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The Dal Eng Experience

DALHOUSIE UNIVERSITY | FACULTY OF ENGINEERING

ENGINEERING

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Dean's Message

Greetings to our engineering community. As I reflect on the past year, I am inspired by the progress and future of engineering.

It has been a challenging time for many universities across the country, particularly with the uncertainties surrounding international enrollment. However, within our Faculty of Engineering, we've experienced a promising rise in prospective students eager to pursue an engineering degree. I believe this can be attributed to several factors.

With an engineering degree, the possibilities are limitless. Our alumni are making an impact across industries worldwide, shaping society in ways that may surprise those unfamiliar with the far-reaching benefits of engineering. In this issue of Engineering, you'll have the chance to learn about some of these remarkable individuals.

However, I believe one of the key reasons for the rise in applications is the enhanced student experience we've cultivated at Dalhousie. This focus is at the heart of this issue of our magazine. From their first year, students have access to unique opportunities, including hands-on experience with design teams, international competitions, leadership roles in student societies, and high-impact research. These experiences provide Dalhousie Engineering students with the tools to define their own path from day one of their degree.

We've also made significant strides in fostering a more inclusive and diverse engineering community. Through initiatives such as the Inclusive Pathways to Engineering Careers Program, we're working to break down barriers and increase access to an engineering education for individuals from equity-deserving communities. Last year, we launched the Indigenous pathway of the program, and this year we're excited to announce the launch of the African Nova Scotian/Black pathway, which will create even more opportunities for students of African Nova Scotian and Black descent. We look forward to sharing more about these initiatives in this issue.

I would like to take a moment to express my gratitude to all our supporters and donors and community partners. Your generosity makes initiatives like the Pathways Program possible and enriches the experience for our students. Together, we are inspiring future-ready leaders and empowering our communities.

We are excited to share these initiatives and more in this edition of Engineering, and we look forward to staying connected with you in the year ahead.

Sincerely,

Dr. John Newhook, P.Eng., FCAE, FCSSE
Dean, Faculty of Engineering

1,874 UNDERGRAD STUDENTS

539 GRADUATE STUDENTS

2,413 TOTAL ENROLLMENT

UNDERGRADS

23.8% FEMALE

74.7% MALE

1.5% OTHER

GRAD STUDENTS

31.9% FEMALE

67.2% MALE

0.9% OTHER

84% CANADIAN

16% INTERNATIONAL

62% NOVA SCOTIAN

104 FACULTY

475 SEXTON SCHOLARS

8 RESEARCH CHAIRS

20,496 ALUMNI

12 SEXTON LEADERS

97% CO-OP PLACEMENT

New gift boosts Dalhousie Engineering's efforts to diversify workforce

Dalhousie's Faculty of Engineering is getting a major boost in its efforts to remove barriers and increase access to engineering education for equity-deserving groups thanks to the Johnson Scholarship Foundation (JSF).

JSF announced that it is making a transformative $1,050,000 gift to the Faculty's Inclusive Pathways to Engineering Careers Program (IPP). Launched in 2023 through consultation with community partners and knowledge keepers, the program aims to remove barriers and increase access to engineering education among equity-deserving groups. The program will develop custom pathways and supports for each equity-deserving group.

The two initial pathways are specifically for Indigenous and African Nova Scotian and Black students at Dalhousie.

"We're honoured to partner with Dalhousie on this innovative program," says Robert A. Krause, Johnson Scholarship Foundation CEO. "Dalhousie's dedication to empowering deserving Indigenous and African Nova Scotian and Black students to graduate as engineers through this program aligns with our mission to help people prepare for and obtain a college degree. We look forward to seeing how this program will promote equitable access to engineering degrees."

Building on a strong partnership

The gift builds on a long-standing partnership between Dalhousie and JSF, which provides grants for scholarships and other support to non-profit organizations that serve students with disabilities, students Indigenous to Canada and the United States, and students from low-income families. Working with the university, JSF helped create scholarships that have benefitted 160 students with disabilities and the Health Sciences Pathway Initiative.

"This donation is more than just financial support — it is an investment in the future of our students and the strength of our community," says Dr. Kim Brooks, president and vice-chancellor of Dalhousie. "It reaffirms our shared belief that education should be accessible to all. We are incredibly grateful to the Johnson Scholarship Foundation for their generous commitment to support the Inclusive Pathways to Engineering Careers Program."

In addition to scholarships that reduce the burden of accessing post-secondary education, IPP will provide Indigenous and African Nova Scotian and Black engineering students with wraparound supports, such as mentorship and career coaching, to ensure that they succeed professionally. This will help foster a more diverse engineering workforce that reflects and develops innovations that benefit the communities it serves.

"I am so proud of the continued commitment to drive positive social change within both the university and our Faculty," says Sherida Hassanali, assistant dean, (Equity, Diversity, Inclusion, and Accessibility) for the Faculty of Engineering. "The development of the IPP is an opportunity for the Faculty and the communities who have been historically and traditionally marginalized to come to together to heal, create, and transform ways of being in engineering. These efforts will make the program welcoming, inclusive, and safe so students from equity-deserving communities thrive, and, in turn, make the field of engineering more diverse, inspired, and robust."

The IPP also benefits from a partnership with Imhotep's Leagacy Academy (ILA). This innovative university-community partnership mobilizes university/college students, faculty, and community leaders to introduce students to the world of STEM, improve their success, and help bridge the achievement gap for Grades 6-12 students of African heritage in Nova Scotia.

"We will continue to work closely with ILA to ensure that the Pathways Program is developed in partnership with them and promoted to students in their program," says Dr. John Newhook, Dean of the Faculty of Engineering.

Diversifying the field of engineering

The program welcomed its first cohort of Indigenous students in September 2024. It will welcome a second cohort of African Nova Scotian and Black students in September 2025, thanks in part to memoranda that have been signed or are in the works with the PREP Academy, the Delmore Buddy Daye Learning Institute, and the Black Cultural Centre. By 2029, the program will graduate at least 40 additional Indigenous and African Nova Scotian and Black students. These first five years will lay the groundwork for increased representation of equity-deserving groups at Dalhousie and in engineering.

"Throughout my engineering degree at Dalhousie, I have often been placed in rooms with few people that look like me," says Elisabet Astatkie, a fifth-year student who is studying Industrial Engineering. "Making conscious efforts to increase the number of Black students enrolled in the program will help to increase the proportion of Black engineering professionals and diversify the workforce. I'm grateful for the Faculty of Engineering and their conscious efforts to adopt this pathways program."

THE DAL ENGINEERING EXPERIENCE

There are many reasons to choose Dalhousie Engineering including its cutting-edge research and state-of-the-art facilities. The campus is also located in the heart of downtown Halifax, right by the ocean, in the center of a thriving hub for technology, ocean industries, and more.

On top of that, it's also ranked the top engineering school in Atlantic Canada.

What you many not realizing is that Dal Engineering is also home to one of the most welcoming and supportive communities in the country. First-year students have access to resources and opportunities sometimes more challenging to find at other universities.

With these supports and hands-on learning experiences, many undergraduate students have been able to explore new paths and pursue experiences that have transformed their academic journey.

The Hands-on Learning Experience

A first-year engineering student at Dal, **Emily Nightingale** wasted no time immersing herself in hands-on learning. In fact, that was one of the key reasons she chose Dalhousie for her undergraduate degree.

“I'd never really looked out East because there's such a focus when you're in Ontario to kind of stay in Ontario,” explains the Ottawa native.

The opportunity to be part of Dal’s dynamic engineering community was impossible to resist. Within her first month on campus, she had already joined the Faculty’s Student Affairs Committee and the Women in Engineering Society (WIE). She also became a member of the Dalhousie Formula SAE (FSAE) team—an opportunity she never expected to have in her first year.

“At some of the bigger universities, first-year students can get lost in the crowd,” she explains. “But at Dal, it’s not just upper-year students who get to be part of student design teams. These experiences have completely changed my perspective on engineering.”

Dalhousie Engineering is home to a wide range of student societies and groups, including its student competition teams. These multidisciplinary teams bring together students from all years to collaborate on ambitious projects such as building boats that sail across the Atlantic Ocean, launching satellites into space, and designing solar- and electric-powered vehicles that compete on international racetracks.

As a member of FSAE, Nightingale had the chance to join the brake subsection team. There, she jumped right into learning while working alongside upper-year students to refine the brake rotors and hubs for the team’s next electric vehicle. Through this experience, she gained technical skills, developed problem-solving abilities, and confirmed her passion for mechanical engineering—a discipline she hopes to declare at the end of her first year.

“I really love the work that I’m doing on the FSAE car,” she says. “I feel like that’s probably where I can find the most overlap of something I’m already doing and loving and something that I can incorporate into my future.”

Moving forward, Nightingale says she hopes to take on more leadership roles, including those with other societies and student design teams.

The Mentorship Experience

Captain of Dal’s Men’s Varsity Track and Field team, **Oluwatobi "Tobi" Oshikoya**, has made quite a name for himself. A standout in the long jump, high jump, and triple jump, the chemical engineering student knows how to inspire, motivate, and push his teammates to perform their best.

