SFU SIMON FRASER UNIVERSITY

51st College Chemistry Canada Conference

Conference Book

The Nature of Chemistry

Table of Contents

SFU respectfully acknowledges that its three campuses reside on the traditional, unceded territories of the Sḵwx̱wú7mesh Úxwumixw (Squamish), səl̓ilw̓ətaʔɬ (Tsleil-Waututh), xʷməθkʷəy̓əm (Musqueam), kʷikʷəƛ̓əm (Kwikwetlem), Kwantlen, qʔíc̓əy̓ (Katzie), Qayqayt, Semiahmoo and Tsawwassen peoples.

Welcome Letter

On behalf of Simon Fraser University and the organizing committee, it is my great pleasure to welcome you to the 51st C_3 Conference—Canada's long-standing gathering of chemistry educators. We are delighted to host you here at SFU's beautiful Burnaby campus, nestled atop Burnaby Mountain with views that remind us of both the beauty and the complexity of the natural world—a fitting backdrop for this year's theme: *The Nature of Chemistry*.

Over the next few days, we'll hear from innovative instructors, and exchange ideas that inspire both our classrooms and our research. Whether you've joined us from across town, across the country, or across the border, we're excited for the perspectives you bring and the connections you'll make.

We would like to extend our sincere appreciation to our generous sponsors for their valuable support: the Department of Chemistry at Simon Fraser University, Vernier, MacMillan Publishing, Nanalysis, Powertech Labs, the Vancouver Local Section of the Chemical Institute of Canada, and the Chemistry Education Division of the Chemical Institute of Canada. We also gratefully acknowledge the organizations that contributed to our conference bags and door prizes.

Here's to a memorable and meaningful 51st C_3 Conference!

Welcome and let the conversations begin.

John P. Canal
Chair C_3 Organizing Committee

C_3 2025 Organizing Committee: Carla Pretorius (co-Chair, SFU), Garry Mund (SFU), Patty Somers (SFU), Rebecca Goyan (SFU) and Jimmy Lowe (BCIT)

President's Address

Welcome to the 51st annual College Chemistry Canada at Simon Fraser University in beautiful British Columbia. This year marks my last year as president of C_3 (I realize I stated this last year, but stuff happens). This journey has been amazing. I am honoured to have been a part of the C_3 executive and membership at large.

This year the conference theme is "*The Nature of Chemistry"*. The organizing committee has an amazing conference lined up for us. I am confident you will find many insightful teaching tidbits, invaluable resources and connect with new, and not so new, like-minded chemistry collaborators.

I hope you have time to join in the many interesting and refreshing activities that have been scheduled outside of the formal conference programming to further grow the strong bonds holding the C_3 community together.

I look forward to seeing you!

On behalf of the C_3 Executive Members and Directors, thank you for being here. I hope you have an inspiring experience with the C_3 community.

Enjoy,

Paula Rooksby, President – C_3

About the Host Institution

Simon Fraser University (SFU), is a leading Canadian public research university committed to excellence, innovation, excellence in teaching and community engagement. With campuses in Burnaby, Vancouver, and Surrey, our university has over 37,000 students and a vibrant community of scholars who strive to make meaningful contributions to society through research, education, and outreach. Founded in 1965, SFU has earned a reputation as one of Canada's top comprehensive universities with a strong interdisciplinary approach and emphasis on real-world applications in its research and teaching.

SFU is also deeply connected to the enduring legacy of one of Canada's most inspiring figures—**Terry Fox**, a former SFU student and varsity athlete. Diagnosed with cancer in 1977, Terry began the Marathon of Hope in 1980 to raise awareness and funds for cancer research. Although the remarkable journey came to an end after 143 days and 5,373 kilometers, his determination and courage captured the hearts of people around the world. Terry's spirit lives on at SFU, where a statue stands in his honour and an annual Terry Fox Run continues to unite the university community in support of cancer research. His legacy serves as a reminder that perseverance, hope, and the drive to create a lasting impact are values we should all aspire to foster.

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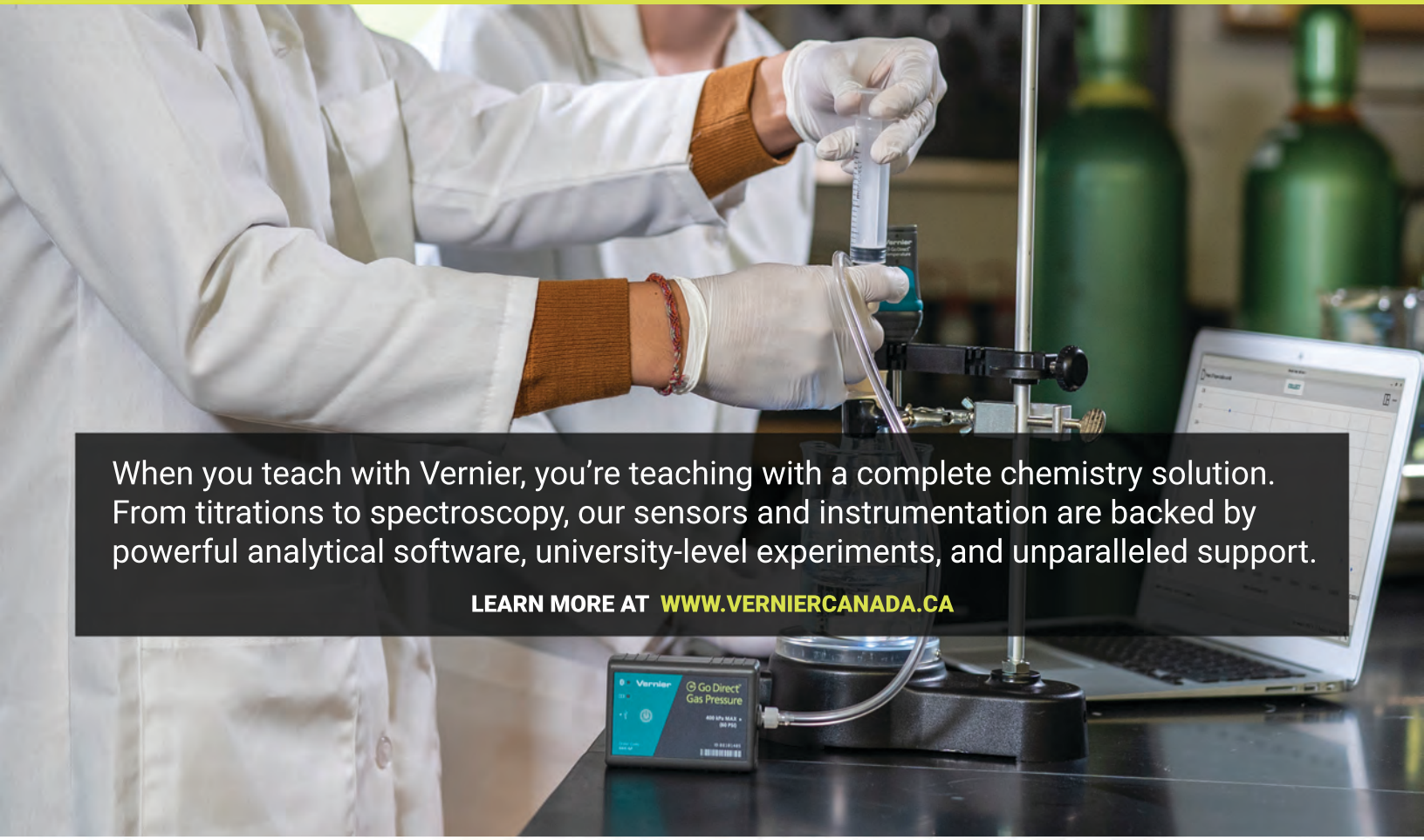

