

## **Engineering More Inclusive Futures: EDI Initiatives at University of Alberta's Faculty of Engineering**

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Educators and researchers in the Faculty of Engineering and the Faculty of Education at the University of Alberta are taking an important step in promoting Equity, Diversity, and Inclusion (EDI) and intersectional learning in the engineering curriculum. Supported by the Institute for Intersectionality Studies, they have launched a new project that seeks to address the unique challenges faced by students from diverse backgrounds in engineering education. The project comprises a team of four members, including Principal Investigator and Professor Janice Miller-Young, Dr. Nicole Wilson (Programs & Engagement Manager in the Faculty of Engineering), Engineering PhD candidate Kineshta Pillay, and PhD Education student Danielle Gardiner Milln.

According to Engineers Canada, female-identifying faculty make up only [19.5 percent](#) of the faculty complement at Canadian engineering schools. In addition, as of 2021, only [0.6 percent](#) of undergraduate engineering students in accredited engineering programs in Canada identify as First Nations, Métis and Inuit Peoples. A recent [report](#) by the Canadian Science Policy Centre underscores the importance of intersectionality to address systemic discrimination and marginalization in STEM fields like engineering to improve the representation of Black, Indigenous, people of colour, and other marginalized groups.

Engineers spend significant time in teams, consulting clients and the public, designing processes and products for society, and writing reports and recommendations. Wilson notes that engineering employers today are seeking graduates with strong verbal and written communication, teamwork, conflict navigation, and leadership skills, as these skills make graduates stand out in the workplace. While there is a growing focus on core skills like interpersonal dynamics and EDI in engineering accreditation, these skills and training are not prioritized in engineering curricula. As Pillay explains, engineering education tends to focus on technical skills, but teaching diversity in engineering settings is crucial to improve equity and prepare students for their careers.

Unequal power dynamics can negatively affect students' sense of belonging to the engineering profession, especially for those from historically underrepresented communities. Pillay points out that the engineering culture also tends to be masculine, which can lead to unequal teamwork interactions, such as being interrupted or talked over, assigning notetaking tasks to women and minoritized groups, and having ideas dismissed or stolen. Pillay emphasizes that initiatives aimed

at, for example, including women and girls in STEM, need to include specific tools to address cultural norms and practices that perpetuate inequality and lead to people leaving the profession. Miller-Young sees this EDI-focused project as an important initiative for improving the experiences of historically marginalized groups in engineering.

In the 2023-24 academic year, the Engineering-Education team focused on an introductory course for Engineering students, ENGG 160 - *Introduction to Engineering Design, Communication, and Profession*. The course aims to "build a foundation for engineering design including using the design process and communication skills" in a team setting. Starting in 2020, first-year engineering students take the course as part of their core credit component. As such, it was an ideal course to test new EDI content.

Miller-Young draws on her previous participation in multidisciplinary projects and her own experience as a woman in engineering to bring together students and knowledge from different disciplines in a space of respect and awareness. During the semester, students learn and implement key principles of effective teamwork, equity, diversity, and inclusivity as they relate to teams and engineering design. The course was initially delivered in a blended format, but it is now taught in person, which required developing a new lecture component and building an actual design prototype. For Miller-Young, including EDI and teamwork skills prepares students for real-world engineering challenges where teamwork and diversity are as crucial as technical expertise: "We recognized the need to equip our students with not just technical skills but also the social competencies required in today's diverse work environment."

Along with the ENGG 160 course, which already has seven active instructors, the initiative aims to create a lesson plan that other faculties can use to teach teamwork effectively while incorporating EDI. This modular approach will ensure that the lessons learned in ENGG 160 can benefit students across STEM contexts. As Wilson puts it, "we are not just teaching engineering; we are shaping future engineers who are aware, inclusive, and capable of fostering a welcoming environment for all."

Despite the positive strides, the project team is acutely aware of the challenges. For example, first-year course classrooms are large, which can hinder deep conversations and reflections on EDI priorities. Gardiner Milln also points out that systemic sexism and racism act as barriers to bringing about changes in the classroom. Additionally, the team recognizes that there may be resistance from some students, faculty members, or professionals to introducing EDI topics in traditionally technical disciplines, which could pose a challenge to supporting intersectional equity in classrooms.

As the project team continues to roll out this innovative project, they are collecting student feedback to refine and enhance the curriculum. Gardiner Milln describes how students have expressed interest in spaces where they can talk about diversity and belonging and their increasing interest in connecting with their peers in collaborative ways. For Wilson, it also reflects a decrease in the number of experiences of exclusion, harassment, and discrimination between teammates: "Another measure of success is that we have less of that happening."

Wilson explains that part of the project's goal is to support instructors who are aware of EDI issues in the engineering classroom but aren't sure how to create more inclusive spaces. She sees the tools from this project as a helpful roadmap or guideline. The ultimate goal of this initiative is to foster an educational environment where all students feel valued and supported, paving the way for a more inclusive engineering profession. EDI in Engineering project aligns with the University of Alberta Strategic Plan and its commitment to achieving "[a more diverse, equitable, accessible and inclusive environment for all who work, learn and live](#)" within its community.



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