THE UNIVERSITY OF BRITISH COLUMBIA

Faculty of Science

Skylight Annual Report 2023/2024

Skylight: The Science Centre for Learning and Teaching

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Land Acknowledgement

We would like to acknowledge that the UBC Vancouver Campus is situated within the traditional, ancestral, and unceded territory of the **xʷməθkʷəy̓əm** (Musqueam).

Executive Summary

We are pleased to present Skylight's seventh annual report, showcasing our key accomplishments from September 2023 to August 2024. Our commitment to adaptability and excellence has enabled us to respond effectively to emerging challenges and opportunities in teaching, learning, and academic support.

During the summer, following a productive full-day team retreat, we began revising our strategic plan to align with evolving priorities. Our core services continue to span pedagogy, curriculum development, evaluation, science education research, institutional and learning analytics, grant support, and learning technology. Our central staff and embedded experts remain dedicated to providing specialized consultations and targeted support, ensuring continued excellence in teaching and learning.

At the Faculty of Science level, our efforts have focused on advancing UBC's Indigenous Strategic Plan (ISP), implementing the Teaching Start-Up program, and preparing comprehensive reports on student profiles at both the course and program levels. We also launched a teaching practices survey, explored the implications of artificial intelligence in education, supported learning technologies, and facilitated teaching and learning enhancement projects. Additionally, we organized community events to foster engagement and collaboration across our academic community.

At the department level, we have supported equity, diversity, and inclusion (EDI) initiatives, contributed to Indigenous Strategic Plan (ISP) goals, and played a key role in committees and grant applications. Our work included the implementation of inclusive teaching practices, the development of new courses, and the transformation of existing ones to enhance student learning experiences and outcomes. We also conducted student experience surveys, assisted faculty with Universal Design for Learning (UDL) projects, and facilitated the development of open educational resources. Our commitment to educational research further reinforced these efforts.

We look forward to another year of collaboration and innovation and wish you continued success in your teaching and educational leadership, and look forward to working with our new Dean, Mark MacLachlan. More details on these impactful projects can be found in the following pages.

Gülnur Birol,
Director

Warren Code,
Associate Director

Team Updates

We welcomed Kirsty McIntyre to our team as the Science Education Specialist (SES) for Microbiology and Immunology (MBIM). Kirsty is the first SES in MBIM, and we are pleased to now have SESs embedded in eight out of nine departments in the Faculty of Science.

Sarah Bean Sherman was promoted to Senior Science Education Specialist in recognition of the additional responsibilities she has undertaken in her role over the years. Bean has notably led the Teaching Start-Up program since its inception, advising the Dean's office and department leadership on program intake, mentoring fellow SESs, running instructor orientations, and coordinating data collection for program evaluation.

Noureddine Elouazizi's role has evolved to Senior Strategist, AI and Innovation in Learning Technology, focusing on Faculty-wide needs assessments, artificial intelligence (AI), and collaborating to promote innovative learning technologies and pedagogies.

Skylight Team 2023–2024

Jackie Stewart
Associate Dean, Academic

Gülnur Birol
Director

Warren Code
Associate Director

Amber Schroeder
Administrative Coordinator

Zohreh Moradi-Clare
Research Analyst

Noureddine Elouazizi
Senior Strategist, AI & LT

Ashley Welsh
Faculty Liaison

Jenny Wong
LT Support Analyst

Christine Goedhart
SES, BOTA

Emma Davy
SES, CHEM

Stephan Koenig
SES, CS

Sarah Bean Sherman
SES, EOAS

Kelly Paton
SES, MATH

Kirsty McIntyre
SES, MBIM

Adele Ruosi
SES, PHAS

Erica Jeffery
SES, ZOOL

Learning Technology Rovers:

Jason Seo, Eros Rodriguez, Alec Currie, Nathan Chen, Ivan Cheung, Erika Delorme

Projects and Initiatives

Engaging with UBC's Indigenous Strategic Plan

We have continued to advance the goals and actions outlined in UBC's Indigenous Strategic Plan (ISP) within the Faculty of Science over the past year. Our focus has been on Indigenizing our curriculum (ISP Goal 4) and establishing a supportive community for the Science faculty, staff, and students engaged in this work. We have highlighted some of our key activities below:

Incorporating Indigenous Ways of Knowing in SCIE 113

This past year, Gülnur Birol, Ashley Welsh, and Adele Ruosi joined a working group with Marcia Graves, SCIE 113 Director, and Annie Prud'homme-Généreux, Educational Developer, to design and pilot an Indigenous Science module for SCIE 113 as part of a Large Teaching and Learning Enhancement Fund (TLEF) curriculum revision project. The module will highlight the research and lived experiences of Indigenous scholars within and outside of UBC Science and will prompt students to reflect on their understanding of Indigenous knowledge systems and science in addition to their own lived experiences and positionalities.

SCIE 113 is a small seminar style-course where students learn about the scientific process, the impact of science on society, and effective science communication. Starting in September 2024, SCIE 113 will be a required course for all BSc students. This expansion provides an excellent opportunity to engage UBC Science students in learning more about Indigenous knowledge systems, Indigenous scholars, and Indigenous science at UBC and beyond.

Skylight's Indigenous Strategic Plan (ISP) Working Group

In March 2024, Ashley Welsh established the Skylight Indigenous Strategic Plan (ISP) Working Group to connect and support members of the UBC Science community who are engaging with UBC's ISP, particularly Goal 4: Indigenizing our curriculum. The working group meets monthly as an opportunity to collaborate on ISP-related projects, discuss challenges and opportunities, share resources and best practices, give and receive feedback on developed resources and materials, and coordinate efforts across the Faculty of Science. Since its launch, the working group has grown significantly and now consists of 16 official members from over 10 departments, institutes, or units in UBC Science.