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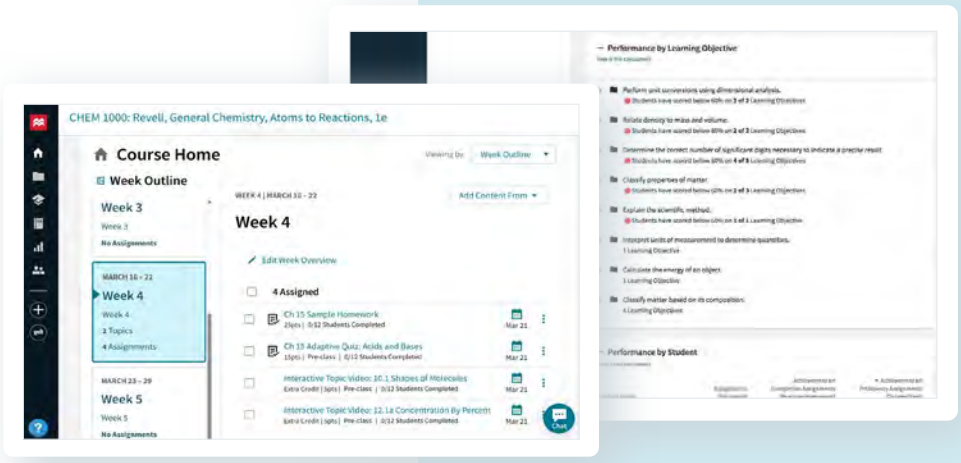

ACHIEVE INCLUDES

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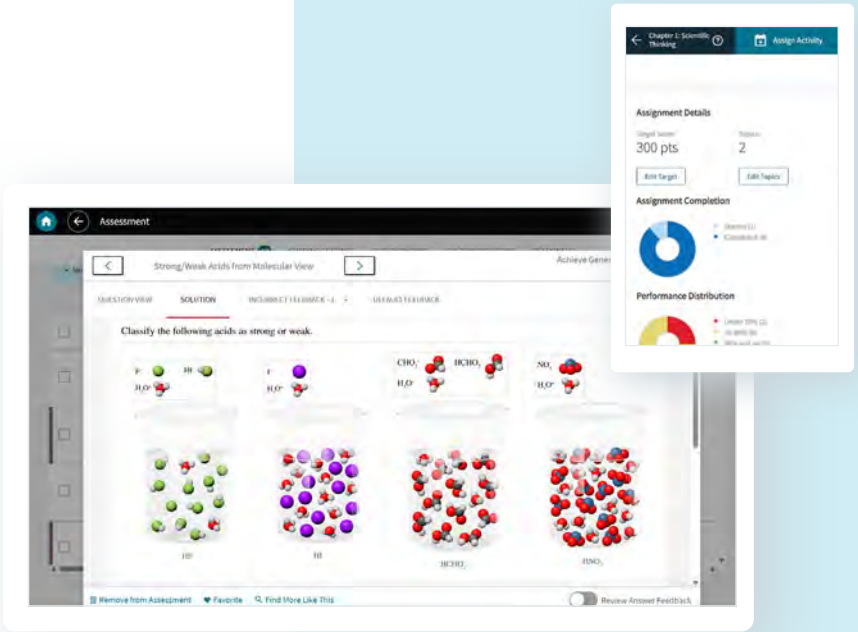

Apr. 2025

Vancouver Section

The Chemical Institute of Canada (CIC) Vancouver Local Section wishes all participants an enriching experience at the
51st College Chemistry Canada Conference
51e Congrès de Chimie collégiale au Canada.

- Get involved by becoming a member of the CIC and check out the benefits. Including the Chemical Education and Green Divisions
- Please remind your students of complimentary membership for **Undergrad.-Dipl.-Cert. Student -** Full-time Undergraduate, Diploma or Certificate student at a Canadian institution. Scan QR code below.

Questions? Please contact Dr. Jimmy Lowe (BCIT) @ jimmy_lowe@bcit.ca or Dr. John Canal (SFU) @jcanal@sfu.ca

Conference Program

Friday, 23 May 2025

Time	Event
11:00	Burnaby Village Museum Excursion
19:00	Social Mixer – Biercraft (SFU Burnaby Campus)
22:00	Starry Nights – SFU Trottier Observatory (SFU Burnaby Campus)

Saturday, 24 May 2025

Time	Event (SFU Diamond Alumni Centre)
08:30	Registration
09:00	Welcome
09:30	Plenary - S. Donnelly, “Fungi-Infected Zombies, Drunk Lemurs, Locust Plagues, and Other Unusual Topics to Show Chemistry's Relevancy”
10:30	**Coffee**
11:00	**Session 1**
11:00-11:20	K. Quinlan, "Textbook Tweaks and Off-Cycle Challenges: Rethinking Resources and Support in First-Year Chemistry"
11:20-11:40	G. Rayner-Canham, "A Journey from the Maggie Benston Centre SFU via Australia and the Torres Islands to the Inuit Nunangat"
11:40-12:00	L. Shaw, "Adapting to AI (Part 2): AI-Proofing an Online/Distance Delivered General Chemistry Course"
12:00-12:20	J. Canal, "Introducing Green Chemistry into Inorganic Laboratory Courses: Approaches and Impact"
12:20-12:40	Poster presenters (2 min talks)
12:40	**Lunch and Poster Session**
13:30	**Session 2**
13:30-13:50	Vernier Presentation
13:50-14:10	C. Doige, "OpenOChem - An online platform for direct assessment of students' use of symbols and representations unique to the Nature of Chemistry"
14:10-14:30	C. Lucy, "How Instructors Can Improve Textbooks"
14:30-14:50	M. Jensen, "Using Chatbots to Create JavaScript Simulations for Analytical Chemistry"
14:50-14:55	V. Monga, "Incorporating AI feedback in laboratory assessments"
14:55-15:00	K. Erickson, "Using Narrative Inquiry to Explore Professional Identities"
15:00-15:05	E. Trofimenkoff, "Shouting into the void . . . or the erlenmeyer flask"
15:05-15:10	E. Dul & M. Kaban, "Movement Breaks in the Chemistry Classroom"
15:10-15:15	Movement Break 1

15:15	**Coffee**
15:45	**Session 3**
15:45-16:05	B. Gates, "Reenvisioning the Analytical Chemistry Laboratory"
16:05-16:25	X. Li, " Strategic approaches to enhance students' metacognitive engagement in 1st year chemistry courses at UBC Okanagan"
16:25-16:45	S. McNeil, "Interior Salish Pit Cooking Practices as a Contextual Framework in Introductory Chemistry"
16:45-16:50	J. Godbout, "How did the plate get its spots?"
16:50-16:55	O. Gulacar, "Enhancing Pre-Service Science Teachers' Awareness of Green Chemistry and Sustainability Through Targeted Interventions"
16:55-17:00	S. Donnelly, "GC-MS and C-13 NMR: Why wait until organic chemistry to teach it?"
17:00-17:05	M. Sheppard, "A Finland Faculty Exchange: Experiences in Culture and Education"
17:05-17:10	J. Allingham, "Implementing the Community of Inquiry Framework in a Student-Driven Capstone Course"
17:10-17:15	J. Allingham, "Implementing Specifications Grading and a Token-Based System in a Third-Year Organic Chemistry Laboratory"
17:15-17:20	Movement Break 2
17:20	**End of Day**
19:00	**Banquet**

