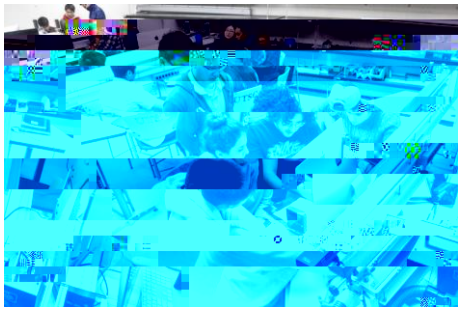

the faculty member and through a reflective journal. Final results will be presented in a written report and a presentation at the end of the term. *Approximately 120 hours of work is expected for the course.*

Permission of the Course Coordinator (Dr. Effie Sauer, effie.sauer@utoronto.ca)
Completion of at least 4.0 credits in a relevant discipline.

Students should connect with a faculty supervisor, then reach out to the course coordinator (Dr. Effie Sauer, effie.sauer@utoronto.ca) to request a Supervised Study Form. After this form is completed and signed, you will be added to the course on ACORN automatically. Typically, students enrolled in a program offered by the Department of Physical and Environmental Sciences and students who have a are granted admission.

1-2 students

Students involved in this project will work closely with the faculty supervisor to

2 students

The students involved in this project will work on developing new experiments for Introduction to Inorganic Chemistry (CHMB31) laboratory. Future experiments will focus on simple acid-base and redox chemistry and simple inorganic synthesis. The tasks involved include developing and designing the experimental procedures, carrying out the actual experimental procedure, organization of results, preparation of material for lab manual and demonstrators, and report sheets. The critical component will also be the direct integration of experiments with the course material, existing CHMB31 lab experiments and videos for online labs. The students will further develop literature research skills, critical analysis of available materials (literature, course, and laboratory), writing skills, scientific reporting, and communication.

Completion of CHMB31 with a minimum course grade of B and lab grade of B+. For further information and to express interest in this project (or other opportunities) please send an e-mail to alen.hadzovic@utoronto.ca.

Lithium: From geosphere to anthroposphere

1 student

In today's technological and information-driven society, lithium batteries play a central role. Found everywhere from cellphones to electric vehicles, they power, what we believe to be, a cleaner future and provide the flow of information. But at what cost? This project is going to collect information and critically analyze the industrial and chemical route from lithium ores to the point of consumption (or as far as we can find the information). The aims are to better understand the impact of lithium production on our environment and society and to discuss the sustainability of the processes involved. The multifaceted approach will look at these questions from geological, industrial, environmental and sustainability points of view. The material will be used as a basis for educational material in sustainability-focused environmental studies and in introductory inorganic chemistry courses. Most of the work can be done remotely. The students will develop literature research skills, critical analysis, organization, and presentation of collected material. The project is particularly suitable for students interested in interdisciplinary research (environmental studies, geology, chemical industry, ŎKŜY˙ƛăúŃѐΣ I·yŘ ă2ŎƛŜűѐú I·yŘ ƛă I·y˙ŜĚűŜyãƛ2y˙2Ŧ ά5ƛăŎ2ØŜŃѐ 2Ŧ [ƛűKƛdzY˙Y ¢ƛY˙Ŝă I·yŘ tfI·ŎŜă¢é

Completion of two or more B-level chemistry courses (preferably CHMB31), with an average grade of B. Asset are courses from EES (geology related in particular) and EST programs. For further information and to express interest in this project (or other opportunities) please send an e-mail to alen.hadzovic@utoronto.ca.

One of the goals of this project is to select several top proposals from prior experiential learning projects that student groups had submitted in previous semesters of the CHMB41H course and transform them into research-based undergraduate labs, not only for the course, but as research projects for our 2nd year (PSCB90Y) and 4th year (CHMD90Y) research students.

Students involved in this project will be responsible for testing out some of the top proposals for projects such as: a) identifying substances to favour the development of traditional tobacco plant microbiome in the soil; b) developing a natural rabbit repellent spray to protect farm crops; and c) preparing natural fertilizers using waste and compost generated on the farm using non-toxic and household products and chemicals, to name only a few.

Students will visit the Campus Farm to collect samples and use them in the lab, employing techniques learned in analytical and organic chemistry courses, to test and develop protocols for the above-

based learning, providing guidance and support during experimentation, and assessing student learning outcomes. Through a systematic approach, this research seeks to enhance student engagement, foster critical thinking skills, and promote a deeper understanding of fundamental concepts in introductory courses.

Hands-on experiments play a pivotal role in introductory chemistry courses, serving as tangible learning experiences that facilitate the comprehension of foundational concepts. However, developing practical experiments requires careful consideration of various factors, including learning objectives, accessibility, safety, and instructional strategies. This research project seeks to address these challenges by exploring innovative approaches to designing and implementing hands-on experiments in introductory courses. The research methodology will involve a multi-stage process, identifying learning objectives for the targeted introductory courses. Brainstorming sessions will be conducted to generate a diverse range of experiment ideas that align with the identified learning objectives. Consideration will be given to accessibility and safety guidelines to ensure that experiments can be conducted safely and inclusively.

Experimental procedures will be meticulously designed, outlining step-by-step instructions and materials required for each experiment. These procedures will undergo rigorous testing and refinement through trial runs to address potential issues or challenges. Inquiry-based learning principles will be