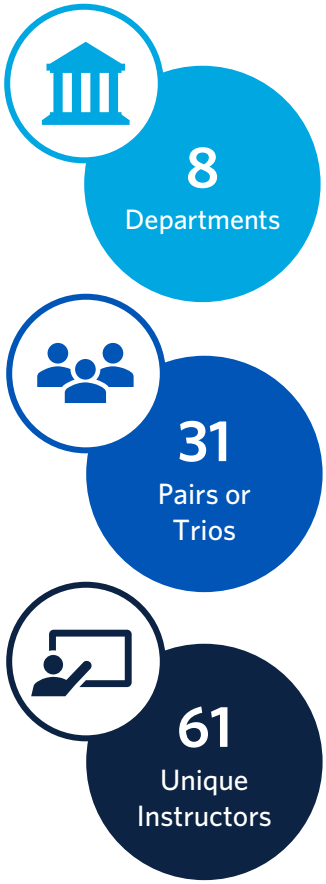
How Do I Get Started? Pressbooks Project

The Pressbooks version of "How Do I Get Started? Creating Safer Learning Environments for Indigenous Students in STEM at UBC" is now available. Developed by Ashley Welsh and Frances Butterfield with contributions from Indigenous students, faculty and staff, this resource provides advice and resources to STEM instructors seeking to incorporate Indigenous ways of knowing, being, and doing into their curriculum and teaching practices. Initially published as a PDF in July 2022, it gained significant interest and was featured in various professional development workshops. In 2023, it was updated and converted to Pressbooks for greater accessibility.

Professional Development and Support for New Faculty

Teaching Start-Up Program

UBC Science's Teaching Start-Up Program is a paired teaching initiative designed to set new faculty members up for success in their future teaching assignments at UBC. It also provides experienced faculty members with an opportunity to build their mentorship skills and reflect on their teaching practices.



Between 2018 and 2023, 31 pairs or trios (or 61 unique faculty members) successfully completed the program, with 4 participants returning to mentor new colleagues. Over the years, participation has steadily increased, and by the 2024/25 Winter Session, 8 out of 9 departments in the Faculty of Science will have engaged in the program. The departments with the highest participation rates include EOAS (11 out of 11 new faculty), BOTA (4 out of 5 new faculty), ZOOL (7 out of 10 new faculty), and PHAS (6 out of 9 new faculty). More than 60% of those eligible have participated following the program's full implementation across our mathematics and science departments. With the surge in hiring in recent years, the demand for support and professional development opportunities has grown. We are pleased to have supported so many faculty members through this program and have received positive feedback from both participants and department heads.

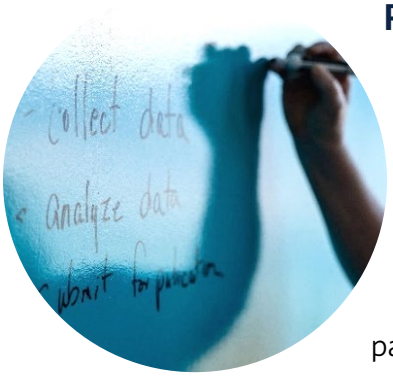
Congratulations the following faculty members who successfully completed the program in the 2023/2024 academic year with support from our SESs:

- Kevin Wei & Jennifer Klenz & Judith Mank (BIOL 234)
- Hal Bradbury & Maite Maldonado (EOSC 372)

Updated Resource for New UBC Science Faculty

In the summer of 2024, we updated our "Getting Started with Teaching and Learning at UBC Science" guide to provide incoming faculty members with information about teaching and learning resources available in the Faculty of Science. We updated the resource links and added a new section about our research, evaluation, and data analysis services. We invite you to check it out and share with your colleagues new to UBC Science.

Learning Analytics and Departmental Reports



Program-Level Profiles and Course Profiles

Zohreh Moradi-Clare and Warren Code recently distributed the second iteration of the Course Profile and Program-Level Profile reports to departments. These reports provide leadership with historical course and program-level data to inform their strategic planning and decision-making. The Course Profile includes data on course and section enrolment, grades, and student demographics per course, and the Program-Level Profile includes data on specialization enrolment, student demographics, retention pathways, graduation pathways, and time to degree. Department heads and program directors have provided positive feedback and expressed a desire to continue receiving these reports in future. We believe these reports can support curriculum revision and evaluation, degree progression tracking, equity initiatives, and much more.

Department Highlight Reports

In December 2023, Warren Code and Gülnur Birol met with department leadership to discuss undergraduate teaching priorities and to identify emerging service and support needs. Prior to these meetings, they shared department-specific reports containing information about SES support, Teaching Start-Up participation, learning technology (LT) support, research and dissemination, learning analytics, and funded projects. Leadership found these reports to be a useful and comprehensive way of capturing recent teaching and learning activities in their department. We plan to continue providing these reports regularly to raise awareness of available teaching and learning supports and maintain an open dialogue with departments about their emerging support needs.

Student Experience in the BSc Project

The Student Experience in the BSc Project was initiated in response to concerns about a perceived decline in student engagement and attendance. The goal of the project is to explore these issues and gain a better understanding of these concerns. Zohreh Moradi-Clare, Warren Code, and Gülnur Birol are leading efforts to collect and analyse data on several themes, such as academic misconduct, grade analysis, first-year course syllabus analysis, and engagement data from the 2024 Faculty Teaching Experience Survey.

Artificial Intelligence for Teaching and Learning

Artificial Intelligence (AI) for Science Education Projects

Over the past year, Noureddine Elouazizi consulted with colleagues on numerous AI for science education projects, including two Large TLEF projects, one led by Dongwook Yoon (CS) and the other led by Kayli Johnson (CHEM). Additionally, Noureddine worked with Cristina Conati (CS) on a Skylight Development Grant project to explore the potential and pitfalls of large language models (LLMs) for acquiring critical thinking skills in COGS 303.

Several of our SESs have also been exploring potential applications of generative AI in their departments:

- Emma Davy (SES, CHEM) is collaborating with Chris Addison on a SoTL Seed Grant project to implement ChatGPT in CHEM 300: Communicating Chemistry. The goal of this project is to assess how comfortable students are using ChatGPT as a tool for communication and how students can use AI to reflect and improve upon their writing practices.
- Erica Jeffery (SES, ZOOL) is consulting with Maryam Moussavi and Tyler Thomson on a Skylight Development Grant project to develop a student journal of cell and molecular biology to showcase undergraduate research in upper-year Biology courses. With her support, Maryam and Tyler have developed a rubric and accompanying set of ChatGPT prompts that can be used to provide students with feedback on their written work as part of the review process.