Sunday, 25 May 2025

Time	Event (SFU Diamond Alumni Centre)
07:00	Exploring the Nature of Chemistry Outdoors (optional hike/ walk)
09:00	Registration
09:30	Plenary - V. Williams, "Learners in a Dangerous Time"
10:30	**Coffee**
11:00-12:00	AGM + Group photo
12:00	**Session 4**
12:00-12:20	MacMillan Presentation
12:20-12:40	C. Knapp, "Molecular Modelling: Increasing Student Exposure to the Molecular World"
12:40-13:00	S. Donnelly, "Classroom Exercises for General and Organic Chemistry Involving Wildlife Forensics and Food Fraud"
13:00-13:05	Movement Break 3
13:05	**Lunch and Poster Session**
14:00	**Session 5**
14:00-14:20	R. Stoodley, "Building student engagement and learning with a student-customized lab manual"
14:20-14:40	J. Wickenden, "Two-Stage Exams in a Large Organic Chemistry Course"

14:40-15:00	A. Dicks, "Promoting Undergraduate Research Opportunities at the University of Toronto"
15:00-15:20	U. Kreis, "Fast, Focused, and Full of Surprises: Teaching Organic Chemistry in a Six-Week Sprint"
15:20-15:25	J. Rodriguez Nunez, "Reimagining First-Year Chemistry: Lessons learned from developing and implementing an enriched introductory chemistry class"
15:25-15:30	C. Alexander, "Real-World Applications in First-Year Chemistry: Investigating Drug Release with Sol-Gel Chemistry"
15:30-15:35	P. Scott, "Introducing Coordination Chemistry in a First-Year Enriched Laboratory"
15:35-15:40	Movement Break 4
15:40	**Coffee**
16:10	**Session 6**
16:10-16:30	N. Merbouh, "The unexpected benefits of incorporating the E-factor in the design of new undergraduate laboratory experiments."
16:30-16:50	J. Allingham, "From Students to Scientists: Exploring Role Models in First-Year Chemistry"
16:50-16:55	K. Rossiter, "Development of an Interactive Activity to Alleviate Student Stress in First-year Chemistry Laboratories."
16:55-17:00	R. Hirowatari, "A Natural Product Lab for Training Research Skills"
17:00-17:05	J. Ochola, "Advancing Scientific Literacy through Student-Centered Organic Chemistry Projects"
17:05-17:20	**Closing**
17:20	**End of Day**

Plenary Speaker | Scott Donnelly

Arizona Western College

Saturday, 24 May

Biography

With entropic fervor, for three decades Scott has taught general and organic chemistry at Arizona Western College and sometimes a fun class called How to Survive the Coming Zombie Apocalypse. About a decade ago he experienced an epiphany that expanded his teaching portfolio with the inclusion of higher engagement instructional strategies. Prof. Donnelly has served his college in a variety of faculty and administrative positions, including as the Director of the Centre for Teaching Excellence and as the Director of Open Educational Resources. He is the former two-year college editor and contributor to the online platform ChemEd Xchange and has twice served as the chair of 2YC3 (Two-Year College Chemistry Consortium).

Fungi-Infected Zombies, Drunk Lemurs, Locust Plagues, and Other Unusual Topics to Show Chemistry's Relevancy

Most students (and, for the most part, the general population) do not lack interest in science, including chemistry, as a way of knowing about the physical world. Rather, they lack interest in chemistry courses that overwhelmingly emphasize memorization of facts (which are soon forgotten), way-out-there abstract theoretical concepts (atomic orbitals), and seemingly endless mathematical exercises converting grams to moles (vice versa), balancing equations, and the list goes on. This teaching/learning approach gives a miserably low percent yield on return- highly impressionable first-semester (year) students taking first semester general chemistry find it a bore, question its relevancy, and end up contributing their intellectual talents and brain power to some other discipline. This presenter-audience interactive presentation will describe some active learning-based classroom/lecture activities that illustrate chemistry's connection to relevant, real-world phenomena and problems. Be ready to exchange in real-time ideas with your friends and colleagues in attendance.

Plenary Speaker | Vance Williams

Simon Fraser University

Sunday, 25 May

Biography

Vance is a professor of chemistry at Simon Fraser University (SFU), where he has distinguished himself as an innovative educator and a strong advocate for inclusive and engaging science education. With several decades of teaching experience, Vance is known for converting the classroom into an environment where curiosity prospers with students empowered to think critically and creatively.

He also serves in the role of Associate Dean (Graduate Studies) and spearheads interdisciplinary teaching initiatives that bridge chemistry with the broader sciences and the humanities at SFU. He has a profound passion for science communication and public outreach, regularly presenting to and interacting with non-specialist audiences.

Learners in a Dangerous Time

My "Industrial Chemistry" course was always intended as an exploration of the place of chemistry in modern society. In early 2025, the same geopolitical tensions that accentuated national borders simultaneously caused the boundaries between my class and world affairs to become increasingly blurred. In this presentation, I will discuss how a curriculum that is responsive to current events can provide meaningful learning opportunities.

SESSION 1 – Saturday, 24 May (11:00 – 12:40)

Oral Presentation (11:00 – 11:20) | Kris Quinlan

University of Toronto

Textbook Tweaks and Off-Cycle Challenges: Rethinking Resources and Support in First-Year Chemistry

This presentation explores two evolving aspects of a first-year general chemistry course: the development of a customizable online textbook and the unique instructional challenges of an off-cycle course offering. In the first part of the talk, I will outline my motivations for developing an open, adaptable textbook better aligned with our curriculum. I'll present results from a baseline student survey on our current, commercially available textbook, which may reflect broader student attitudes toward traditional resources. I will also share features I hope to incorporate into the new textbook and highlight the potential of OERs as living, flexible resources that can adapt over time. The second part of the talk will focus on our off-cycle general chemistry course, offered each Winter to accommodate students who do not complete the Fall course. Since reorganizing our first-year chemistry sequence several years ago (making general chemistry a prerequisite for organic chemistry) this off-cycle course has become disproportionately populated by students who are repeating or recovering from previous challenges. I will share strategies we have implemented to support and engage this cohort with limited success. I hope to start a discussion around approaches others have found effective in supporting similar groups of students.

Oral Presentation (11:20 – 11:40) | Geoff Rayner-Canham

Memorial University (Grenfell Campus)

A Journey from the Maggie Benston Centre SFU via Australia and the Torres Islands to the Inuit Nunangat

A definition of chemistry: "Chemistry is what happens in Chemistry Labs". Another definition of chemistry: "Chemistry is what chemists do". Maggie Benston was a pioneer in believing that "Chemistry is for All". A question: to "do chemistry", do you have to know about "atoms and moles", or is it that you "perform changes to a substance in a specific manner for a defined purpose"?

In this presentation, I will provide a brief biographical account of pioneer SFU feminist-chemist Margaret Lowe Benston (1937-1991), then comment upon the use of chemistry by indigenous peoples around the world, with specific examples from Australian Indigenous peoples and Torres Straits islanders. Finally, I shall provide a brief introduction on the importance of chemistry for Inuit, a prelude to presentations at the 2026 C3 Conference, Iqaluit, Nunavut.

Oral Presentation (11:40 – 12:00) | Lawton Shaw

Athabasca University

Adapting to AI (Part 2): AI-Proofing an Online/Distance Delivered General Chemistry Course

This presentation is a follow-up to the 2023 C_3 Conference presentation in which I outlined some of the challenges and opportunities of artificial intelligence in chemistry education. Recently, there has been a complete overhaul of online/distance delivered general chemistry courses at Athabasca University, with changes intended to reduce the negative impacts of AI. Assessments have been redesigned in such a way that academic misconduct using AI is virtually irrelevant: Written assignments have been replaced with oral quizzes and algorithmic chemistry problems, delivered in Mastering Chemistry. These changes are expected to improve educational outcomes by building-in immediate feedback on assessments and increasing personal contact with instructors, which is a constant challenge in online/distance education.