Yet, despite his many victories, his greatest achievements have come off the track, where he’s had the opportunity to channel his leadership into mentoring and inspiring the next generation of engineering leaders through Imhotep’s Legacy Academy (ILA).

“Finding a community here was amazing, but as an undergraduate, having the chance to be part of an initiative that empowers others is something I may not have found anywhere else, and it’s a good outlet to escape from my studies.”

– TOBI OSHIKOYA

Located on Dal Engineering’s Sexton campus, ILA is an organization committed to encouraging Black youth to pursue careers in STEM. While ILA plays a key role in empowering young students, it also has a significant impact on Dal Engineering students who are given the opportunity to get involved with the organization, engage and mentor young students, and discover a community they can call home.

What began as a mentorship role in Oshikoya’s third year evolved into a leadership position as program coordinator. This allowed him to take on more responsibility within the organization. Through initiatives like the FIRST LEGO League competition, he’s had the opportunity to help young students engage with robotics and problem-solving, just as ILA once did for him when he was first introduced to STEM in junior high.

“When I think back to my time at Dal Engineering, the opportunities I had with ILA really shaped my entire engineering experience,” says Oshikoya. “Finding a community here was amazing, but as an undergraduate, having the chance to be part of an initiative that empowers others is something I may not have found anywhere else, and it’s a good outlet to escape from my studies.”

The Biomedical Engineering Experience

A former member of Dalhousie’s Women’s Soccer team, **Kaitlyn Woodworth** had to step away from the sport this year due to injury. But rather than letting it hold her back, the chemical engineering grad is embracing a new path—one that began when she got the chance to explore the world of biomedical engineering during her undergraduate studies.

“I remember being in high school thinking prosthetics were the coolest thing ever,” laughs Woodsworth, noting that as an athlete, her own injuries and rehabilitation experiences sparked an interest in Biomedical Engineering. “I think fundamentally when I look back on why Biomedical Engineering was appealing to me was because I had this interest in medicine, but I didn't know how I wanted to get there.”

During her undergraduate studies, she discovered the option to pursue a Certificate in Biomedical Engineering. The program allowed her to take biomedical-focused courses, such as anatomy, while also requiring her to complete a senior-year design Capstone project in a Biomedical Engineering-related field.

For her senior-year research project, Woodworth worked under the supervision of Dr. Locke Davenport Huyer and focused on optimizing a polymeric microparticle intracellular delivery system to regulate macrophage inflammation. It was a research opportunity she was first introduced to during a summer co-op placement in 2022, where she worked in the same lab developing particles with the potential for therapeutic delivery.

"It started as proof-of-concept work to see if we could use polymer engineering to fabricate particles as a potential therapeutic delivery strategy,” says Woodworth. “And over time, I continued to progress towards biological assessments.”

The experience gave Woodworth a new perspective on the field of biomedical engineering, and a new career path. Now, her journey has come full circle. For her master’s thesis, she is continuing her research under Dr. Davenport Huyer, building upon the foundation she established as an undergraduate student.

The Student Advocacy Experience

As Vice President Academic (VPA) for the Diploma of Engineering Society (DES), **Olivia Millett** has not only given a voice to first- and second-year students but has also found her own voice within the Dal Engineering community. A second-year Chemical Engineering student, Millett initially hesitated to get involved in Dal Engineering's extracurricular activities.

"I was worried that I was going to be very overwhelmed," she explains. "I had just received an ADHD diagnosis over the summer, and I was really scared to start that journey."

Originally from Saint John, New Brunswick, Millett had always been involved in leadership roles at her high school, driven by a desire to support others. She decided to take a measured approach when she began her degree, attending student society events occasionally and gradually learning about available opportunities. It was at an Engineering Leadership Summit that she discovered the Diploma of Engineering Society, which later inspired her to run for Vice President Academic (VPA).

Millett now leads the Faculty's Student Affairs Committee, where she advocates for students and works to enhance their academic experience. The committee addresses student concerns, tackles challenges in courses, and suggests teaching strategies to improve the learning environment.

"Being that voice for so many students and ensuring our needs are heard is truly empowering," says Millett. "I find that a lot of the time profs might not know enough about how the students are feeling, and I get to push that forward and get us heard."

"Through talking to upper-year students, I also get to see where I'd like to go next in my leadership journey"

– OLIVIA MILLETT

Serving as VPA has helped Millett develop her confidence, leadership abilities, and public speaking skills while strengthening her sense of belonging within the engineering community and easing the concerns she had when she first started her degree.

"Our society is very close-knit, and we're all friends," she says. "We all sit in class together. We talk all the time, and we've really grown to be very close to each other."

"Through talking to upper-year students, I also get to see where I'd like to go next in my leadership journey, and I'm thinking I'd like to be a part of the Women in Engineering society next year. I can also see myself in the future applying for a position with the Dalhousie Undergraduate Engineering Society."

The International Student Experience

When **Wilfried Kindo** moved to Canada from Africa in 2021 to begin his engineering degree at Dalhousie University, one of the biggest culture shocks he experienced was the dramatic change in weather.

"I remember visiting the International Centre at Dal and learning about jackets," he laughs, adding that in his home country of Burkina Faso, it's very hot. "I had to learn what kind of jacket to buy and the different temperatures some jackets can withstand," he continues.

Now in his fifth year of Civil Engineering, he has not only adapted to the cold but also embraced a new way of life, new people, new customs, and new foods.

While participating on Dalhousie's Varsity Soccer team played a huge role in his transition to Canada, so did Dalhousie's International Student Centre.

"French is my first language, so English didn't come naturally to me at first," he explains. "It took a lot of reading, a lot of practice, and a lot of tutoring."

Thankfully, Dalhousie offered plenty of support. The International Centre helped him connect with other students, welcomed him to university events, and provided him with valuable resources. Through Dalhousie Athletics, he also accessed tutoring services that helped him succeed academically, and through Dal Engineering's supportive community, professors such as Dr. Craig Lake stood by his side throughout his entire degree.

"Dr. Lake is the GOAT, as we call him among classmates," says Kindo. "My interest in Geotechnical Engineering came from taking his classes. Even though I always knew what to study, I didn't always know what kind of career I wanted. From talking to him and having him as our Capstone advisor, I knew that I'd like to work in an environment that revolves around Geotechnical Engineering. His life and work experiences are so valuable. I highly encourage every student to approach him for questions and advice."

As he prepares to graduate as the first-ever undergraduate student from Burkina Faso at Dalhousie, Kindo says if he had the chance to do his Dal Engineering experience all over again, he definitely would.

"Even though I always knew what to study, I didn't always know what kind of career I wanted."

– WILFRIED KINDO

The Women in Engineering Experience

When **Grace O'Connor** *(L)* and **Emma Deveau** *(R)* first started their degrees at Dal Engineering, neither of them could have imagined stepping into the role of Co-Presidents of Dalhousie's Women in Engineering Society (WIE).

One of the most dynamic and influential organizations on campus, WIE serves as a voice for all women in engineering, providing mentorship, networking, and skill-building opportunities while inspiring young women to explore the field. But for Deveau and O'Connor, the society has been so much more—transforming their entire university experience.

"I think being involved has definitely made it feel like I was part of the Dal Eng community rather than just kind of floating through it," explains Deveau. "I actually feel like I have a spot on this campus and within this community and I actually have the ability to help students. "

"And that was a big thing for me," adds O'Connor, "I wanted to join this society because I wanted to be part of helping other students find that kind of community on campus. There's a whole life at school outside of just your classes that a lot of people don't ever really get a chance to embrace"

"I actually feel like I have a like a spot on this campus and within this community and I actually have the ability to help students."

– GRACE O'CONNOR

Their partnership has been a powerful one. Deveau, now in her third year of Environmental Engineering, and O'Connor, in her final year of Chemical Engineering, have combined their strengths to elevate the society and bring new initiatives to life. Together, they've introduced a student representative group designed to improve communication, engage students, and ensure that everyone's voice is heard within the society and Faculty.

"We have reps from first and second year, and one upper-year rep from each discipline," explains O'Connor. "So far, the feedback and engagement from the rep team has been incredibly positive. It's been amazing to get more people involved, and we see this as a stepping stone for them to join the exec team or find other opportunities. We're really excited about it and hope it continues to thrive."

In addition, Deveau and O'Connor have also launched a mentorship program that pairs students with mentors based on shared interests and experiences. The initiative has allowed students to build strong bonds and connections with their peers, And for Devau and O'Connor, the these friendships have been the best part of their Dal Eng experience.

"Having a safe space and a community where women can socialize, gather, and find peer support is so important. It's a large campus, and it can be easy to feel isolated. But knowing that you have people rooting for you makes all the difference for students."

– EMMA DEVEAU

The Research Experience

Joelle Korkomaz's passion for renewable energy took an inspiring turn last summer thanks to an Undergraduate Student Research Award (USRA).