Artificial Intelligence (AI) Workshops

Noureddine Elouazizi and Emma Davy offered a workshop on "AI, Assessment, and the Student and Educator Experience" at Celebrate Learning Week 2024. The goal of the workshop was to address common questions and better equip instructors to make informed decisions about the use of generative AI in their courses. Noureddine and Emma shared their reflections and resources from the workshop on the Skylight website to support those in the teaching and learning community who may be grappling with the challenges of generative AI tools and the effect on their classrooms. They have also been asked to give numerous other workshops and presentations on topics related to AI, including the challenges and opportunities of implementing large language models (LLMs) in higher education, strategies for using AI in instructional design, the current limitations of AI, and incorporating Generative AI in chemistry courses.

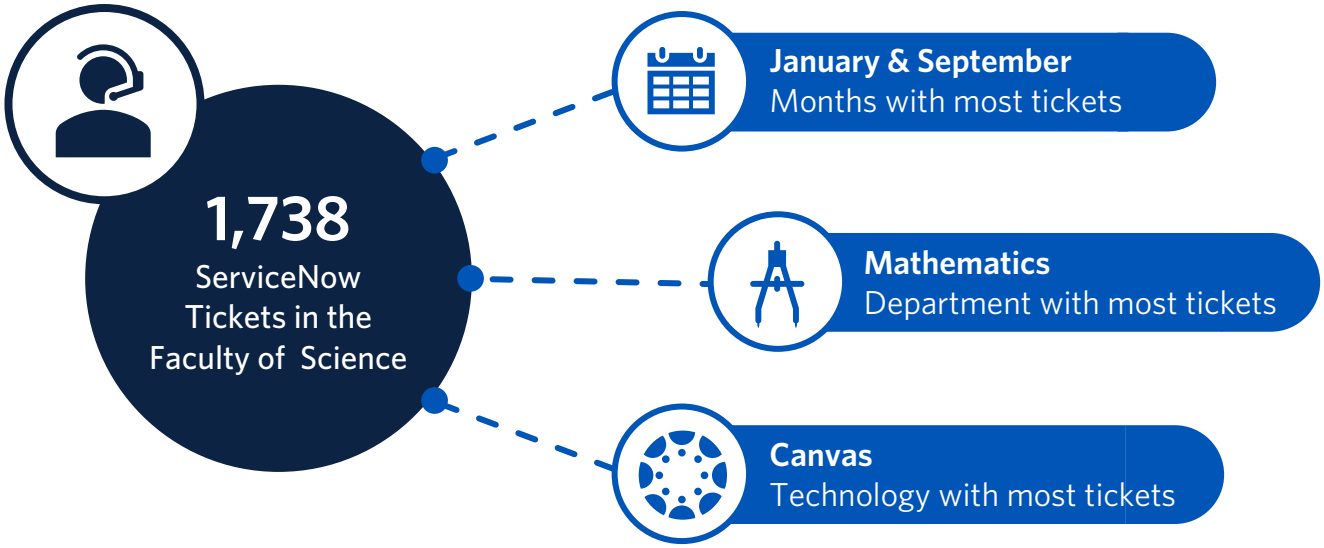
Support and Services

Through our consultations, collaborations, and engagement with faculty on teaching and learning projects, the Skylight team worked with over 120 faculty and 65 staff members, impacting 90 undergraduate courses spanning all years across UBC Science departments and accounting for more than 34,000 enrolments.

Department	Number of Courses Impacted in 2023/2024	Student Enrolments Impacted in 2023/2024
BIOL (BOTA/ZOOL)	22	6,568
CHEM	20	5,934
CS	11	6,454
EOAS	10	814
MATH	5	8,675
MBIM	11	1,551
PHAS	4	3,357
Other	7	1,486

Learning Technology Support

Skylight offers learning technology (LT) support in partnership with the LT Hub, and in collaboration with department-based teams across the Faculty of Science.



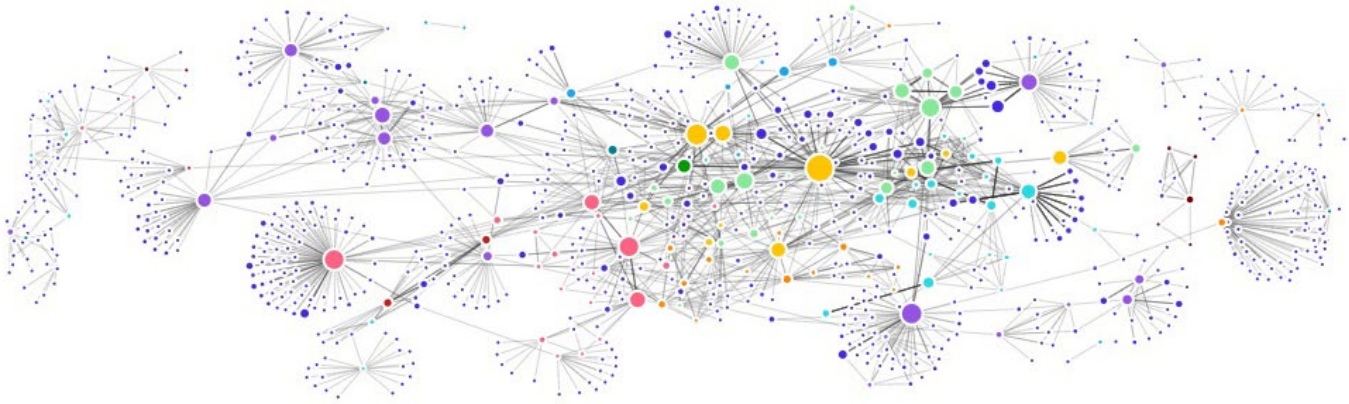
Between September 2023 and August 2024, a total of 1,738 Science tickets were submitted via UBC ServiceNow. The Skylight LT team serviced 67% of the tickets (1,168 tickets), and the remainder were serviced by the LT Hub. The majority of tickets were received in January and September, corresponding with the start of the winter academic terms. The department with the most tickets was Mathematics. 75% of all tickets were related to Canvas, and most Canvas tickets were related to user enrolment management, cases where existing Canvas items did not match the request, or cases of human error.

In addition to servicing tickets, the Skylight LT team offered weekly drop-in sessions for instructors, support for final exams, learning analytics, and quality assurance testing, and consulted on numerous teaching and learning projects across the Faculty of Science.