Oral Presentation (12:00 – 12:20) | John Canal, Garry Mund & Carla Pretorius

Simon Fraser University

Introducing Green Chemistry into Inorganic Laboratory Courses: Approaches and Impact

This presentation outlines strategies for integrating green chemistry into undergraduate inorganic laboratory courses, including modifying traditional experiments and designing new ones aligned with the Twelve Principles of Green Chemistry. We will share how changes such as the use of safer reagents, reduced waste, and energy-efficient methods can be implemented in course design. By also examining the impact on student learning, engagement, and sustainability awareness, we offer adaptable models for educators aiming to modernize their curricula with greener practices.

Poster Presentation | Lawton Shaw & Carmen Allen

Athabasca University

A High-School Chemistry Outreach Program in a Rural Community

Colleges and universities located in small population centres can have a unique impact on local secondary education, as smaller high schools may not be well-equipped to handle laboratory experiments which are meant to be part of science curricula. Athabasca University (AU) has a well-designed teaching laboratory custom-built for visiting students who travel to Athabasca to complete biology, microbiology, and chemistry labs over 2-5 continuous days. There are blocks of time in the year where the teaching lab is available to host K-12 students. Over the last year, AU science faculty and staff have worked with local high school teachers to arrange class visits to the teaching lab, where students can complete a chemistry experiment in one class period. Every high school class that has a chemistry component (Science 10, Chemistry 20, Chemistry 30) has visited the AU lab once per semester. Experiment topics include qualitative chemical reactions, acid-base titrations, gas laws, and electrochemistry.

Poster Presentation | Andrew Dicks

Toronto University

The Green Chemistry Commitment

For more than two decades individual faculty from various colleges and universities have brought green chemistry, emphasizing materials and methods that are inherently safer for human health and the environment, to their students and research programs. As global calls for sustainability in the chemical enterprise ramp upward, the need to more widely integrate green chemistry into the background of all our students becomes imperative, preparing students to be competitive in the workplace and to solve important problems that they will encounter.

The Green Chemistry Commitment (GCC) is a consortium project that seeks to encourage colleges and universities to commit to changing the education of tomorrow's chemists. Currently over 210 colleges and universities are participating: from research-intensive universities to primarily undergraduate institutions to community colleges, nationally and internationally. They include the University of Toronto (who were the first Canadian (and non-US) institution to sign the Commitment in 2016) and 14 others in Canada. The flexible framework allows all to participate in ways that best fit the local needs of the institution: the program is distinctive but not exclusive. This poster presents how to adapt the GCC framework to a wide range of colleges and universities, with the goal of encouraging broadened participation.

Poster Presentation | Chris Addison

The University of British Columbia (Vancouver)

Training Future Chemists on the Responsible Use of Generative AI in a Writing-intensive Chemistry Course

Like many, we have been grappling with the role of Generative AI (GenAI) in our teaching context – a chemistry-specific writing and communication course. Required for third-year chemistry and chemical biology students at The University of British Columbia, this course provides training to students in writing to both expert and novice audiences, effectively searching and citing the chemical literature, presenting data in visual and oral forms, and accessible communication practices.

We implemented a multi-week module on the responsible use of GenAI tools in our course. This module includes training on how these tools work, prompt engineering and text transformation, and the ethical use of GenAI. Additionally, we had students complete a writing assignment solely using GenAI and submit a reflection on their experience.

Several lines of evidence were obtained, including an analysis of pre- and post-training activity student surveys, thematic analysis of submitted post-activity reflections, and post-training activity focus groups. Key findings of our study into student perceptions and experiences with GenAI will be presented.

Poster Presentation | Kaitlyn Towle

MacEwan University

Integrating Structure-Activity Relationship Studies into a Course-Based Undergraduate Research Experience (CURE) in Peptide Chemistry

Course-Based Undergraduate Research Experiences (CUREs) provide students with meaningful opportunities in research while strengthening their skills in scientific literacy, critical thinking and interdisciplinary problem-solving. At MacEwan University, a CURE course was designed using a Structure-Activity Relationship (SAR) research framework to investigate novel antimicrobial peptides. Applying the CURE course model to peptide chemistry, students experience the interconnectedness of many chemistry subdisciplines, requiring them to integrate organic synthesis, analytical chemistry, biochemistry and physical chemistry to achieve their overall research goals. This presentation will describe the full lifecycle of developing a CURE course, from defining student learning outcomes to aligning those outcomes with research goals and implementing inquiry-driven laboratory experiences. Through the implementation of the CURE course model, the Physical Sciences Department has expanded undergraduate research opportunities while bridging the gap between traditional laboratory instruction and research-driven learning.

Poster Presentation | Uwe Kreis

Simon Fraser University

Reactions and Reflections: Using AI to Enhance Student Learning in OChem Labs

As generative AI tools like ChatGPT become more accessible, their role in science education—especially in organic chemistry—raises both opportunities and challenges. In a second-year organic chemistry lab course, I incorporated ChatGPT-based prompts into team assignments and surveyed 112 student teams on their experiences. While most teams rated ChatGPT as "adequate" for organic chemistry tasks and saw it primarily as a "starting point," a surprising 54% reported using it to "check their understanding"—a practice that, without proper verification, risks reinforcing misconceptions. Interestingly, only 13% selected "learning" as a use, despite AI interactions often prompting deeper engagement. This disconnect highlights the need for guided integration of AI into science education. I discuss a potential instructional approach—AI fact-checking exercises—to help students critically assess AI-generated content and transform it into a meaningful tool for conceptual learning. The results suggest that with proper framing, generative AI can support—not replace—student learning in complex chemistry contexts.

Poster Presentation | Rebecca Goyan & John P. Canal

Simon Fraser University

Natural Polymers - The Boba Lab

It can be challenging to create a laboratory experience for Introductory Chemistry that is fun, a little challenging, uses non-toxic chemicals, and is relevant to the non-chemist. Using alginate, an extract of brown seaweed, students create alginate beads and analyze their mass, dimensions, and density. Over the following weeks, the students observe the dehydration of their beads to determine the % composition of water, conduct a statistical analysis of a class set of data, and learn how to interpret their results in light of error analysis. Dubbed "The Boba Lab" by students, this lab is rapidly becoming a favourite of the Introductory Chemistry students.

Poster Presentation | Tina Bott

Macewan University

Oral Exams - A Dynamic Assessment Strategy of Structure Elucidation Skills in Organic Chemistry

Oral exams in higher education offer a unique method for assessing student learning, particularly in complex subjects like spectroscopic data analysis. Oral exams allow educators to engage directly with students, gaining a better understanding of how a student approaches problem solving by asking specific prompts that can uncover their understanding and thought processes. This interactive format enables educators to identify and address small roadblocks that may lead to incorrect or incomplete data interpretation, allowing for a more well-rounded assessment of student understanding of the topic. Additionally, oral exams foster critical thinking and communication skills, as students must articulate their reasoning and defend their conclusions. This style of assessment is well-suited to organic structure elucidation, where students are required to interpret IR, NMR, and MS data to construct a picture of an organic molecule and provide evidence to support their characterization. Herein, I will discuss my experience incorporating oral exams as a dynamic assessment method in my applied organic spectroscopy course at MacEwan University in Fall 2024.