As a mechanical engineering student on Dalhousie's Solar Car Team, Korkomaz's journey began unexpectedly at a barbecue in 2023 to celebrate the team's 4th place finish at that year's Formula Sun Grand Prix competition. There, Korkomaz met Dr. Ghada Koleilat, a professor in Dalhousie Engineering's Department of Electrical Engineering and a Faculty Advisor to the Solar Car Team.

Intrigued by Koleilat's research work, Korkomaz reached out and soon discovered the USRA program, a grant that funds undergraduate research opportunities.

In the summer of 2024, she joined Koleilat's lab, which develops cost-effective, flexible solar cells using nanomaterials and perovskites. Their goal is to create scalable, long-lasting solutions that make solar energy more accessible.

"When I thought about researchers, I was like, alright, cool, they test, read articles, and write reports. But when I started, not only did I perform tests, but the first thing I did was engineer. I got to fabricate solar cells, and I learned about all of the science behind it, how solar cells work and why," says Korkomaz. "She (Koleilat) really opened my life to a whole other realm of the solar industry that I didn't know existed."

Korkomaz says she's always been driven by a desire to make a positive impact on the world through renewable energy. "There are a lot of issues in the world... but I feel like nothing else is going to matter if we don't have a planet to stand on," she explains. "So whether it's solar, geothermal, or even hydropower, whatever it is, renewable energy is the future, and something I'm very fond of."

Korkomaz's research experience made for a seamless transition to her first co-op at Rayleigh Solar Tech, where she continued working on perovskite solar cells. She says the skills she gained in Dr. Koleilat's lab gave her the confidence to dive into projects and collaborate with industry professionals.

"...not only did I perform tests, but the first thing I did was engineer. I got to fabricate solar cells, and I learned about all of the science behind it, how solar cells work and why."

– JOELLE KORKOMAZ

Donor-supported societies make all the difference for Dal Engineering student

When Sapna Natarajan looks back at her time at Dalhousie Engineering, it won't be the study sessions or midterms that come to mind. It'll be the friendships and community connections she made through the societies she joined.

The fifth-year Bachelor of Chemical Engineering student says participating in Dal Engineering's largest societies—Women in Engineering (WIE) and the Dalhousie Engineering Society (DUES) gave her the confidence and support to transform a challenging start to her degree into the most rewarding experience of her life.

From isolation to connection

"My first year of engineering was completely online," explains Natarajan. "I'm definitely an extrovert, so being stuck at home doing school all day by myself was really difficult for me."

It was Instagram that first introduced Natarajan to the student groups at Dal Engineering and the impact they were making in the community. Four years later, she is vice president of WIE and vice president social for DUES. Through these roles, she's developed leadership skills, fostered connections, and created opportunities for others to thrive.

Creating community through support

Both societies work to strengthen the sense of community on Sexton Campus through events, fundraisers, and career development workshops. One of WIE's main goals is to support the Engineers Canada 30 by 30 initiative, which aims to have women represent 30 per cent of newly licensed professional engineers in Canada by 2030. As part of that mission, WIE hosts their annual Go ENG Girl event, which introduces young women from junior high and high school to engineering through hands-on activities and mentorship from women in the field.

Natarajan's involvement in Go ENG Girl led to one of her first meaningful impacts on Sexton Campus involving WIE president Emma Deveau. "Someone asked her why she got involved with the society. She said I made a positive impact on her during a conversation we had a Go ENG Girl event and that really pushed her to join."

Today, Natarajan and Deveau, now a third-year engineering student, work closely to create opportunities for women on Sexton Campus to connect. From organizing trips to global women in engineering conferences to hosting campus events such as paint nights and IDEA MakerSpace activities, these initiatives are what Natarajan loves most about Dal Engineering.

"The goal is to come there, meet other people, network, and then keep those connections throughout the year," she says. "Those people you meet, that's what makes your degree. That's what makes me want to wake up every morning and go to school."

Turning challenges into opportunity

Natarajan says opportunities like these are made possible thanks in large part to university donors and supporters, adding that she's unsure where she would be today without the chance to get involved on campus.

"That's the reason that I've been able to find all these opportunities in my degree, to meet new people, and secure co-op jobs," she says. "In my co-op interviews, we talk about some of the academic projects and schoolwork I've done, but the main bulk of experience that I've discussed is my involvement with societies on campus."

Now in her final year, Natarajan is on a mission. As VP social for DUES, she's focused on creating the same kind of moments for students that defined her time at Dalhousie.

"That's my goal, just making those core memories for people," she says. "Engineering's hard, so I think we all deserve to have a little fun. I just want to make an impact that everyone can look back on."

Quinn Stanley's Work to Empower Queer Engineering Students

From the moment Quinn Stanley could tinker with toys, they were drawn to problem-solving. It wasn't long before those around them noticed, too.

"Everybody kind of knew I was going to be an engineer from when I was like five. So this has kind of always been what I wanted to do," says Quinn.

When it came time to apply to university, Dalhousie Engineering was an easy choice. Its strong co-op program and hands-on learning opportunities made it the perfect place to turn Quinn's childhood passion into a career. But their first year of study wasn't exactly what they had imagined. Starting university during a global pandemic presented challenges—particularly the hybrid learning model.

"I started to realize that the social connection of engineering is really your big ticket."

"I definitely am the type of person that does not thrive in hybrid classes, so there were a lot of difficulties I faced in first year, along with the transition from high school to university," they say. "But I think it was more of the social aspects that were difficult rather than the course content."

By second year, things changed. As in-person interactions returned to normal, Quinn, who identifies as queer, discovered a way to completely transform their undergraduate experience.

"I started to realize that the social connection of engineering is really your big ticket."

Building a More Inclusive Engineering Community

Now in their fourth year of Chemical Engineering, Quinn is the Co-President of Dalhousie EngiQueers, a student society dedicated to fostering equity, diversity, and belonging in engineering. For Quinn, the society has been more than just a leadership role—it's become a platform to drive change.

Quinn says that when they first came to Dal, they found welcoming spaces on campus but noticed a lack of visible representation and structured support for 2SLGBTQIA+ students in engineering.

"Dal Engineering is working towards being more inclusive and supportive, and I think it would be harmful for me to ignore the fact that there are still challenges and barriers that exist in every engineering program," they say. "I don't think any program has it completely figured out, and I don't think that we necessarily will anytime soon."

That gap motivated Quinn to get involved in advocacy and community-building, eventually leading them to take on a leadership role with Dalhousie EngiQueers—a society that, in recent years, had been less active on campus. Through their efforts, Quinn helped create more opportunities for connection, professional development, and education for students.

"We prioritized social connection by hosting study sessions, movie nights, drag shows, and participating in events like Pride to create a welcoming space," they say. "But that first drag show we put on—I had never been prouder of myself and my community than in that moment."

For Quinn, organizing events has always been a part of their experience, but seeing lifelong friends moved to tears at the drag show held in the Sexton Campus T-Room reinforced the impact of their work.

"I think that was the moment where I was like, OK, this is what I'm meant to be doing, and this is why I do it," they say.

Expanding Professional Development

Their efforts haven't stopped there. Dalhousie EngiQueers is now expanding its focus on professional development, collaborating with companies such as CBCL Limited to build meaningful industry connections.

"For me, professional development is about creating spaces where students, especially those entering co-op or industry, can find support and representation. Not every workplace will be immediately inclusive or understanding, so it's crucial to build connections with mentors and role models who share similar experiences. My main goal is to establish industry connections that help students feel safe and supported as they transition into the workforce."

Finding Community and Support

While EngiQueers continues to support and empower students at Dal Engineering, it's had an even greater impact on Quinn.

"I think, honestly, the best part of my experience so far has been the friends that I've made along the way. And I know that's kind of cheesy, but I think it's true, and I think it's the best part of being Co-President of EngiQueers," they say.

Whether they're discussing shared interests or their experiences as queer engineering students, Quinn adds that these connections have provided a sense of understanding and community that's hard to find elsewhere.

"At the end of the day, the most important aspect of all of our lives is our support system—especially when you're looking at queer students or minority students in general."

SPARKING A PASSION FOR INDIGENOUS ENGAGEMENT IN ENGINEERING

For Dalhousie engineering student Charlotte Muise, one of the most significant moments of her academic journey came during her third-year co-op placement in Environmental Engineering. That's when she discovered that monitoring stations were being set up in Indigenous lands without any involvement from those communities. The realization surprised her.

"I asked about Indigenous involvement, and they said that doesn't exist," shares Muise. "They were building these stations all over Indigenous lands and not asking them for any guidance or anything."

As an Indigenous woman herself, it was in that moment that Muise realized how she could leverage her engineering skills to make a positive impact on her community.

During her final co-op placement with the Ulnooweg Education Centre, Muise had the chance to see firsthand the difference those skills could make to the community.

"I got to build a mini water filtration system, and I got to bring that out into the community. Just seeing how it impacts them really motivated me and made me realize that this is what I want to do for the rest of my life."

Finding Her Purpose

When Muise first came to Dal, that path wasn't as clear. Growing up in Newfoundland, engineering had always played a big part in her life.