UBC Science Teaching and Learning Publications Project

We would like to thank our Learning Technology Rovers (LTRs), Alec Currie, Ivan Cheung, and Nathan Chan, for their excellent work on the UBC Science Teaching and Learning Publications project. The goal of this project was to compile a comprehensive list of scholarly publications written by UBC Science Faculty members from 2000 to 2024, focusing on post-secondary teaching and learning.

Alec, Ivan, and Nathan migrated an existing publications dataset from RefWorks into a publicly available Zotero library. They then collected new data from various sources, manually categorized the publications based on related keywords, and analyzed the data using Python. Additionally, they created data visualizations using Tableau and Flourish to illustrate data patterns and relationships between authors from different departments in the Faculty of Science.



Science Publications Network Graph created by Alec Currie, Ivan Cheung & Nathan Chan

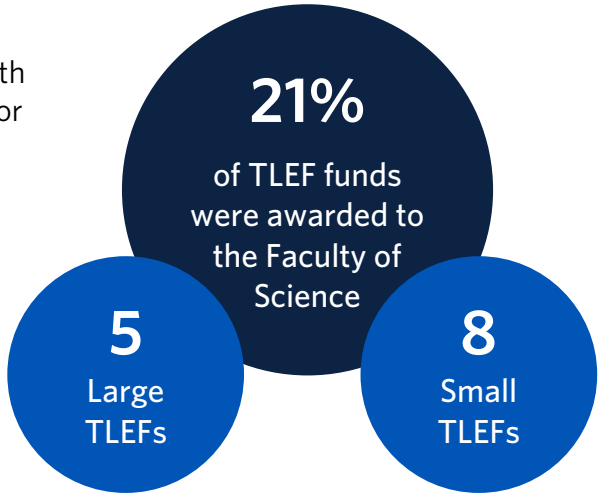
Teaching and Learning Grants

Teaching and Learning Enhancement Fund Projects

We were pleased to provide project development and implementation support to UBC Science faculty in the 2024/2025 Teaching and Learning Enhancement Fund (TLEF) competition. In partnership with CTLT, we connected faculty with resources to help implement best practices and build capacity for change within the Faculty of Science.

Current TLEF projects in the Faculty of Science are focused on curriculum development and renewal, advancing climate education, enhancing experiential and interdisciplinary learning, developing innovative and scalable assessment tools, integrating AI into learning processes, promoting equity and inclusion, incorporating Indigenous knowledge systems into the curriculum, and strengthening students' sense of belonging in Science.

2024/2025 Funding Competition



Skylight Development Grants

Skylight received 27 proposals requesting nearly $73,000 in total across the 2024 Spring and 2024 Summer competitions. We awarded nearly $50,000 in total to 21 proposals.

Funded projects focused on a variety of themes such as developing new course materials and resources, improving assignments, migrating to digital assessment platforms, implementing alternative grading schemes, addressing the opportunities and challenges presented by AI tools, enhancing climate literacy, and providing more support and mentorship to Indigenous students in Science.

Spring 2024

- *Student Co-Authored Course Guide for BIOL 203 Eukaryotic Microbiology* – Patrick Keeling (BOTA)
- *An Online Database for Chemistry for Engineering (CHEM 154) for Improved Student Learning* – Mark Thachuk (CHEM)
- *Moving CPSC 330 to PrairieLearn* – Varada Kolhatkar (CS)
- *Improving Assignments and Infrastructure for CPSC 317: Intro to Computer Networking* – Aastha Mehta (CS)
- *Analyzing Alternative Lab Kits for CPSC 121* – Karina Mochetti (CS)
- Revitalizing Computational Thinking Assessments – Oluwakemi Ola (CS)
- *Enhancing Teaching Support: Facilitating Effective Feedback for Large CPSC 322 Classes* – Mehrdad Oveisi (CS)
- *Converting CPSC 304 to PrairieLearn* – Rachel Pottinger (CS)
- *Extending the Reach of Climate Literacy Education in EOAS* – Stephanie Waterman (EOAS)
- *The Power of Narrative Learning for Second-Year Microbiology Students* – Karen Smith (MBIM)
- *Novel Learning Pathways to Applied Statistics Education* – Lucy Gao (STAT)

Summer 2024

- *Curiosity and Humility: A Model for Indigenous Co-Mentorship in the Research Laboratory* – Emma Davy (CHEM)
- *Building Systems Thinking and Green Chemistry into First-Year Chemistry Curriculum: Updates to CHEM 123 and eChIRP* – Laura Stirchak (CHEM)
- *Ungrading CHEM 203 Laboratories* – Jay Wickenden (CHEM)
- *New Qualitative Assessments for CPSC 411 Resistant to GenAI* – William J. Bowman (CS)
- *Exploring the Potential and Pitfall of LLMs for Acquiring Critical Thinking Skills in COGS 303 Classes* – Cristina Conati (CS)
- *PrairieLearn Enhancements to Better Support the Needs of UBC Courses* – Mehrdad Oveisi (CS)
- *Engaging with Climate-Related Emotions with Students* – Sara Harris (EOAS)
- *Alternative Neuroscience Laboratory Modules for Students with Animal Ethics Concerns* – Achol Jones (NSCI)
- *Re-Development of the Course "PHYS 315 Materials Physics" for 2024 W1* – Ke Zou (PHAS)
- *Building Communication Pathways for Indigenous UBC Students in STEM* – Laura Parfrey (ZOOL)

Community Building

Events

Skylight organized and facilitated a diverse array of events from September 2023 to August 2024, including professional development and networking opportunities for faculty and staff. We also teamed up with other units, such as the Office of Respectful Environments, Equity, Diversity & Inclusion (REDI), the Centre for Teaching, Learning and Technology (CTLT), and the Faculty of Land and Food Systems (LFS) Learning Centre, on numerous teaching and learning events. Through such events, we aimed to extend our connections, foster collaboration, and build strong, supportive communities. Overall, our events attracted over 1,100 participants.

Some of the major themes across our events were instructional skills development, inclusive teaching practices, Indigenizing our curriculum, interdisciplinary learning, alternative grading, the role of AI in teaching and learning, and mental health and wellbeing.