Poster Presentation | Dagny Lin

University of British Columbia (Vancouver)

Expanding Worldviews in Chemistry Education Through the Lens of a Policy Brief

Indigenization in curriculum is an important step in creating dialogue and raising awareness of Indigenous knowledge systems. In the UBC Chemistry Department, educators are working to shift current curriculum from a Western-centered perspective into one that acknowledges and incorporates Indigenous epistemologies. This study focuses on the development and rollout of a pilot assignment, which aimed for students to draw upon scientific communication skills while engaging with Indigenous worldviews. The pilot consisted of two key modules: a policy brief assignment paired with a reflection-based learning experience with the Ktunaxa Nations. Pilot success was evaluated using a post-presentation survey, post-assignment survey, and focus groups. The results of the post-presentation survey demonstrate an overall student understanding of how to write an effective policy brief, with constructive feedback to improve teaching material for future iterations. Emergent themes from policy brief drafts point towards understanding the importance of including Indigenous perspectives, while analysis for the post-assignment survey and focus groups is forthcoming. The findings of this study demonstrate how

Indigenization can be done within UBC Chemistry curriculum, and the importance of this work in the broader education system.

Poster Presentation | Jessica Pham

University of British Columbia (Vancouver)

Weaving Indigenous Ways of Knowing and Western Science in a Communicating Chemistry Course: Assignment Development

Indigenous ways of knowing have historically and presently been excluded from chemistry curricula at post-secondary institutions. This paper outlines the development of a chemical education assignment aimed at weaving Indigenous ways of knowing alongside Western science for a third year communicating chemistry course at UBC. Specifically, this paper details the creation of a learning module with learning objectives that capture the spiritual domain of learning, and a student evaluation survey. By considering Indigenous ways of knowing in chemistry, this assignment aims to encourage students, as future chemists and decision-makers, to critically reflect on the dominant and hidden epistemologies present in Western academia. This approach will help to create resilient chemists who have the skills to interact with global challenges in their future careers while also holding reverence for diverse perspectives and a deep appreciation for the woven relationships between science, community, and the environment.

SESSION 2 – Saturday, 24 May (13:30 – 15:15)

Oral Presentation (13:50 – 14:10) | Carl Doige

Okanagan College

OpenOChem - An online platform for direct assessment of students' use of symbols and representations unique to the Nature of Chemistry

In the past two decades, online homework and quizzing platforms have become commonly used in undergraduate science courses for the purpose of both formative and summative assessment. These are available as part of commercial e-assessment tools made available from textbook publishers or part of the quizzing features of Learning Management Systems (LMS's). Typically, the question-types in these platforms have been limited to questions involving multiple choice, fill in the blank, short answer, and algorithmic-based numerical answers.

Given the unique Nature of Chemistry, an important component of understanding and communicating about this discipline is the accurate use of symbols and representations. These include chemical formulae, balanced chemical equations, Lewis dot structures including resonance forms and formal charges, three-dimensional representations of complex organic structures with the associated conformers and stereoisomerisms, and of course curved arrow notation. Direct assessment of students' ability to generate and use such key representations has, until recently, largely been unavailable to e-assessment platforms. This has been especially true for instructor-designed questions within the quizzing features of LMS's.

In this presentation, I (Carl Doige) describe the features of the openOchem platform created by Carl LeBlond (Indiana University of Pennsylvania). This platform allows instructors to easily create and adapt questions which assess the students' use of the aforementioned key chemistry representations and produce homework and quizzes which can then be integrated into the institution's LMS. I also describe my own contribution in writing many questions for general and organic chemistry (over 3000 questions) and my attempt to design scaffolded and multistep question-types with the goal to better simulate the more open-ended tasks found in typical pen-paper quizzes and tests.

Oral Presentation (14:10 – 14:30) | Charles Lucy

University of Alberta

How Instructors Can Improve Textbooks

Whew. After five years, I recently finished revisions on the 11th edition of Harris and Lucy's Quantitative Chemical Analysis textbook (shameless plug). When you get your review copy (recommended) have a look at the Acknowledgements. Over 100 people from around the world are thanked. Some are researchers who helped us understand the papers we cite, or who provided us data for end-of-chapter problems. Others are with instrument manufacturers who shared insights into the inner workings of the equipment. But the majority are instructors who helped us improve the textbook in myriad ways.

This presentation focuses on how you, as an instructor, can help improve commercial and open access textbooks in any field. Specific examples from QCA will illustrate how instructors and students have made a difference.

Oral Presentation (14:30 – 14:50) | Mark Jensen

Concordia College

Using Chatbots to Create JavaScript Simulations for Analytical Chemistry

Chatbots such as ChatGPT, Gemini, and Claude have allowed those with little experience in a particular programming language to write functional code across many applications. Over the course of several years I have used LabVIEW to generate a series of simulations used for teaching analytical chemistry. These simulations involve topics such as titration curves, voltammetry, and signal-to-noise enhancement. However, distribution of these simulations to a wider audience has always proved challenging. In the summer of 2024, I began experimenting with the use of ChatGPT (and later Claude) to write simple JavaScript code, a language with which I had no prior experience. Very soon I had recreated all of the LabVIEW simulations as JavaScript applications that can be run directly from a web browser. In this presentation I will outline the process for generating and sharing the JavaScript code, and show the simulations I have created that are freely and readily available to anyone.

Furious Five Presentation (14:50 – 14:55) | Vishakha Monga

University of British Columbia (Vancouver)

Incorporating AI feedback in laboratory assessments

At UBC_V, first year Chemistry labs for engineering students is offered as a virtual, online laboratory experience for ~900 students. This year, we have made changes to student assessments and incorporated advanced technological tools including AI feedback. The focus of this talk will be to discuss the advantages and disadvantages of involving AI feedback in improving students' critical-thinking skills through these assessments.

Furious Five Presentation (14:55 – 15:00) | Kristy Erickson

Red Deer Polytechnic

Using Narrative Inquiry to Explore Professional Identities

This presentation highlights the results of the author's inquiry-based analysis into her post-secondary experiences as a BSc, MSc, and PhD student in chemistry, and her time as a post-secondary instructor. To conduct this analysis, the author used narrative inquiry as a methodological tool to qualitatively analyze self-reflective journal entries she had written to explore the following: 1) how she had been meeting her personal expectations and the expectations placed on her, and 2) how her professional identities as an instructor, experimental chemistry researcher, and chemical education researcher had evolved over time. From the analysis, the author ascertained the full educative power of her experiences by discovering how views of herself within academia had been shaped by the approaches she had used to learn, the levels of ownership she had taken on her work, and how she had been responding to her experiences.

Furious Five Presentation (15:00 – 15:05) | Elizabeth Trofimenkoff

University of Lethbridge

Shouting into the void . . . or the erlenmeyer flask

There are many approaches to teaching chemistry, from didactic methods to flipped classrooms, and everything in between. But there are other tools we can use to enhance the students' experience, and supplement their learning. John Eng and Elizabeth Trofimenkoff from the University of Lethbridge will be sharing some of their approaches and tools, as well as facilitate a conversation around finding creative ways to support students and level up your teaching.

Furious Five Presentation (15:05 – 15:10) | Erin Dul & Melanie Kaban

Northern Alberta Institute of Technology

Movement Breaks in the Chemistry Classroom

Movement breaks are pauses during classes or lectures where learners are physically active. Movement breaks promote good physical and mental health and may also improve academic performance. Some learners find brain breaks enjoyable. We will present movement breaks that are related to chemistry topics, including VSEPR theory, organic reactions, thermodynamics, and glassware. These movement breaks can be used to provide a break as well as reinforce lecture topics.

SESSION 3 – Saturday, 24 May (15:45 – 17:25)

Oral Presentation (15:45 – 16:05) | Byron Gates

Simon Fraser University

Reenvisioning the Analytical Chemistry Laboratory

On the surface, the undergraduate laboratory is where students learn to apply the theory they learn from lectures, tutorials, and their readings. The student's experience in the laboratory is also a critical time in their career. It is a place where they can realize their passion for Chemistry but also a place where they can experience frustration and doubt. It is critical to formulate laboratory methods that foster a positive learning environment. Ideally, this would be a place where students can also gain confidence in applying the theory to practice in the laboratory, gain laboratory skills, and overcome their fears (e.g., using new equipment, making a mistake, handling chemicals). It is desirable to provide students with a laboratory experience that enables them to perform experiments independently and develop their skills and confidence.