"Both my parents are engineers—my dad's a civil engineer, my mom's mechanical," she says. "Having been raised by engineers, we'd always go above and beyond for every school project. So I always knew I was going to go into this field of work."

Though she had an interest in Environmental Engineering, Muise wasn't sure where to begin her journey.

"Luckily, Dal has many different niches and different labs and things that you can get involved in," she says. "There's just something for everyone."

For Muise, that place was the Centre for Water Resources Studies (CWRS)—a research hub focused on water issues in the Atlantic region, including drinking water treatment, wastewater management, and sustainable water solutions.

"I always knew the lab existed, but I never really got involved until last summer," she says. "Then there was this opportunity that arose in collaboration with Ulnooweg and the CWRS to do a master's degree centered on Indigenous water sovereignty. I've always been passionate about my culture, so I set up a couple of appointments with people from the CWRS, and I really got to learn about everything they offer and all the different things I could research."

Now in her senior year, Muise is applying her passion for Indigenous water sovereignty through one of her environmental engineering courses. Her work is focused on optimizing wastewater treatment lagoons in collaboration with a First Nations community. She is using a Two-Eyed Seeing approach—combining Western scientific methods with Indigenous knowledge to develop a sustainable solution that enhances water sovereignty and improves wastewater management.

"When I came to Dal, I didn't know if I wanted to do grad school, consulting, or public sector work," she says. "This definitely helped steer me in the right direction because I found a master's project that I was interested in applying for and that is accessible to me as an Indigenous engineering student."

The Power of Mentorship

For Muise, one of the key aspects of her journey has been the mentorship of Daisy Peter-Paul, whom she first met while completing her co-op at Ulnooweg. As the Community Engagement Coordinator for Dal Engineering's Indigenous stream of the Inclusive Pathways to Engineering Careers Program (IPP), Peter-Paul has been instrumental in helping Muise prepare for the next chapter of her academic journey—pursuing the master's degree in Environmental Engineering with the CWRS.

"I think the pathways program is so unique and just so great because I never had anything like that growing up"

"I met Daisy while they were creating the IPP. She interviewed me to talk about my experience as an Indigenous student in engineering," says Muise.

Since then, she says Peter-Paul has been a constant source of support, helping her overcome barriers to applying for grad school.

Launched in 2023, the IPP is designed to empower students like Muise to succeed in engineering by offering tailored support, mentorship, and opportunities that promote diversity and inclusion. For Indigenous students, the program creates a space to honor traditional knowledge while pursuing an education that can benefit their communities.

"I think the pathways program is so unique and just so great because I never had anything like that growing up," says Muise. "I was fortunate to have two engineering parents who guided me, but I know that's not the case for most people—Indigenous or not."

Though the program is still in its early stages, Muise acknowledges the need for more Indigenous representation within engineering. "I can count on one hand how many Indigenous students I know in engineering, and it's disheartening," she says, admitting that she's optimistic the Faculty is moving in the right direction.

Despite the absence of a large Indigenous community at Dal, Muise was able to find a strong support network within her engineering program.

"I've met some of my best friends in the engineering program, and they're friends I will keep for a lifetime," she says. "I've made so many memories with them and learned so much from them as well. Having all those people in my life was the best part of my experience."

Muise, who was recently accepted into her master's program, she says she feels both excited and confident about her future and grateful for the opportunities that have helped her discover the right path for her.

"I know that the research I'm doing is going to be groundbreaking for the community because no one has really done it before."

“I always want to make things useful”:

Dr. Ghada Koleilat embraces both fundamental research and its applications

Imagine a solar panel that you unfurl like a roll of fabric — because it’s actually made from repurposed fabric.

That’s one of the innovations coming out of Dr. Ghada Koleilat’s Dalhousie Engineering lab. A Canada Research Chair in Advanced Materials for Energy Application, Dr. Koleilat has a joint-appointment in the Departments of Process Engineering and Applied Science, and Electrical and Computer Engineering.

Her work on electronic textiles involves integrating solution-processed transparent stretchable conductive particles into fabrics, using waste materials from a plant in the Annapolis Valley owned by Arditz Fabrics and Rolls. The fabrics are turned into solar power arrays, and contribute to a low-waste circular economy the same time. Dr. Koleilat has a partnership with den Haan greenhouses, a leading Nova Scotia producer of tomatoes and cucumbers, who hope to ultimately power their operations with solar. “They have been super-collaborative and gave us access to test our modules on their greenhouses,” she says.

In addition to greenhouses, with their curved roofs, Dr. Koleilat imagines all kinds of other applications. “In rural communities, or communities far from the grid, if there is a storm and they are cut off, they can roll out these fabrics,” she says. “You could also use them on tents, if you are going camping, or more importantly for refugee camps in war zones.”

And the fabric-based arrays have another advantage: “The fabrics have different patterns, and those patterns can help trap light — micro-concentrate the light inside them — which is basically a method to increase the efficiency of the solar cell.”

On the fundamental research side, Dr. Koleilat’s work also has potential implications for solar power. Her team is developing novel semiconductor nanomaterials that are compatible with existing, traditional electronics, but can “enhance their performance, stability, and efficiency,” she says.

“These materials can, for example, lead to efficient stable green technology. Lead-free solar cells for example, or LEDs for displays. And we are collaborating with international teams experienced with machine learning, to discover new materials and then using them to create quantum computing and neural network applications,” she says. “I focus on the materials fundamentals and innovation. We're completely creating novel materials with a structure that has never been reported before, and never been proven before. It is a very exciting time in my lab.”

Even when she’s doing fundamental research, Dr. Koleilat keeps possible applications in mind.

“I always try to keep my feet on the ground by asking myself, why would this be interesting? I mean, it is interesting on its own, but you have to also see how this will help the community and the people around you,” she says. “In the end, I am an engineer. And even though I get very excited about fundamental science, I always want to make things useful.”

Students working with Dr. Koleilat speak of her as a supportive mentor whose excitement about research is infectious. She is modest about her mentorship role, giving credit to the students, but says she believes strongly in helping them broaden their horizons by considering research careers, supporting them through programs like the Undergraduate Student Research Awards, and mentoring the solar car team since its inception.

Asked about her involvement with Dal Solar Car — a group of students who have built Atlantic Canada’s first solar-powered vehicle — she credits the team itself: “They are very independent and I'm very proud to be their supervisor. But honestly, I shouldn't really take credit. We’ve had a great collaboration, but they're pretty independent. I'm just there to cheer them on and support them as much as I possibly can. Our students are incredible.”

Dr. Koleilat says she understands that most undergrads will wind up going into industry. But she is passionate about giving them as much exposure as possible “to the beauty of research and to the possibilities. I try as much as possible to fund undergrads in the summer [through programs like USRA], and I take time in the summer to make sure I'm available daily for my undergraduate students.” She also organizes weekly group lunches with all her student researchers, both graduate and undergraduate, “to foster a positive collegial environment.”

Ultimately, students may opt to go to industry, and that’s OK. “Will they fall in love with research or will they go to industry? It’s not about the outcome. I just want them to explore,” she says. “As long as they are excited about the work, then at the end of the day I’ve succeeded.”

Door-in-Door-out:

Noreen Kamal brings an engineer’s eye to stroke treatment

Dr. Noreen Kamal is working to improve outcomes for stroke patients across Canada. A professor in Dalhousie’s Department of Industrial Engineering, she’s used to people finding the focus of her work unusual. “I do get it a lot. ‘You’re in engineering and you do health care? That’s so weird.’”

Dr. Kamal is the principal investigator for OPTIMISING ACCESS, a national initiative that aims to ensure the highest level of quality in acute stroke treatment across Canada.

Stroke is the leading cause of severe disability in adults, and one of Canada’s top killers. EVT (endovascular therapy) is a highly effective treatment, but it is only available in large centres and must be administered quickly. OPTIMISING ACCESS will build a national stroke registry, use the data to assess rural-urban disparities when it comes to EVT access, and then move on to a national project to improve transfer efficiency.

“In stroke, we lose 1.9 million neurons every single minute,” Dr. Kamal says. Administering EVT quickly can mean the difference between minimal brain damage and severe disability or death. But the procedure can’t be done just anywhere. She says, “You need an angio suite and interventional neuroradiologists to perform these procedures” — and those are typically only found in larger cities and teaching hospitals.

Currently, EVT is only available at 27 hospitals in Canada. The majority of patients arrive at one of the country’s 178 primary stroke centres, which offer thrombolysis treatment, but not EVT. They may then get transferred to one where EVT is available.