Committees and Organizations

Skylight members served on numerous department-level, faculty-level, and university-level committees to contribute to decision-making processes, strengthen our relationships, and advance teaching and learning in the Faculty of Science and across UBC. We also held professional memberships with several external organizations to support broader efforts to shape the future of higher education.

Some examples include:

- Curriculum Committees
- Equity, Diversity, and Inclusion (EDI) Committees
- Generative Artificial Intelligence (GenAI) Community of Practice
- Hiring Committees
- Indigenous Initiatives or Indigenous Strategic Plan (ISP) Committees
- Learning Analytics, Visual Analytics (LAVA) Community of Practice
- Learning Technology Operations Committee (LTOC)
- Peer Teaching Review Committees
- Science Planning for Future (SPFF) Committee
- Teaching Initiatives Committees
- Bay View Alliance (BVA)
- Canadian Consortium of Science Equity Scholars (CCSES)
- Society for Canadian Women in Science and Technology (SCWIST)

Research and Dissemination

Over the past year, we continued sharing our work with the broader science education community through book chapters, peer-reviewed journal contributions, and conference presentations. We also generated numerous internal reports to inform strategic decisions at UBC related to teaching and learning.

2023 Teaching Practices Survey

In 2023, UBC ran the Teaching Practices Survey (TPS) to better understand how faculty structure learning for students and to offer an opportunity for instructors to provide confidential feedback on their perceptions of the teaching climate at UBC. Zohreh Moradi-Clare and Warren Code worked with the TPS team (Andrea Han, Trish Varao-Sousa, Adriana Briseño-Garzón, and Barbara Komlos) to prepare the standard public reports. With Gülnur Birol, Warren, and the TPS team, Zohreh also worked on research questions related to teaching streams and wellbeing. The outcomes of the wellbeing study were shared at Celebrate Learning Week in May 2024.

2024 Science Faculty Teaching Experiences Survey

During the summer, the Skylight team conducted the 2024 Faculty Experiences Survey to capture faculty experiences with teaching during Winter 2023/2024. The survey received a total of 111 responses and provided some valuable insights.

In comparison to the 2021 and 2022 surveys, faculty seemed to feel more positive about teaching but continued to struggle with balancing increased workloads and student needs. With respect to student engagement, faculty reported that students who consistently attended classes were engaged, but there were some concerns about declining attendance and coursework completion. Other major themes through the responses included adapting to generative AI in higher education and engaging with ISP Goal 4: Indigenizing our curriculum. Although many faculty members were interested and engaged in these areas, some were more apprehensive and felt they needed additional support. If you would like to read the full report, please reach out to us at skylight@science.ubc.ca.

Publications and Presentations

The following works and presentations were issued by Skylight members between September 2023 and August 2024. Please visit our website for a full list of our scholarly publications.

Book Chapters

- Davy, E. & Wonham, M. (In press). Chapter 9: Content-Intensive Courses. In *Block Teaching Essentials: A Practical Guide*. Springer Nature.
- Paton, K. & Sinclair, N. (2024). An Ethico-Onto-Epistemology for Mathematics Education. In *Ethics and Mathematics Education: The Good, the Bad and the Ugly*. Springer Nature. https://doi.org/10.1007/978-3-031-58683-5.

Journal Articles

- Paton, K. (2025). Rethinking Equality in Mathematics Education with Category Theory. *The Mathematics Enthusiast, 22*(3), 343-374. https://doi.org/10.54870/1551-3440.1674.
- Clapson, M., Davy, E., Durfy, C., Schechtel, S. & Scott, S. (2024). *An Interactive Exploration of the Societal Impacts of Inorganic Chemistry – A Base Metal View on Sustainable Catalysis* [Submitted for publication].

- Clapson, M., Davy, E., Durfy, C., Schechtel, S. & Scott, S. (2024). *Challenging the "Traditional" Conference Format – Perspectives for Organizers Developing an Interactive Symposium in Inorganic Chemistry* [Submitted for publication].
- Güneş, C., Paton, K. & Sinclair, N. (2024). The Sensory Politics of Mathematics: Aestheticizing Multiplication. *Educational Studies in Mathematics, 117*, 239–261. https://doi.org/10.1007/s10649-024-10326-4.
- Harris, S. E., Code, W. J., Sherman, S. B., Jeffery, E. & Birol, G. (2024). *Teaching Start-Up: Supporting Incoming Faculty Members for Long-Term Culture Change* [Submitted for publication].
- McIntyre, K., Dale, V., Weitz, N. & Sherman, S. (2024). *Experiences of (Re)developing an Online Digital Skills Awareness Course: Practical Implications for Supporting Widespread Implementation of Open Educational Resources* [Submitted for publication].
- Nomme, K., Storlund, R., Goedhart, C., Mazabel, S., Sun, C., & Germano, B. (2024). An Assignment Wrapper Promotes Student Self-Regulation of Learning in a Science Writing Assignment. *Journal of College Science Teaching*, 1–11. https://doi.org/10.1080/0047231X.2024.2415297.
- Webb, A. S. & Welsh, A. J. (2023). *Theory Isn't a Dirty Word: Elevating the Role of (Educational) Theory in SoTL Work* [Submitted for publication].

Conference Proceedings

- Moradi, Z., Code, W., Elouazizi, N. & Birol, G. (2024). Example of a Participatory Approach in Developing Analytics Work at a Science-Focused Teaching and Learning Centre. *LAK24 Conference Proceedings*, Kyoto, Japan. https://tinyurl.com/yst82my9.