In the analytical chemistry laboratory, where the experiments emphasize the hands-on use of equipment and methods that enable trace chemical analysis, the practical costs can hinder implementing an individual laboratory experience. This presentation will introduce a new envisioned approach to teaching analytical chemistry that provides students with each of these ideals with hands-on, personal experience using instrumental techniques to implement a series of analytical methods. A rethinking of the approach to how the students engage with this experience and the role of the instructor can enable a rewarding laboratory experience. Students can be empowered in an environment focused on learning by making their own decisions, taking time to review and reflect on results, adjusting their methods and correcting their errors. In addition, an appropriate design of the experiments, including avoiding overly complex instrumental techniques, enables instructors to provide just-in-time assistance and a more personalized experience for each student. This re-envisioned laboratory experience can also provide additional benefits that will also be highlighted, such as reduced waste production, training on the importance of error analyses, and an introduction to a variety of statistical methods of data analysis.

Oral Presentation (16:05 – 16:25) | **Xia Li**

University of British Columbia (Okanagan)

Strategic approaches to enhance students' metacognitive engagement in 1st year chemistry courses at UBC Okanagan

Many first-year students entering universities tend to lack learning strategies, self-regulation, and self-awareness. These essential skills, often referred to as metacognition, have been shown to improve academic performance and self-confidence[1],[2]. Despite efforts to engage students with learning materials through active learning and student-centered classroom designs, it is important to acknowledge that many first-year chemistry students struggle—not due to a lack of ability or interest, but because they are unaware of effective study strategies and resilience-building techniques.

This invisible gap is particularly pronounced among first-generation college students and marginalized students, further exacerbating existing inequalities in higher education. To address this issue, we have been incorporating self-guided metacognition training modules into our general chemistry courses over the past few years. However, these modules, which are worth 2% of the students' final grade, have generally received neutral responses.

Upon reflection, we believe that teaching metacognition needs to be explicit and fully integrated into the curriculum. When presented as an isolated task outside of lecture time, metacognition training can feel like just another item on students' to-do lists, increasing their cognitive load instead of alleviating it. In contrast, embedding these skills as part of a shared classroom experience may help students internalize and apply them more effectively.

To this end, I designed a six-part series to train first-year students in cognitive skills. These activities are aligned with the timeline of our first-year course, integrated into the learning objectives, and allocated classroom time to ensure they are a central part of the curriculum. This presentation will discuss the structure and delivery of the modules, as well as their impact on undergraduate students' learning experiences. Additionally, it will highlight the outcomes of three student feedback surveys conducted during the project.

References

1. Larmar, S.; Lodge, J. M. Making Sense of How I Learn: Metacognitive Capital and the First Year University Student. Int. J. First Year High. Educ. 2014, 5 (1), 93–105. https://doi.org/10.5204/intjfyhe.v5i1.193.

2. A Fundamental Gap - A Surprising Number of Students Don't Know How to Study Effectively | Education World. https://www.educationworld.com/teachers/fundamental-gap-surprising-number-students-don%E2%80%99t-know-how-study-effectively (accessed 2023-06-16).

Oral Presentation (16:25 – 16:45) | **Stephen S. McNeil**

University of British Columbia (Okanagan)

Interior Salish Pit Cooking Practices as a Contextual Framework in Introductory Chemistry

As part of a revision of introductory chemistry at UBC's Okanagan campus, we have developed a series of context study activities that demonstrate the applicability of course concepts to societal, environmental, and biomedical issues. These activities reinforce those concepts and increase student appreciation for the roles of chemistry in their lives and society.

One context study draws meaningful connections from course concepts to local Indigenous knowledge, based on the sophisticated and complex process by which the taproot of arrowleaf balsamroot (Balsamorhiza sagittata) is heated in elaborate cooking pits, as traditionally practiced by the Syilx and Secwépemc peoples of the British Columbia Interior Plateau. This pit cooking process chemically transforms the indigestible complex carbohydrate inulin – a fructose polymer – into a high-energy food source. The necessity for each step in the complex pit-cooking process can be understood in terms of principles of chemical kinetics, thermodynamics, acid-base chemistry, and substitution reactions in organic compounds, concepts that correspond precisely to the curriculum of the second term of our introductory chemistry sequence, and which are explored during class after the completion of each course topic.

Rationales for this learning activity include both furthering the goals and actions of UBC's Indigenous Strategic Plan and to better support our own affective learning objectives for the course. We hope to increase interest in science and create opportunities for identity for Indigenous students, and to develop in all students an improved understanding of and appreciation for local Indigenous cultural practices. Student responses to a post-course survey demonstrate successful achievement of these goals.

Furious Five Presentation (16:45 – 16:50) | Jerry Godbout

University of New Mexico (Valencia)

How did the plate get its spots?

The value of an original research component in an undergraduate chemistry, or any other curricula, has long been established. Students often find this to be the most enjoyable and rewarding part of their curriculum. While an original research component is common at the four-year college level, it is much less so at two-year institutions. The reason most often cited for this disparity is that the students lack the appropriate skill set until their third or fourth year. This is unfortunate, as it may be the only chance to expose students to the creative way in which science is actually done. At UNM-Valencia, we have made a conscious effort to involve our first- and second-year students in original research projects during their time on our campus. These efforts have included traditional mentoring of students by individual faculty, as well as course-based undergraduate research experiences (CURE). This talk will discuss the progress to date of this endeavor, as well as the ongoing efforts of the author's students to bridge the gap between Arts and STEM to form STEAM by trying to understand how plates with crystalline glazes get their spots.

Furious Five Presentation (16:50 – 16:55) | Ozcan Gulacar

The University of California (Davis)

Enhancing Pre-Service Science Teachers' Awareness of Green Chemistry and Sustainability Through Targeted Interventions

This study investigates the awareness of green chemistry, sustainability, and environmental education among pre-service science teachers in Israel. Twenty-nine prospective chemistry and biology teachers participated in an intervention exploring the chemistry and applications of plastics and bioplastics. To assess its impact, participants completed a 34-item questionnaire before and after the intervention. Results revealed a significant increase in sustainability and green chemistry awareness, with paired-sample t-tests confirming substantial improvements in both areas, as well as in attitudes toward environmental education. While initial attitudes toward environmental education were already high, they showed the least variation post-intervention. Nonetheless, all questionnaire subcategories reflected positive gains, demonstrating the intervention's effectiveness in enhancing awareness and attitudes. These findings underscore the importance of integrating sustainability-focused activities into teacher education programs, equipping future educators with the knowledge and skills needed to address environmental challenges in their teaching.

Furious Five Presentation (16:55 – 17:00) | Scott Donnelly

Arizona Western College

GC-MS and C-13 NMR: Why wait until organic chemistry to teach it?

GC-MS and carbon-13 NMR are seminal topics taught in sophomore-level organic chemistry. But why wait until organic chemistry to expose students to the principles that make GC-MS and NMR indispensable tools for contemporary scientific inquiry into molecular structure? This presentation will give an overview of multiple GC-MS and C-13 NMR activities created by the presenter that are used early and often in General Chemistry 1. Instrumentation acquisition funded by USDA-NIFA-HSI grant award 2022-77040-38530.

Furious Five Presentation (17:00 – 17:05) | Mary Sheppard

Saint Mary's University

A Finland Faculty Exchange: Experiences in Culture and Education

Known for its world class education system, Finland is also the happiest country in the world. Lessons learned from a one-week faculty mobility visit to the University of Jyväskylä will be presented. Experiences of teaching in a chemistry field course and differences between Finnish and Canadian approaches to pedagogy and education will also be discussed.