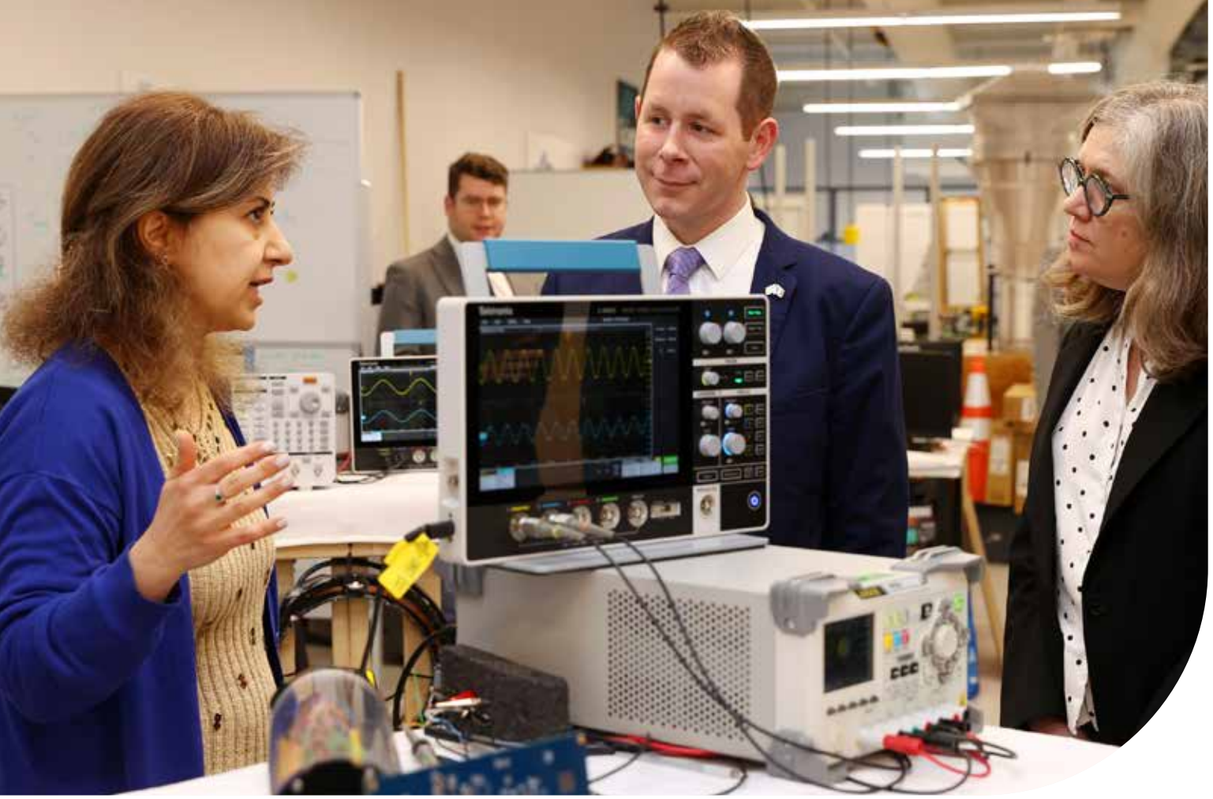
As Dr. Kamal explains, “Something like 30 to 50 percent get the procedure, and the remainder arrive too late. So it creates this huge disparity between urban and rural patients in this country.”

She says the answer is not to make EVT available everywhere — that would mean putting neuroradiologists in small communities where they might only do the procedure a few times a year. Instead, she hopes to help lower the time between stroke patients arriving at a primary stroke centre, and when they leave for an EVT hospital. That’s called door-in-door-out-time.

This is not Dr. Kamal’s first large-scale project aimed at improving stroke care. After completing her PhD at UBC, she joined the internationally renowned Calgary Stroke Program. There, she led a project to reduce “door to needle time” — the time from arrival in hospital to the start of thrombolysis treatment. “I worked with all 17 of their stroke centres, and we brought it down from approximately 70 minutes to 39 minutes. So, a huge reduction in time to treatment,” she says. She also learned “a lot about how to implement change and how to make change across organizations.”

That experience will inform her work with OPTIMISING ACCESS, where the goal is to reduce door-in door-out time across Canada. “Currently we're sitting at something like two hours, and we want to bring it down to 45 minutes.” That may seem ambitious, but the Alberta experience shows it’s possible.

While her research involves working closely with medical staff, Dr. Kamal says it’s her engineering background that has primed her for success in quality improvement — even if she didn’t recognize it right away. Her attitude was, “I’m an engineer! I want build new technology, I don’t just want to be improving processes.” But Dr. Kamal says she quickly “got the quality improvement bug. I loved it. As an engineer, we think differently than clinicians, right? We're systems thinkers.”



Tiny tech, big opportunities:

How MINDI Hub is Powering the Future of Microelectronics

Beneath the icy waters of the Arctic, a fleet of unpiloted underwater drones glides silently, guided not by human hands but by the Earth's own magnetic fields. These high-tech instruments, developed by researchers at Dalhousie University's new Microelectronics Innovation, Design and Integration (MINDI) Hub, are designed to push the boundaries of ocean exploration. With the ability to navigate autonomously and transmit critical data across large underwater distances, these drones could unlock new insights into climate change and marine ecosystems.

This ground-breaking project, led by engineering professor Dr. Jean-François Bousquet in collaboration with Arizona-based Ambature Ltd., is just one of many ambitious research initiatives already underway at the newly launched MINDI Hub. Established with a $1.4-million investment from the Government of Nova Scotia, the hub aims to solidify the province's position in Canada's rapidly evolving microelectronics sector.

Bridging Research and Industry

Officially unveiled in January, the MINDI Hub is based at Dalhousie Faculty of Engineering, Sexton Campus. It is a strategic initiative designed to bridge cutting-edge research with industry needs, fostering innovation and commercialization in semi- and superconductors. These technologies serve as the critical foundation for modern advancements in artificial intelligence, healthcare and communications.

"With the Government of Nova Scotia's investment in the MINDI Hub, the province is carving out a strong foothold in Canada's microelectronics landscape," says Dr. Jennifer Bain, Dalhousie's interim vice president, research and innovation. "By fusing our strengths in electrical engineering with Dalhousie's broader expertise—and making industry engagement a core element—this initiative is poised to ignite a tech sector rooted in Nova Scotia's unique capabilities."

Nova Scotia's investment, delivered through the Community Economic Development Fund, is a timely response to both soaring global demand for microelectronics and increasing geopolitical pressures to expand domestic production. The MINDI Hub ensures that Nova Scotia is well-positioned to take advantage of these trends, transforming the province into a key player in Canada's semiconductor landscape.

From Concept to Commercialization

Unlike traditional research labs, MINDI Hub is built with a strong emphasis on industry collaboration. By working with organizations like Canadian not-for-profit CMC Microsystems and international partners such as Ambature, the hub aims to accelerate the development and commercialization of semiconductor applications. This will not only generate new intellectual property but also support the growth of a deep-tech business ecosystem in the region.

"Through MINDI, we will be able to provide access to cutting-edge semiconductor design, testing, and IP development facilities," says Dr. Bousquet, the project lead. "This initiative will create conditions to attract and build deep-tech businesses rooted in Nova Scotia, while training a highly skilled workforce to sustain and grow the sector into the future."

Innovations in Health and Communication

Beyond ocean technology, the MINDI Hub is supporting pioneering research in health and communication applications. Dr. Kamal El-Sankary, director of Dalhousie's Mixed Signal Integrated Circuits Laboratory, is leading efforts to develop ultra-sensitive biosensing technologies. His team is working on an advanced system-on-chip solution that integrates sensors and processors into a single compact device, creating electronic noses capable of detecting and classifying airborne molecules with remarkable precision.

"By fusing advanced science with industry partnerships, the MINDI Hub will position Nova Scotia as an important new centre for microelectronics innovation in Canada"

DR. JEAN-FRANÇOIS BOUSQUET

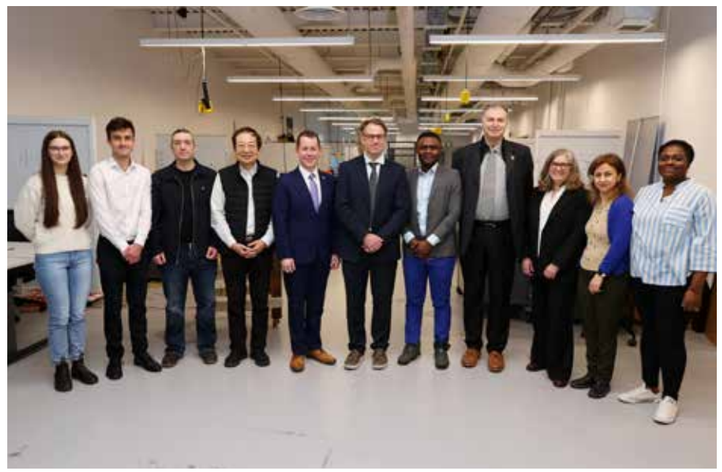
These electronic noses, inspired by the human olfactory system, could be game-changing in various fields, from smartphone-integrated diagnostics to environmental monitoring and robotics. By significantly reducing the cost and size of molecular detection systems, this research could lead to widespread applications in healthcare and industrial safety.

Meanwhile, Dr. Zhizhang (David) Chen, and another principal investigator at MINDI Hub, is working on next-generation communication technologies that leverage microelectronics for faster, more efficient data transfer. His work has the potential to revolutionize wireless networks, supporting everything from smart cities to next-generation space communication systems.