Conference Presentations

- Paton, K. (2024, July). *Thinking With Category Theory About the Sociopolitics of Equality* [Presentation]. ICME-15, Sydney, Australia.
- Addison, C. & Davy, E. (2024, June). *Use of Specifications Grading in a Third-Year Discipline-Based Writing Course* [Oral Presentation]. CSC 2024, Winnipeg, MB.
- Addison, C., Davy, E., Faria dos Santos, A. & Palmer, G. (2024, June). *Don't Fear It, Embrace It: Incorporation and Assessment of a Generative AI-Based Activity in a Third-Year Discipline-Based Writing Course* [Oral Presentation]. CSC 2024, Winnipeg, MB.
- Addison, C., Davy, E., Mezera, M. & Stoodley, R. (2024, June). *Community Service Learning: Using Wikipedia in a Third-Year Discipline-Based Writing Course* [Poster Presentation]. CSC 2024, Winnipeg, MB.
- Code, W. (2024, June). *Mathematics Attitudes and Perceptions Survey: Development and Results in Measuring a Variety of Contexts for Over Ten Years* [Poster Presentation]. 2024 SALTISE Annual Conference, Montréal, QC.
- Davy, E., Rodriguez Nunez, J., Weber, D., Yu, T. & Zhang, J. (2024, June). *How Did It Go? Assessing Student Perceptions and Engagement in an Enriched First-Year Course* [Oral Presentation]. CSC 2024, Winnipeg, MB.
- Komlos, B., Briseño-Garzon, A., Birol, G., Code, W., Han, A., Moradi, Z. & Varao-Sousa, T. (2024, May). *Keeping Wellbeing in the Teaching Loop* [Presentation]. CTLT Celebrate Learning Week, Vancouver, BC.
- Stang, J. Welsh, A., Stewart, J., Ma, K., & Smith, M. (2024, April). *Exploring Undergraduate Students' Perceptions of Disciplinary Communities and Belonging in Science Fields* [Presentation]. Conference on Postsecondary Learning and Teaching 2024, University of Calgary, AB.
- Güneş, C., Paton, K. & Sinclair, N. (2023, December). *Does It Make Sense? A Literal Aesthetic Investigation of a Co-Embodied Multiplication Model* [Presentation]. Sciences in the Flesh, Embodiment in STEAM Education, Paris, France.
- Welsh, A. J., & Moradi, Z. (2023, November). *How Do I Analyze This? Building Capacity for Analyzing Open-Ended Survey Responses in STEM-Oriented SOTL Research* [Presentation]. ISSOTL23, Utrecht, Netherlands.

Department Highlights

Biology (Botany and Zoology)

Inclusive Teaching in Biology

Erica Jeffery (SES, ZOOL) partnered with faculty on several projects focused on enhancing inclusivity. As part of their Universal Design for Learning (UDL) Fellows Project, Erica and Charissa Fung integrated 3D digital models into BIOL 204 to address accessibility barriers in the course. Erica also collaborated with Liane Chen and Vivienne Lam on a Teaching as Research (TAR) project to implement inclusive teaching strategies in BIOL 200, supporting scientific literacy among diverse learners. Additionally, Erica has offered numerous sessions on neurodiversity and student learning and started developing and curating resources on this topic.

Christine Goedhart (SES, BOTA) continued collaborating with faculty and staff on the Sex and Gender Inclusivity in Biology project. This initiative aims to improve the representation of sex and gender identity in biology courses and create a more welcoming, safe, and inclusive learning environment for 2SLGBTQIA+ students. Over the past year, Christine co-developed a session titled "Strategies for Promoting Inclusivity and Accuracy in the Biology Classroom" for the 2024 Biology Teaching and Learning Retreat session and finalized the Sex and Gender Inclusivity Canvas site. The Canvas site includes key definitions and concepts, frequently asked questions, guided resources and checklists, and more.

Biology Indigenous Strategic Plan (ISP) Committee

In the past year, Erica Jeffery conducted preliminary work to support the development of the new Biology Indigenous Strategic Plan (ISP) Committee. Erica with Laura Parfrey and Duncan MacNaughton applied for Science Student EDI funding to conduct focus groups on barriers and opportunities for UBC Indigenous students in STEM careers and applied for Skylight Development Grant funding to hire an Indigenous Student Ambassador. This ambassador, working closely with Salisha Old Bull (Indigenous Academic Advisor) from Science Advising, will assist in building community and developing communication pathways for Indigenous science students. The Biology ISP Committee will hold its first official meeting in September 2024.

Course Development (BIOL 348)

Christine Goedhart co-developed BIOL 348: Biology of Cannabis with Lacey Samuels and taught the first iteration of the course in 2023W2. The concept behind creating this course was to use cannabis as a context to teach students about the foundational biological concepts that underlie the structure, function, cultivation, adaptation, and human use of the cannabis plant. Christine ensured the course content was grounded in real-world applications and implemented labour-based grading to support student learning. You can learn more about Christine's experience with developing and teaching BIOL 348 by visiting the Bio News Blog.

Chemistry

Indigenous Strategic Initiatives (ISI) Fund Project

Emma Davy (SES, CHEM) has led a 3-year Indigenous Strategic Initiatives (ISI) project in the Department of Chemistry. This project aims to build capacity for ISP work in the department by providing professional development opportunities to faculty, staff, and graduate students, and developing teaching materials that incorporate Indigenous ways of knowing and being. Emma has organized multiple workshops as part of the professional development aspect and has been supporting Noah Depner, the Education Specialist hired for the project, in developing course materials in partnership with faculty.

Chemistry Lab Foundations Event

Emma Davy has been working with Anka Lekhi on a Small TLEF project to develop a Chemistry Laboratory Foundations Event for incoming first-year students with little or no lab experience from high school. The goal is to enhance equity and inclusion, reduce student stress in the lab, and increase diversity and accessibility. Emma has assisted with survey design and results assessment, attended regular team meetings, and provided feedback on all produced materials. She will co-facilitate the inaugural event in August 2024.

Course Transformations (CHEM 141, CHEM 203, CHEM 300)

Over the past year, Emma Davy collaborated with faculty on several projects to transform the following courses:

CHEM 141: The goal of this project is to develop and implement a new, enriched, first-year course for students interested in laboratory sciences by connecting lecture topics to real-world examples and exploring modern chemistry techniques and tangible applications. Emma co-authored the Small TLEF grant application, advised on the development of course materials, prepared the BREB application, led survey development, delivery, and assessment, and conducted student focus groups.

CHEM 203: The goal of this project is to introduce ungrading to the CHEM 203 laboratory. Emma supported project planning, prepared a BREB application, prepared support documents for TAs and students, and led survey development, delivery, and assessment.

CHEM 300: The goal of this project is to implement an alternative grading method (specifications grading) in CHEM 300. Emma collaborated with Chris Addison to generate new assignments, a teaching manual for the course, and student resources. She also worked on incorporating AI into the course and taught one section of the course in 2023W1.

