question and framed the direction of research inquiry in the context of the relevant background and literature by writing a concise proposal.
- performed research in accordance with appropriate professional norms, such as lab safety and applied relevant training.
- searched for scientific information using a wide range of library skills, properly documented those sources, read scientific papers and identified key concepts.
- established advanced time management skills required to plan and complete a research project.
- performed original research in a specific field of chemistry at an advanced skill level.
- analyzed and interpreted scientific results and then communicated to a broad chemistry audience the findings by writing a final thesis in a format appropriate for the specific area of study and delivering an oral or poster presentation.
- developed an understanding of possible professional career paths including summer research jobs and graduate school, and practiced appropriate skills to use for applications, interviews, and networking opportunities.