Furious Five Presentation (17:05 – 17:10) | Jess Allingham

Thompson Rivers University

Implementing the CoI Framework in a Student-Driven Capstone Course

The Community of Inquiry (CoI) framework provides a structured approach to fostering deep learning through the integration of cognitive, social, and teaching presence (Garrison, 2000). This presentation explores the application of CoI in a fourth-year capstone course designed to be student-driven, emphasizing curiosity, problem-solving, and method development. In this course, students collaboratively identify research questions, design experimental approaches, and tackle real-world challenges within an interdisciplinary context. By embedding CoI principles, the course aimed to enhance student engagement, critical thinking, and collaboration. This presentation will highlight key outcomes, including successes in student-driven learning, challenges in balancing autonomy with guidance, and the role of CoI in shaping a dynamic, inquiry-based environment. Lessons learned from this implementation provide insights into optimizing CoI for in-person, research-focused learning experiences.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. The Internet and Higher Education, 2(2-3), 87-105. https://doi.org/10.1016/S1096-7516(00)00016-6

Furious Five Presentation (17:10 – 17:15) | Jess Allingham

Thompson Rivers University

Implementing Specifications Grading and a Token-Based System in a Third-Year Organic Chemistry Laboratory

This presentation reflects on the experience of implementing specifications grading and a token-based system in a third-year organic chemistry laboratory. Specifications grading, which requires students to meet clearly defined criteria to achieve specific grades, was applied to lab reports, experimental techniques, and overall lab participation. Tokens allowed students to retake assessments, revise reports, or extend deadlines, offering a more flexible and student-driven approach to assessment. The implementation process involved designing transparent grading rubrics, clarifying learning objectives, and balancing the flexibility of tokens with the rigor of meeting specified standards. Challenges included managing the logistics of token use and ensuring consistent feedback, while successes included improved student engagement, increased accountability, and greater student ownership over their learning. The experience also highlighted the need for clear communication and ongoing adjustment of the grading system to fit the unique context of a laboratory course. This presentation provides insights into the practicalities and benefits of introducing specifications grading and tokens in a high-stakes, skill-based learning environment.

SESSION 4 – Sunday, 25 May (12:00 – 13:05)

Oral Presentation (12:20 – 12:40) | Chrissy Knapp

Concordia University of Edmonton

Molecular Modelling: Increasing Student Exposure to the Molecular World

Many concepts we teach in chemistry rely on molecular-level explanations. From reaction mechanisms to infrared spectroscopy, we challenge students to think about bulk phenomena as resulting from properties of individual molecules. However, students' access to the molecular world is often limited to static drawings of molecules or hard plastic modelling kits with fixed angles and bond lengths. In 2024, I taught an introductory course on computer-based molecular modelling to senior chemistry students, and anecdotally observed that the act of building molecules, running calculations, and visualizing the results granted students a better understanding of fundamental concepts from introductory chemistry. I have since challenged myself to integrate molecular modelling into other courses to ensure that students are actively participating in the creation of both data and visuals to enhance their exposure to the molecular word. In this presentation I'll demonstrate examples of how that can be achieved using various free, open-source software options.

Oral Presentation (12:40 – 13:00) | Scott Donnelly

Arizona Western College

Classroom Exercises for General and Organic Chemistry Involving Wildlife Forensics and Food Fraud

Chemistry, now and in the future, has a pivotal role in combating the growing global criminal syndicates associated with wildlife and food crimes. Why not teach some aspects of general or organic chemistry in the context of these real-world issues that show how chemistry helps law enforcement counter criminal activity? This presentation will describe classroom exercises related to wildlife forensics/crime and food fraud that center around seminal principles or concepts taught universally in general and/or organic chemistry- namely, stable and unstable isotopes.

SESSION 5 – Sunday, 25 May (14:00 – 15:40)

Oral Presentation (14:00 – 14:20) | Robin Stoodley

University of British Columbia (Vancouver)

Building student engagement and learning with a student-customized lab manual

Typically, chemistry lab manuals take a one-size-fits-all approach; every student receives the same content, delivered in the same way. This misses opportunities: 1) to provide increased content depth for ambitious/gifted students, and 2) to support struggling students with refresher content.

We report goals, process and outcomes of transforming our traditional, static, lab manual for 3rd year analytical chemistry experiments into an online version based on the Alchemy platform. Alchemy, developed internally at UBC-V Chemistry Department, allows students to choose the route(s) they take through the content, similar to a Choose-Your-Own-Adventure book.

Students thus self-customize their learning experience, tailoring it to their academic background and interests. In addition to change the delivery mode of the lab manual content, the new version features supportive content for students who need a refresher or otherwise get up to speed with their peers, enrichment content to serve students with voracious appetites for knowledge and self-quizzes to encourage students to check their understanding.

Oral Presentation (14:20 – 14:40) | Jay Wickenden

University of British Columbia (Vancouver)

Two-Stage Exams in a Large Organic Chemistry Course

This talk explores the implementation of two-stage exams in a large organic chemistry course and their impact on student learning. Two-stage exams, where students first complete the exam individually and then collaborate on a group portion, have been shown to enhance engagement, retention, and deeper understanding of content. Data from in-person and online offerings—particularly during the COVID-19 pandemic—demonstrate positive outcomes, including reduced exam anxiety and improved performance. The presentation will highlight logistical strategies for administering two-stage exams at scale and share insights into student perceptions, suggesting that collaborative assessment can be a powerful tool in large, content-heavy STEM courses.

Oral Presentation (14:40 – 15:00) | Andrew Dicks

University of Toronto

Promoting Undergraduate Research Opportunities at the University of Toronto

Since the COVID-19 pandemic began in March 2020, the number of U of T St. George undergraduates participating in formal research has approximately tripled (from 50 to 150) per year. This includes students enrolled in a CURE (course-based undergraduate research experience), those undertaking a formalized project for course credit in a faculty member's laboratory, and others receiving a funded scholarship during the summer. This presentation will discuss mechanisms in place to boost student interest in pursuing research opportunities (including mentorship programs), how various courses have been designed and are structured, and best practices in promoting research to undergraduates at a departmental level.

Oral Presentation (15:00 – 15:20) | Uwe Kreis

Simon Fraser University

Fast, Focused, and Full of Surprises: Teaching Organic Chemistry in a Six-Week Sprint

Can organic chemistry—lecture and lab—be taught effectively at double speed? In Summer 2023, I piloted SFU's first Intersession-format organic chemistry courses, condensing a full semester into six immersive weeks. To meet the challenge, I reimagined the curriculum around conceptual depth rather than broad content coverage, adopted flipped and flexible learning structures, and wove in reflective and collaborative elements like team projects and bonus-based assessments. The result? Higher-than-usual student performance, strong engagement, and overwhelmingly positive feedback—even from students who initially feared the pace. In this session, I'll share insights, bumps, and bright spots from this high-speed experiment, with practical takeaways for educators looking to innovate within compressed timelines—without compromising learning.

Furious Five Presentation (15:20 – 15:25) | José Rodriguez Núñez

University of British Columbia (Vancouver)

Reimagining First-Year Chemistry: Lessons learned from developing and implementing an enriched introductory chemistry class

In September 2023, the Department of Chemistry at UBC-Vancouver introduced a new, "enriched", first-year introductory chemistry course for students interested in pursuing a career the laboratory sciences (CHEM 141). The course is built on modern pedagogical practices ranging from active learning activities to cumulative formative assessments. A brand-new laboratory component was developed to highlight modern chemistry while still honing foundational techniques. This talk will describe the lecture and laboratory design. Moreover, results from end-of-term surveys and focus groups to understand the effectiveness of having an enriched course in the curriculum will be discussed.