Computer Science

Committee for Outreach, Diversity, and Equity (CODE) Data Analysis Projects

Stephan Koenig (SES, CS) has been leading comprehensive data analysis efforts to better understand student demographics, program choices, and academic performance within the Computer Science program. In 2024, Stephan summarized gender composition throughout the undergraduate program and determined drop-out rates. He also modelled the performance in upper-level courses based on first-year performance.

Universal Design for Learning (UDL) Fellows Project (CPSC 203)

Stephan Koenig collaborated with Firas Moosvi on a Universal Design for Learning (UDL) Fellows Program project to develop an open-access website, segment videos into shorter clips to enhance the flipped-classroom model and incorporate autogenerated subtitles in CPSC 203. Stephan designed a framework to convert PowerPoint slides into a more accessible HTML format and is investigating ways to integrate crowdsourcing into the course to improve video subtitles.

Computer-Based Testing Facility (CBTF)

The Computer-Based Testing Facility (CBTF) in the Department of Computer Science is designed to allow instructors to run digital assessments at scale securely and equitably. In 2024, Stephan Koenig provided feedback on the CBTF website and helped develop instructional videos to increase accessibility and encourage more instructors to use the facility.

Earth, Ocean, and Atmospheric Sciences

Earth Science Experiential and Indigenous Learning (EaSEIL)

Over the past year, Sarah Bean Sherman (Senior SES, EOAS) has continued collaborating on the Earth Science Experiential and Indigenous Learning (EaSEIL) project with a large interdisciplinary team of faculty and students. EaSEIL is a Large TLEF project aiming to transform field-based experiential learning across multiple programs, departments, and faculties by increasing opportunities for interdisciplinary learning, incorporating Indigenous ways of knowing into the curriculum, and enhancing accessibility and inclusion in field-based learning settings. The project team have conducted student focus groups, established a community of practice, developed resources for students, instructors, and curriculum developers, and implemented a 3-tier Indigenous engagement model for curriculum development.

Universal Design for Learning (UDL) Fellows Project (EOSC 116)

Sarah Bean Sherman collaborated with Louise Longridge on a Universal Design for Learning (UDL) Fellows Program project to increase accessibility in EOSC 116. EOSC 116 is a hybrid course that uses figures in Canvas to deliver information. In total, the course includes over 800 figures. Bean and Louise worked with one of our Learning Technology Rovers, Erika Delorme, and colleagues at CTLT to add alt text and extended captions to all figures to support student learning, particularly for visually impaired students.

Implementing the Environmental Science (ENSC) Curriculum Renewal

Sarah Bean Sherman is member of the project team on the "Implementing an Environmental Science (ENSC) Curriculum Renewal" Large TLEF project, led by Tara Ivanochko. The goal of this initiative is to develop, implement and evaluate a revised ENSC curriculum that will realign existing courses with updated Specialization Objectives and Learning Goals, revise current course pedagogies to accommodate larger class sizes, and build new courses to develop students' skills and provide exposure to complementary fields of study and professional opportunities.

Mathematics

MATH 100/101 Curriculum Revision

Over the past year, Kelly Paton (SES, MATH) has been an instrumental part of the MATH 100/101 Curriculum Revision project. This project was launched to combine a previously disparate set of courses into one differential calculus and one integral calculus course and enable learning through problem-solving group work in small TA-led classes as well as traditional expert faculty lectures. The redesigned courses serve over 4,000 students per term from diverse disciplines. Kelly contributed to the project by providing regular support to the instructional team, developing course materials, including student worksheets, instructor notes, and assessments, and leading efforts to evaluate the student experience.

MATH 100 Open Educational Resource (OER) Textbook

In 2024, Kelly Paton patterned with Elyse Yeager and Matt Coles on the MATH 100 Open Educational Resource (OER) Textbook project. This initiative aims to create a unified reference source for MATH 100 students, instructors, and TAs by combining relevant sections from existing open-source textbooks into a MATH 100-specific textbook. Kelly has been working closely with Elyse to reorganize existing content and draft new material as needed.

MATH 322/323 Student Experience Project

Kelly Paton co-led the MATH 322/323 Student Experience project with Nahid Walji. This initiative sought to understand the student experience in MATH 322/323 and increase Math major enrolment in these courses. Additionally, the project team aimed to identify factors that might be linked to overall decreased performance in MATH 322/323. Kelly and Nahid gathered student feedback through surveys and focus groups and presented their findings to department leadership in July 2024.

Microbiology and Immunology

Curriculum Review and Data Science in MICB Courses

In 2024, the Department of Microbiology and Immunology (MBIM) received provincial funding to expand the MBIM Major program and integrate data science knowledge and skills throughout the curriculum. Kirsty McIntyre (SES, MBIM) has supported this transition by conducting a curriculum review and interviews of faculty to explore how existing MICB courses support, deliver, or enhance students' knowledge or skills in data science.

Course Development (MICB 205)

As part of the MBIM Major program expansion, MBIM has created a new course: MICB 205. This course incorporates the use of biological data science tools to perform survey-level analysis of microbiology and immunology datasets. Kirsty provided feedback on the course plan and syllabus and reviewed existing data science content and faculty perspectives to inform course delivery.

Skylight Development Grant Project (MICB 211)

Karen Smith applied for Skylight Development Grant funding in Spring 2024 to implement narratives, using bacterial and human-centric stories, into MICB 211 course materials. These narratives aim to connect course materials to the real world, stimulate dialogue among students, and promote deeper understanding. Kirsty McIntyre has consulted with project team on their development plan and BREB submission and participated in project meetings to provide guidance and feedback.

Physics and Astronomy

Course Transformation (PHYS 158)

Adele Ruosi (SES, PHAS) has continued to lead the redesign of PHYS 158 over the past year. From September to December 2023, Adele coordinated and facilitated weekly meetings with the redesign team, developed new assessments and instructional materials, and reformatted the tutorial workshops. From January to July 2024, she co-developed and delivered a training session for TAs, conducted classroom and tutorial observations, and collected student feedback via surveys and focus groups.