A Vision for Nova Scotia's Tech Future

With MINDI Hub, Nova Scotia is staking its claim in the high-tech world of microelectronics. By providing state-of-the-art research facilities and fostering industry connections, the hub is setting the stage for long-term economic growth, high-tech job creation and technological breakthroughs.

"This investment from the Government of Nova Scotia represents a huge opportunity for technological discovery and economic development," says Dr. Bousquet. "By fusing advanced science with industry partnerships, the MINDI Hub will position Nova Scotia as an important new centre for microelectronics innovation in Canada—where ground-breaking ideas become tangible technologies that improve lives, fuel economic growth, and help shape the world to come."



ENGINEERING A LIFE-CHANGING SOLUTION:

Dal Students Develop Wearable Artificial Kidney

When the time came to choose a capstone project, Dalhousie Chemical Engineering student Haley Beaton and her classmates knew what they wanted to do.

"Over the previous summer, I worked at the hospital with dialysis patients," says Beaton. "It really touched me how much it affects their lives. They're doing this multiple times a week for multiple hours, and it takes a lot of energy out of them."

Believing that they could make a difference, Beaton, along with fellow Chemical Engineering students Jayden MacKenzie, Melanie Langmaid, and Katelynn Robinson developed a portable, wearable artificial kidney. This lightweight, battery-charged system has the potential to free millions patients worldwide from demanding treatment schedules that make it impossible to do everything from having a full-time job to travelling.

"There is a current take-home option for dialysis, but after a few months of training, the patients are left to themselves and there are no real fail safes in the system," explains Jayden MacKenzie. "We really envisioned the patient experience in designing this to ensure it is as user friendly as possible."

The artificial kidney is unique in several ways. It has a silicon membrane, making it lightweight and safe. It also has a regeneration system, which removes different toxins from the dialysis fluid, and a replenishment system that adds the right balance of electrolytes to the fluid.

But MacKenzie says the real benefit is the increased mobility the battery-powered kidney offers patients.

"Our kidney has a blood flow rate of 40 millilitres per minute, which is far less than the 200 to 500 millilitre rate of traditional dialysis," he explains. "That means our kidney is less draining on patients. There is no point in offering them the ability to be mobile if the process leaves them exhausted."

More than user friendly, the artificial kidney is environmentally friendly, using considerably less water and generating significantly less greenhouse gas than traditional dialysis. Add in cost efficiency, and MacKenzie believes the kidney has the potential to be revolutionary for millions of patients and for the planet.

"That's why we took this project on—we saw that we could engage patients and other stakeholders, see a benefit, and give back to the community," MacKenzie says.

The opportunity to engage with stakeholders and apply learning to solve a real-world challenge was invaluable for the team. So too was the chance to explore possible career paths beyond the traditional realm of oil and gas. But it was the ability to work relatively autonomously that helped the team finesse their skills and grow in confidence.

"Typically, in our courses, we're given a project where we follow a set design," he says. "For the capstone, we control the scope ourselves and we get to meet with stakeholders and patients, explore what they want, and figure out ourselves how best to do that."

Beaton, who is interested in a career in biomedicine, says the team is finalizing the design of the artificial kidney.

"We are interested in talking with our advisors about the way forward," she says. "If we can find the right supporters, either in the faculty or beyond, this is definitely something that we can look at continuing, either some of us or all of us."

THE PHANTOM OF THE LABORATORY

Electrical Engineering students Liam Hines and Joe Anderson don't mind admitting one of the reasons they chose their Capstone project is that it sounded cool. They are part of a team of four (which also includes Denis Hadzimurtezic and Nicholas Comeau), building a wet phantom to test the calibration accuracy of a Magnetoencephalography (MEG) system.

"We got a list of different projects that we could work on, and when we saw 'wet phantom,' it was kind of awesome," Anderson says.

MEG machines measure the tiny magnetic fields generated by electrical currents in the brain. They use tiny sensors, each of which is calibrated. But testing overall calibration accuracy requires a phantom — an orb that mimics a human head. A wet phantom is filled with a saline solution, and while they are available from MEG manufacturers, the cost to researchers is prohibitive. So the students, working under professor Timothy Bardouille of Dalhousie's Biosignal Lab, are building a low-cost open source 3D-printed alternative.

"The whole vision for this project is that different labs across the world can print and create their own version of the stuff that we're making," Anderson says. "So we're going to release instructions on how to assemble it, and how to run a test to assess how accurate your MEG system is."

While Anderson describes the phantom as "an orb of water with a little bit of salt," building it comes with its challenges.

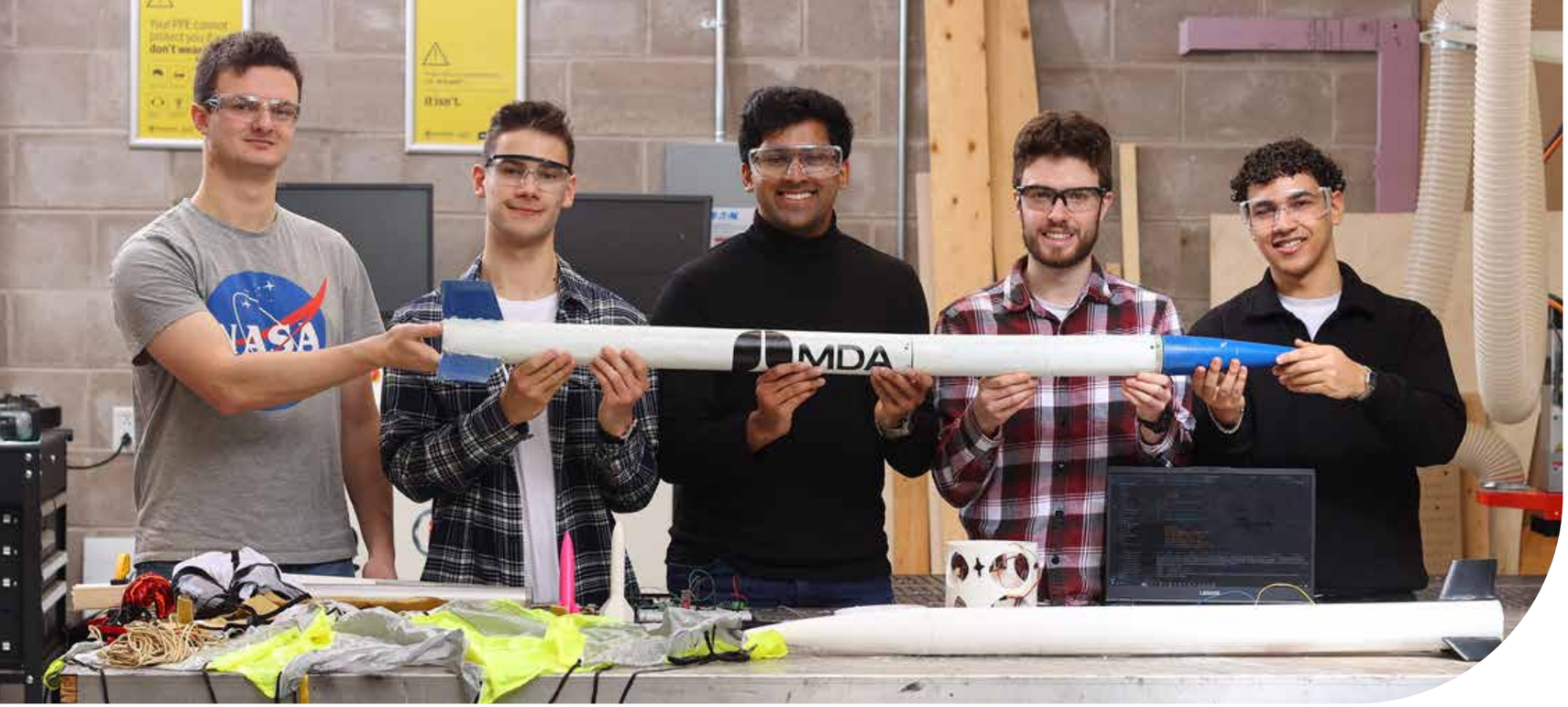
For one thing, it has to be waterproof. "If you have a ball of water in a couple of million dollar machine, you don't want it leaking and bursting everywhere," Anderson says. The phantom has to not only be waterproof, it needs to be made out of easily accessible parts that other teams can replicate.

And that's where Hines, the self-described "gasket guy" comes in.

"Basically, we are using a super-elastic silicone material, and hoping we can clamp that in between the two pieces," Hines says. The solution has to be durable, reusable, and easy to replicate: "If we can give them a file to print that has a gasket they can just put in and that will work, then that's an attractive option."

The project is multi-faceted, involving designing the phantom and a circuit board, creating files for 3D printing, and developing clear instructions for other users. Still, one of the biggest challenges was "just wrapping our head around the theory," Hines says.

He adds, "Electromagnetic theory was none of our strong suits, I'd say. But we all find it interesting, and that made it a lot more approachable. And since Tim's a prof, he's really good at explaining. Our client was not just a client — they were a professor in the field."



