

PSCB90H3 Physical Sciences Research Experience – Summer 2022



This course provides an opportunity for students to work with a faculty member and carry out original research. Students will provide assistance with one of the faculty member's research projects, while also earning credit. Students will gain first-hand exposure to current research methods, and share in the excitement of discovery of knowledge acquisition. Progress will be monitored by regular meetings with the faculty member and through a reflective journal. Final results will be presented in a written report and/or a presentation at the end of the term. Approximately 120 hours of work is expected for the course.

Prerequisite: Permission of the Course Coordinator (Dr. Effie Sauer, effie.sauer@utoronto.ca)

Recommended Preparation: Completion of at least 4.0 credits in a relevant discipline.

Breadth Requirements: Natural Sciences

Link to UTSC Timetable: <https://utsc.calendar.utoronto.ca/section/physical-sciences>

Note: Students must send an application to the course Coordinator (Dr. Effie Sauer, effie.sauer@utoronto.ca) for admission into this course. Applications must be received by the end of August for Fall enrolment, December 15th for Winter enrolment, and **April 30th for Summer enrolment.** Typically, students enrolled in a program offered by the Department of Physical and Environmental Sciences and students who have a CGPA of at least 2.5 or higher are granted admission. Approved students will receive a signed course enrolment form to be submitted to the Office of the Registrar.

Applications must include:

- 1) A letter of intent indicating the student's wish to enroll in the course
- 2) A list of preferred projects, ranked in order of preference (see project descriptions below)
- 3) A list of relevant courses successfully completed by the student, their grades, as well as any relevant courses to be taken during the upcoming semester
- 4) Any additional materials requested by the project supervisor (see below)

Project 1 (Chemistry)

Supervisor: Prof. Shadi Dalili (sdalili@utsc.utoronto.ca)

Title: Developing New Tutorial Material for CHMB41H

Project Description: Students involved in this project will be expected to develop new tutorial worksheets and quizzes based on current CHMB41H course content, using reputable scientific resources and textbooks. Students in this placement will work with the course instructor to select appropriate questions and exercises from the chemistry education literature, textbooks, and online resources to prepare tutorial material and quizzes, along with demonstrator notes. Students will learn skills such as literature searching and analysis, and proper design of problem sets and questionnaires. Students will also develop written scientific and communication skills through developing problem sets, quizzes, and TA documents for each tutorial section.

Qualifications: Completion of CHMB42 with a minimum course grade of B+.

Number of Positions: 1-2 students

Additional Application Instructions: Please send updated resume and transcript to sh.dalili@utoronto.ca

Project 2 (Chemistry)

Supervisor: Prof. Shadi Dalili (sdalili@utsc.utoronto.ca)

Title: Developing New Lab Material for CHMB41H

Project Description: Students involved in this project will be expected to develop and modify new laboratory experiments for Introductory Organic Chemistry I (CHMB41H). Students will work with the course instructor to select new experiments from the chemistry education literature, test the experiments, and prepare accompanying lab manual instructions and demonstrator notes. Students will learn skills such as literature searching and analysis, and utilize essential lab techniques such as extraction, distillation, recrystallization, reflux, etc. to develop new labs for the course. Students will also develop written scientific and communication skills through preparing lab manual writeups, quizzes, and TA documents for each experiment developed.

Qualifications: Completion of CHMB42 with a minimum course grade of B+ and lab grade of A; must be available for lab work 2 full days during the week between 9 am-5 pm, ideally Tues, Wed and/or Thurs.

Number of Positions: 1-2 students

Additional Application Instructions: Please send updated resume and transcript to sh.dalili@utoronto.ca

Project 3 (Chemistry)

Supervisor: Prof. Lana Mikhaylichenko (mikhay@utsc.utoronto.ca)

Title: Development of New Laboratory Experiments for C-level Organic Chemistry Courses

Project Description: Students involved in this project will perform literature search for the new laboratory experiments for the Bio-Organic and Organic Chemistry Mechanisms courses. Each experiment will be evaluated on relevance to the course material, price, and level of difficulty. Most promising experiments will be performed in a lab. Students will participate in preparation of the practical part of each experiment as well as prepare sets of potential quiz questions. The working schedule will be built based on the current situation and students' availability.

Qualifications: Completion of either CHMC47 or CHMC41/42 with a minimum grade of B+.

Number of Positions: 1-2 students

Project 4 (Chemistry)

Supervisor: Prof. Lana Mikhaylichenko (mikhay@utsc.utoronto.ca)

Title: Development of New Laboratory Experiments for CHMA12H3 General Chemistry Course

Project Description: Students involved in this project will perform literature search for the new laboratory experiments for the General Chemistry II CHMA12H3 course. Each experiment will be evaluated on relevance to the course material, price, and level of difficulty. Most promising experiments will be performed in a lab. Students will participate in preparation of the practical part of each experiment as well as prepare sets of potential quiz questions. The working schedule will be built based on the current situation and students' availability.

Qualifications: Completion of either CHMA12H3 or at least CHMB41H3 with a minimum grade of B+.

Number of Positions: 1-2 students

Project 5 (Chemistry)

Supervisor: Prof. Effie Sauer (effie.sauer@utoronto.ca)

Title: Development of New Laboratory Experiments for CHMB42

Project Description: Students involved in this project will work closely with the faculty supervisor to research, test and troubleshoot new experiments for use in Organic Chemistry II (CHMB42). New experiments will be evaluated for safety, reliability, and alignment with key course topics. In addition to testing and troubleshooting the experiments, students will participate in the development of accompanying lab materials including lab manual pages, demonstrator notes and quiz questions.

Qualifications: Completion of CHMB42 with a minimum course grade of B+ and minimum lab grade of A. Availability to work in the lab on Wednesdays (~ 10-3) and one of either Tuesday or Thursday afternoon (~ 12-4 pm)

Number of Positions: 2-3 students