According to the course data and student feedback, the redesign has had an overwhelmingly positive impact on the student learning experience. Highlights include:

- **Student Wellbeing:** Students reported that the classroom environment was more respectful (81% in 2024 vs. 61% in 2023) and they felt valued and supported by instructors.
- **Student Understanding and Course Content:** Students noted that the curriculum revisions led to clearer expectations (70% in 2024 vs 39% in 2023), better guidance (57% in 2024 vs 29% in 2023), and easier navigation of course content (73% in 2024 vs 49% in 2023).
- **Student Engagement and Attitudes:** There was an increase in tutorial attendance (87% in 2024 vs 50% in 2023) and peer interaction (71% in 2024 vs 57% in 2023).
- **Student Learning and Knowledge:** Students demonstrated a better understanding of physical concepts with 10% learning gain in BEMA results.
- **Gendered Performance:** The Gendered Performance Difference (GPD) decreased from -7.5% to -3.5%.

Physics Education Research

In the fall, Adele Ruosi collaborated with Jonathan Massey-Allard and Firas Moosvi to research how a course's assessment structure impacts students' sense of social and disciplinary belonging and whether the impact varies based on student demographics. From September to December 2023, the research team met regularly to review existing research on the topic and develop a coding scheme to characterize course assessment structures.

Equity Diversity, and Inclusion (EDI) in Physics & Astronomy

In January 2024, Adele Ruosi and Jess McIver were nominated as co-chairs of the new Physics and Astronomy EDI Committee. Adele and Jess established the terms of reference for the committee and recruited 14 committee members, representing undergraduate and graduate students, postdoctoral researchers, staff, and faculty. During the summer, they co-organized a town hall to collect community feedback to inform strategic planning in the department. Adele also coordinated monthly general meetings and biweekly working group meetings to advance strategic planning efforts.

Statistics

Creation of a Randomized Question Bank in PrairieLearn for STAT 200

Rodolfo Lourenzutti received Skylight Development Grant funding for the “Creation of a Randomized Question Bank in PrairieLearn for STAT 200” project in Spring 2023. The project's primary focus was the creation of a large question bank in PrairieLearn, replacing the existing Webwork assignments, practice exams, and textbook questions.

As of today, the bank contains 284 questions, surpassing the project team's initial goal by approximately 20%. The project has had positive impact on student learning and engagement. The additional practice questions have 1) increased student practice and engagement (approximately 650 students voluntarily utilized the optional questions), 2) enhanced student preparedness by providing students more opportunities to practice and reinforce their understanding of course concepts, 3) addressed student concerns by directly responding to requests for more practice problems, and 4) supported student success by offering a diverse range of questions.

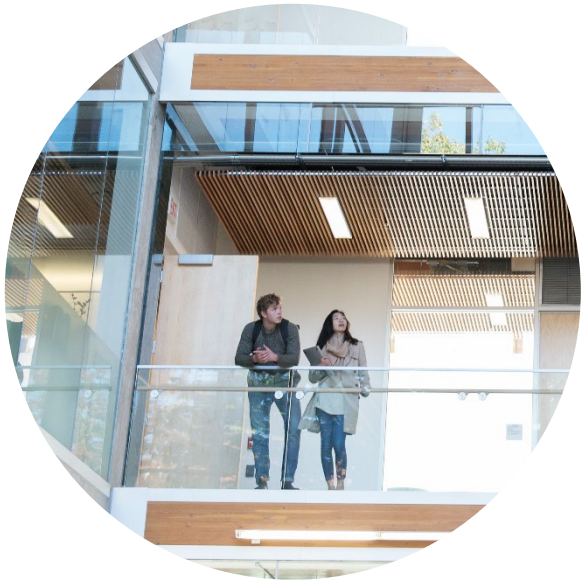
Developing Guidelines for Effective Assessments in the ChatGPT Era

Joel Östblom received Skylight Development Grant funding for the "Developing Guidelines for Effective Assessments in the ChatGPT Era" project in Spring 2023. The goals of the project were to explore ChatGPT's performance on traditional STAT and DSCI assessments and learn whether current designs of take-home assignments remain effective for assessment and whether there are design alterations that could make take-home assessments more challenging for ChatGPT.

The project has been completed, and the project team are currently writing up a manuscript for submission in Summer 2024. The results suggest that ChatGPT performs exceedingly well (a grade of 85-100% in 8 out of 9 courses tested) in courses at both the Undergraduate Statistics level and at the Master of Data Science-level. As such, relying on take-home assignments as a large portion of student assessment could lead to final grades that do not reflect student learning. The project team highly recommends running assignments for summative assessment through ChatGPT to understand what the baseline score would be for a student with no actual domain knowledge.

Novel Learning Pathways to Applied Statistics Education

Lucy Gao received Skylight Development Grant funding for the "Novel Learning Pathways to Applied Statistics Education" project in Spring 2024. This pilot project will focus on creating novel pedagogical and learning pathways to bridge the gap between research objectives and formulating the statistical problem as well as selecting appropriate statistical methodologies. To achieve this, the project team will develop pilot content for an interactive learning module, named StatEngage, that can be loaded from any Canvas course, and develop pilot evaluation materials to evaluate the effectiveness of StatEngage in learning applied statistics.



Message from the Associate Dean, Academic

Congratulations to Skylight on another successful year of supporting teaching and learning excellence across the Faculty of Science!

This annual report describes Skylight's contributions to the many impressive teaching and learning innovations within the Faculty of Science. Certainly, generative artificial intelligence (GenAI) remained at the forefront, from thinking about AI-invariant skills and how to teach them, to using GenAI to help provide feedback on students' conceptual learning, communication, and critical thinking. Skylight support is vital to ensuring that our curricula, instruction, and assessments help BSc students gain the expected knowledge and skills of their specialization, and prepare them to thrive in a world with GenAI.

Twice a year when we adjudicate Skylight Development Grant applications, I am impressed with the range of ways instructors are working to improve students' learning, wellbeing, and belonging. With Skylight's support, faculty members are able to improve their courses and evaluate the impact of their transformations. The projects initiated during the timeframe of this annual report have impacted 25 courses at different levels of the curriculum and many are focussed on incorporating more accessibility and flexibility into the student experience.

Creating meaningful and effective learning experiences for all students is a collaborative endeavour, and I express my deepest thanks to the staff, students, and faculty who are working together to advance education at UBC Science.

Jackie Stewart,
Associate Dean, Academic

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