DALHOUSIE ROCKETRY TEAM SET TO SOAR TO NEW HEIGHTS

Members of Dalhousie Engineering's Rocketry team share a common passion—they're fascinated by rockets.

"The best part is the love for the field," says Will Greenlaw, a mechanical engineering student and co-project lead for the student design team. "There's kind of a community around it. Everyone who gets involved has a super passion about it. They get so excited to launch, they get jittery."

That excitement is about to reach new heights as the team prepares for the Intercollegiate Rocketry Competition this August. Student teams from universities and colleges across North America will put their engineering skills to the test, designing, building, and launching high-performance rockets.

Over the past year, Greenlaw, along with his fellow co-lead, electrical engineering student Anirudh Nair, and 25 other Dalhousie Engineering students, have been working to design and build their rocket. Standing 3.5 meters tall with a 6-inch diameter, the rocket is powered by a solid rocket motor capable of propelling it to speeds exceeding 400 meters per second.

The ultimate goal? To reach an altitude of 10,000 feet.

"It's a pretty fast rocket. It'll reach 10,000 to 12,000 feet in 20-25 seconds. When you launch it, you don't even see it. It just disappears," says Greenlaw. "Then it just falls out of the sky with a parachute."

"But the competition isn't just about launching a rocket," adds Nair. "It's also an engineering design competition. It's not just about how high you go or how big of a motor you have. It's about how well the entire rocket is built."

Engineering the Best Design

To win, teams need to meet specific criteria for safety and functionality during the competition. In addition to speed and altitude, teams are required to demonstrate the performance of various onboard systems, including flight computers and recovery mechanisms. Factors such as accurate altitude measurement, smooth and controlled ascent, effective recovery systems, and quick problem-solving during testing all play a role in determining the winning teams.

"But before you launch a rocket, you have to do a presentation. You talk about your rocket, and you have to show the judges that you actually engineered a rocket by showing them all of your technical analysis work," says Nair. "You need to convince them that you actually engineered it properly."

Like many other competitors at the event, the Dal Rocketry team isn't just competing to launch a successful rocket. Their goal is to push the boundaries of success in aerospace engineering.

"If you build a bigger, better rocket, it'll eventually go higher and higher, faster and faster. And there's no real limit to what it theoretically can or cannot do," says Nair. "That's what I love about rocketry, and I eventually want to do something like that."

Facing Challenges

Although the prospect of launching a rocket is thrilling, the process comes with potential challenges. One of the biggest concerns is the risk of the rocket getting damaged while being transported to the competition. Nair and Greenlaw say that the team must carefully pack and test crucial components, including black powder charges and flight computers, while also ensuring the rocket remains intact during the journey. The biggest goal is to make sure everything functions as planned so that once the rocket is airborne, there are no surprises.

"There's a lot that can go wrong," says Nair. "I've heard stories in the Launch Canada community where a rocket is ready to go 100%, but someone forgets to arm it or press the on button for the flight computers."

Another potential issue is the parachutes failing to deploy after a successful launch.

"If the parachutes don't deploy, the rocket will just slam into the ground like a missile," explains Greenlaw. "You really have no idea what's going to happen; it's unpredictable. If the parachutes deploy too early, they'll create so much drag that it could cause the rocket to malfunction."

The key, he says, is incorporating redundancies into the design to ensure everything functions properly, particularly when it comes to parachute deployment.

Hands-on Learning at Its Best

Throughout this process, Nair and Greenlaw have been able to apply their classroom knowledge directly to their rocket design. Greenlaw has drawn on his mechanical engineering expertise to address challenges related to aerodynamics, materials science, and structural design. Meanwhile, Nair says that his background in electrical and computer engineering, along with the skills learned in class, has been essential to the success of the rocket design process.

"The design requires extensive calculations, math, and simulations, which are directly tied to what we learn in our courses," he says.

As co-leads, Nair and Greenlaw oversee a team divided into specialized subsections, each focused on key aspects of the rocket's design and launch. The mechanical engineering team handles the rocket's structural components, while the materials science team selects and tests materials like carbon fiber for durability. The electrical and computer engineering team, led by Nair, manages the flight systems.

Students in each section gain hands-on skills beyond what's taught in the classroom, with all subsections collaborating to ensure the rocket functions seamlessly for a successful launch. Despite the work put in outside of class, it's the excitement and the opportunity to be part of something bigger that makes it all worthwhile.

"I find that everyone who gets involved is super passionate about it and wants to be there, wants to help, and wants to do stuff," says Greenlaw. "For a rocket launch, there's so much engineering involved, and there's so much preparation, and then the actual event is like a spectacle. You get to watch a rocket launch!"

Engineering a Toolbox of Possibilities

The Emera ideaHUB is the go-to resource for students to learn about innovation and entrepreneurship and bring their ideas to life.

Meet three Dal students: **Aratha Thanamayooran** (B.Eng. ’25), **Kenneth Martyns-Yellowe** (M.S. ’21), and **Rudransh Goyal** (B.Eng. ’27) who have immersed themselves in Atlantic Canada’s vibrant startup community through the Emera ideaHUB.

Tools to Create: The ideaHUB coop experience

Aratha Thanamayooran has always had an insatiable curiosity about understanding how things work, which is what drew her to the Emera ideaHUB. Growing up in Sydney, NS, she was fascinated by many things—like how road systems are designed and how everyday devices in our homes are marketed. While pursuing her degree in electrical engineering at Dalhousie, Thanamayooran chose the Emera ideaHUB for her coop work term. “At the -HUB, I got to be part of the design process, working across a variety of sectors, doing hands-on work like building physical prototypes using 3D printing,” she says. Each project added a new tool to her engineering skillset—

"The Emera ideaHUB is a space where creation never stops."

ARATHA THANAMAYOORAN

design thinking, rapid prototyping, and interdisciplinary collaboration.

One of her most impactful experiences was working with B3D, a company developing a novel medical device to stabilize the breast during a lumpectomy. “I learned about preoperative planning, imaging techniques, and how consistent and precise positioning of the breast throughout the process would help surgeons pinpoint and remove the tumor, plus any cancer cells in the surrounding margins,” she explains. “Having the opportunity to work with Dr. Michael Gross and the B3D team and contribute to developing a breast stabilizing prototype was really meaningful.”

While still in the early stages of development, B3D is on its way to producing a device designed to stabilize the breast position for improved tumor localization—from imaging to surgery—and achieve better patient outcomes.

Reflecting on her work term experience, Thanamayooran says, “The Emera ideaHUB is a space where creation never stops. Whether I’m working on developing a medical device or a solar car design, I’ve learned how to ideate and go through the prototyping and iteration process, and for me, that’s engineering at its finest.”

Tools to Transform: The ideaBUILD program

Kenneth Martyns-Yellowe, while completing his Master’s in Earth and Environmental Science, became familiar with the Emera ideaHUB's BUILD program through which he and his colleagues are building their prototype. Martyns-Yellowe grew up by the sea in Port Harcourt, the capital of Nigeria’s oil industry, and has always had a deep connection with—and respect for—the ocean. “I remember launching paper boats in my backyard and watching them travel with the swift current,” he says.

Today, Martyns-Yellowe aims to use ocean currents to help cleanup teams respond more effectively to oil spills. He is developing RETSSOP, a floating, hexagon-shaped absorber integrated device that can be deployed in strong currents and uses super-hydrophobic biomass sorbents to rapidly absorb oil. RETSSOP stands for retractable, extendable, traversable, sustainable system and operational planning.

“We’re developing an oil containment solution that functions when the seas are high or the winds are strong—conditions

where booms may be less effective," he continues. RETSSOP uses a unique oil sorbent made from inexpensive plant waste with hydrophobic properties, meaning it is designed to absorb oil while repelling water. "One kilogram of our preferred sorbent is capable of absorbing up to 18 kilograms of oil."

"Our participation in the Emera ideaHUB has exposed us to the expertise and resources needed to continue iterating and developing a scalable prototype to meet industry demand."

KENNETH MARTYNS-YELLOWE

The RETSSOP prototype is engineered for easy deployment, to flow with the currents, and to rapidly absorb oil spills. Its hexagonal design will allow multiple RETSSOPs to connect in a floating honeycomb formation, making it possible to turn virtually any workboat or larger vessel into an Oil Spill Response (OSR) vessel and quickly initiate containment in case of an accident.

Martyns-Yellowe and his team are now using a portion of the $10,000 grant from the ideaBUILD program to pitch RETSSOP at international offshore oil industry conferences in South America and Africa, and establish connections with potential industry and academic partners. "Our participation in the Emera ideaHUB has exposed us to the expertise and resources needed to continue iterating and developing a scalable prototype to meet industry demand," says Martyns-Yellowe.

Tools to Integrate Emerging Tech: ideaDESIGN and Hackathons

Rudransh Goyal loves figuring out how new technologies can improve things. In grade 10, his team faced off against college students and won the Indian Institutes of Technology (IITs) car robotics competition. Then, in his second year of engineering, while working at the CNIB Foundation, he learned that it takes two years to train a guide dog, at a cost of about $50,000. "People who are blind and visually impaired are waiting up to a year for a guide dog to become available, and I wanted to find a solution," says Goyal.