Furious Five Presentation (15:25 – 15:30) | Charlotte Alexander

University of British Columbia (Vancouver)

Real-World Applications in First-Year Chemistry: Investigating Drug Release with Sol-Gel Chemistry

CHEM 141 is an enriched, first-year course, for students interested in the laboratory sciences at UBC. This presentation will describe the development and implementation of a teaching lab for CHEM 141. The experiment introduces students to the versatile sol-gel process and its applications to drug delivery methods. Students synthesize a gel loaded with acetaminophen or fluorescein and analyze the release of these compounds under different pH and time conditions using UV-Vis and fluorescence spectroscopy. These pH conditions simulate those found in the human body, demonstrating the potential of the sol-gel process to make materials for controlled drug release. Through this experiment, students learn about synthetic chemistry, polymerization, the sol-gel process, UV-Vis, and fluorescence spectroscopy. This reinforces fundamental concepts while introducing advanced analytical methods typically only encountered in upper-year courses. By engaging with a real-world application of chemistry, students develop critical thinking skills and a greater understanding of materials chemistry and pharmaceutical science.

Furious Five Presentation (15:30 – 15:35) | Pinn Yee Scott

University of British Columbia (Vancouver)

Introducing Coordination Chemistry in a First-Year Enriched Laboratory

CHEM 141 is an enriched first-year chemistry course offered at UBC. This course is geared towards students who have a particular interest in laboratory sciences. One of the goals of the course's laboratory component is to show the students applicable chemistry in order to improve their attitude towards our discipline. This presentation describes the development and implementation of an experiment first reported in J. Chem. Ed for CHEM 141. In this experiment, students synthesize a transition metal complex and study its solvatochromic and thermochromic properties. Connections to thermochromic materials that students may have encountered, such as mood rings, are used to highlight how coordination chemistry can be used to explain the stimuli-responsive behaviour of this molecule. Through completing this activity, students are introduced to coordination chemistry and are provided insight into the discipline.

SESSION 6 – Sunday, 25 May (16:10 – 17:05)

Oral Presentation (16:10 – 16:30) | Nabyl Merbouh

Simon Fraser University

The unexpected benefits of incorporating the E-factor in the design of new undergraduate laboratory experiments.

Incorporating the E-factor in the design of new undergraduate laboratory experiments yielded several unexpected benefits. Starting with the use of microwave chemistry which dramatically reduced the energy and solvent consumption, followed by the use of new extraction and recrystallization solvents, and finally the complete removal of deuterated NMR solvents, these initiatives not only reduced laboratory waste but more importantly generated unaltered informative results. Focusing the experiments on waste reduction, not only made them sustainable but more importantly instructive and readily accessible to students and instructors in teaching institutions of any size.

Oral Presentation (16:30 – 16:50) | Jess Allingham, Lindsay Blackstock & Sharon Brewer

Thompson Rivers University

From Students to Scientists: Exploring Role Models in First-Year Chemistry

First-year chemistry is a foundational gateway course with high enrollment and a high risk of attrition (Mervis, 2010; Koch, 2017). Many students struggle with motivation, confidence, and a sense of belonging in STEM, factors that are critical to their persistence and success (Tinto, 1988). This study investigates the role of self-efficacy and identity development in first-year chemistry students through a pedagogical intervention in which students select and analyze a chemistry role model. Research suggests that exposure to role models can positively shape student engagement, particularly for underrepresented groups in STEM (Shin et al., 2016; Herrmann et al., 2016). By examining who students choose, what characteristics they find significant, and why these role models matter to them, we aim to uncover themes that contribute to a stronger sense of belonging in the chemistry classroom. In our presentation, we will share preliminary data and reflections on this intervention, highlighting emerging trends in student responses and their implications for teaching practices. The findings will help shape future strategies for fostering student engagement, motivation, and retention in STEM.

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Shin, J. E. L.; et al. Effects of role model exposure on STEM and non-STEM student engagement. J. Appl. Soc. Psychol. 2016, 46, 410–427.

Herrmann, S. D.; Adelman, R. M.; Bodford, J. E.; Graudejus, O.; Okun, M. A.; Kwan, V. S. Y. The effects of a female role model on academic performance and persistence of women in STEM courses. Basic Appl. Soc. Psychol. 2016, 38, 258–268. DOI: 10.1080/01973533.2016.1209757.

Furious Five Presentation (16:50 – 16:55) | Kate Rossiter

University of British Columbia (Vancouver)

Development of an Interactive Activity to Alleviate Student Stress in First-year Chemistry Laboratories

UBC offers two courses for first-year Science students who completed Grade 12 chemistry in high school. CHEM 121 is a high enrollment (~2000 students) Introductory Chemistry course geared to most students in the Faculty of Science; CHEM 141 is a small (~140 students), enriched first-year chemistry course for students interested in laboratory sciences. The courses run independently of each other and have their own laboratory components. Most students who finish CHEM 121 and CHEM 141 in the Fall semester go on to take CHEM 123 in the Spring term. CHEM 121 and CHEM 123 have somewhat similar laboratory requirements, expectations, and logistics. In an end-of-term class survey and in focus groups, some CHEM 141 students reported feeling less prepared for CHEM 123 labs than their peers who took CHEM 121. To alleviate this stress, a formative activity to prepare CHEM 141 students for CHEM 123 laboratories was developed and implemented in the 2024 Fall term. In this activity, students complete pre-lab and in-lab work for a mock experiment. In-class surveys collected in 2024 showed this activity was well received by students. This presentation will discuss the activity in detail and how it impacted student attitudes toward the transition to CHEM 123.

Furious Five Presentation (16:55 – 17:00) | Rose Hirowatari

Trinity Western University

A Natural Product Lab for Training Research Skills

This Organic Chemistry lab project is designed to introduce essential research skills to students early in their academic journey. It emphasizes the importance of engaging with scientific literature, preparing for lab time, and applying chemistry theory to problems that arise to achieve success. The culmination of this project involves an oral presentation, where students present their findings to their peers. This serves not only as an evaluation of their scientific work but also as a valuable opportunity for them to practice and refine a crucial professional skill. The success of this student-designed, research-like project can largely be attributed to the comprehensive preparation and guidance students receive throughout the process, the substantial amount of lab time dedicated to the project, and the various assessment methods used. Notably, students demonstrated a level of initiative and enthusiasm for this project that is often absent in traditional organic chemistry experiments.

Furious Five Presentation (17:00 – 17:05) | Janet Ochola

Douglas College

Advancing Scientific Literacy through Student-Centered Organic Chemistry Projects

This talk will describe a student-centred guided research project for an Organic Chemistry course in which students apply First- and Second-Year Chemistry concepts and skills as they play the role of Food Scientists in search of sustainable food dyes. The discussion will focus on design strategies that develop their scientific literacy, experimental design and scientific writing skills.

Students designed and executed an experiment to study the UV-Vis spectroscopy of carminic acid, an organic acid used as a food dye, in aqueous solutions of varying pH and in a drink of their choice. In addition to designing and performing their own experiments, students completed a library session, developed in collaboration with the Information Literacy and Educational Technology Librarians, during which they learnt effective search strategies and critical analysis of information sources.

After the final course grades were submitted, a survey was sent out to the students to gather feedback from the participants of this pilot study. All the students' responses to the survey indicated that the project was moderately to extremely effective at teaching the scientific research process, improved their ability to analyze scientific information sources, and increased their understanding of how scientific research can be used to solve real-life problems. These results support the efficacy of the design strategies that were implemented for effective preparation of future scientists.