While robotic guide dogs may one day help the visually impaired, Goyal came up with the idea of incorporating AI into a pair of sunglasses that could offer people independence today. These innovative AI sunglasses, called VisAble, would be able to identify a range of elements, like traffic signals, to provide users with enhanced route planning capabilities. "Our VisAble sunglasses would be engineered with tiny cameras and use AI to report back to the wearer things in their environment," Goyal explains.

Excited by their idea, Goyal jumped into Dalhousie's entrepreneurship ecosystem with both feet. They participated in the Emera ideaHUB's DESIGN and Dal Innovates' Collide programs. "The HUB and Dal Innovates guided us through design sprints and customer discovery efforts, which helped us validate our idea in the marketplace," says Goyal. "We also gained access to the HUB's incredible engineering resources and made connections with successful entrepreneurs whose insights guided the development of our VisAble sunglasses."

Goyal continues to embrace emerging technologies, applying his growing skill set in hardware, software, and process design. He participated in—and won—a design hackathon hosted at the Emera ideaHUB, where the first-place prize was an internship at Detect Inc., a company dedicated to modernizing power line structure inspections through drone imagery and artificial intelligence.

The hackathon's problem statement was: "How can Detect benefit from changes in drone laws that will allow more automated flights?" Now, Goyal brings his innovative, solution-driven mindset to work each day. He adds, "I am proud to have the opportunity to work with the Detect team on integrating artificial intelligence algorithms so drones can cover more area in less time."

Stocking Up the Student Entrepreneurship Toolbox

Dalhousie University, through the Emera ideaHUB, offers students a wide range of opportunities to learn the skills of prototyping, innovation, and entrepreneurship. Amplifying the student experience to include possibilities like building your own physical product, starting your own business, and finding jobs in Atlantic Canada's startup ecosystem.

For Thanamayooran, Martyns-Yellowe, Goyal, and many other aspiring innovators, the Emera ideaHUB is more than just a space—it's a fully stocked toolbox of possibilities, empowering students to engineer a future where ideas take shape and solutions come to life.

Colin Silver's Journey with Detect

Colin Silver has lived in Nova Scotia his whole life. The 23-year-old Engineer in Training completed two of his Dalhousie Electrical Engineering Co-op work terms with Detect (formerly Pilot Wave). After graduation, he was hired full-time as a Junior Engineer in Flight Operations.

"Detect was formed as a collaboration between Pilot Wave Technologies and Connect Atlantic Utility Services (CAUS) after Pilot Wave acquired CAUS in 2021," says Silver.

Initially launched in 2022 as an R&D project to enhance data-driven powerline inspections, the initiative quickly expanded beyond its original scope, leading to the creation of Detect as a standalone entity focused on revolutionizing utilities' operating systems and enhancing the stability and security of the power grid.

Silver noted that the organization has always provided him with the freedom to explore through his ideas and projects. "They did an amazing job at giving me the power, responsibilities, work, and trust of a full-time employee during my co-ops," he says. "Becoming a full-time employee felt like a true reward for my hard work during co-op. I now can work on projects that will span beyond 4 months. This further contributes to the atmosphere of innovation and freedom that makes Detect such an amazing workplace."

Detect has been fortunate to collaborate with the Emera ideaHUB, which has allowed them to strengthen their technical capabilities and market position. Silver described the partnership as invaluable to their growth and success. "Working with the Emera ideaHUB has significantly benefited our organization by providing access to cutting-edge facilities, expert mentorship, and a collaborative environment that fosters innovation," he says.

"This partnership has accelerated our product development, connected us with talented students and graduates, and helped us bring projects to market more efficiently."

Silver discussed the impact Dalhousie Co-op students have had on Detect. "Their work has not only supported our day-to-day activities but has also led to innovations that have had a lasting impact on our organization.

"The tools and solutions they've developed have enhanced productivity and streamlined workflows, making them an integral part of our ongoing success. Their contributions have been invaluable, and we look forward to continuing our partnership with Dalhousie University."

WHERE CLASSROOM MEETS WORKPLACE:

Dal Engineering Student Honoured as 2024 Top Co-op Student of the Year

Dalhousie students once again demonstrate that when it comes to work-integrated learning, they are eager to make an impact on the organizations they work for while gaining valuable skills and knowledge for the future.

In 2024, 72 students (from engineering, computer science and management) were nominated for Top Co-op Student of the Year, proving that Dalhousie students are making an impact on their employers every day.

Of those 72 nominations, five exceptional students were chosen as the 2024 Top Co-op Students of the Year, including Dalhousie Engineering student Grace O'Connor.

Grace saw an opportunity where others saw a choice. Rather than choosing between chemistry and engineering, she pursued both, blending theory with application. She is pursuing a dual degree in Chemistry and Chemical Engineering and a certificate in Biomedical Engineering.

Grace's passion for chemistry started in high school. As she explored engineering at Dalhousie, she realized the two fields complemented each other perfectly. "Through the co-op program, I was able to apply for jobs that combined engineering and chemistry, allowing me to see the connections between the two fields," she says.

Grace's first co-op was as a student lab technician at Bureau Veritas in Calgary, where she gained extensive lab experience. "I was responsible for processing client samples and performing tests, validating data and results, managing the GRV area, and communicating with other groups in the laboratory," she explains.

For her second co-op, she joined Solid State Pharma as a research intern, exploring the use of supercritical carbon dioxide as a solvent for praziquantel cocrystal formation. She analyzed data using X-ray powder diffraction, optical and scanning electron microscopy, thermogravimetric analysis, and differential scanning calorimetry.

"The work I did became part of a recently published research paper, which is an incredible opportunity as an undergraduate student," she reflects.

Her third co-op took her to Dalhousie's Department of Physics & Atmospheric Science and the School of Biomedical Engineering, where she researched fibers for tissue scaffolds using marine collagen from commercial waste. Grace played a key role in discovering a new method to produce protein microfibers, significantly impacting how her research group and 3D BioFibR approach microfiber fabrication. Her final presentation to stakeholders was highly regarded, and she won third place for her poster at Atlantic BIOCON 2024 in Halifax.

Through these experiences, Grace developed independence in tackling research challenges and gained confidence in her problem-solving skills. "I've learned a lot about myself and what I want in my career through the co-op program," she says.

Her co-op journey solidified her interest in research and its real-world applications, shaping her aspirations for graduate studies and a career in scientific innovation. "The co-op program has had a profound effect on me over the course of my undergraduate experience, and I believe it has set me up for success post-graduation," she adds.

She encourages other students to explore diverse co-op experiences to discover their interests. "Give yourself the opportunity to try as many things as possible so you find what you like. But don't stress too much about it," she advises.

As she moves forward, Grace is eager to continue pushing the boundaries of research, using science to solve real-world problems.

Dealing with Data: Julia Sarty is equally at home in finance and health care

"Any place you go has a data team," Julia Sarty (MASc '23) says. As part of that team at Mosaic, a company that provides strategic finance software, Sarty spends her time "learning and listening to people from so many different industries — anything from school software, to commercial laundry, to tech security. I live and breathe their financial data, and bring it into the product I work for."

It's not the career direction she expected when she started her undergrad as an Electrical Engineering student at Dalhousie. But, Sarty says, that speaks to the strength of Dal's engineering programs, and in particular Industrial Engineering, which she eventually switched into. The "broad base of knowledge" she got in Industrial has served her well, she says: "I'm able to interact with customers from a variety of backgrounds, which is something you don't get if you go to school for something very niche or don't have that really broad background."

Sarty, who lives in Halifax and works remotely for California-based Mosaic, did her graduate work in Industrial Engineering working with a very different set of data — four years worth of information from the emergency department at Halifax's IWK Health Centre. Working under the supervision of Dr. Peter Vanberkel at Dal, and Dr. Majid Taghavi from Saint Mary's University, she used machine learning to try and understand why some patients who present at hospital emergency departments leave without being seen (LWBS).

Sarty says the "bounce-back effects [of LWBS] are quite serious." Sick patients who leave could infect others before returning. Or if they have an unaddressed issue, it could become more severe before they come back to the ED.

"I'm able to interact with customers from a variety of backgrounds, which is something you don't get if you go to school for something very niche."

Since patient data is very sensitive, Sarty worked with anonymized information that would prevent individuals from being identified. Still, she says, some clear patterns emerged. One of the most striking was that people who travelled the shortest distances were more likely to leave early. "Predicting if they're going to leave or not seems to be kind of like an insurmountable task," Sarty says. "But we ended up building models that were able to pretty accurately predict [the possibility of LWBS] based on the administrative data we had." ED nurses can then use that information to predict which patients are most likely to leave, and develop effective interventions.

Going from health care research to strategic finance planning may seem like a jump, for Sarty it's a natural outgrowth of her training in Industrial Engineering at Dal. "I'm able to talk to a variety of people about a variety of subjects and understand their perspective," she says. "Having that broad base of knowledge keeps me learning from the people I work with now, and also makes me feel like I'm equipped to return to health care, if that's something I wanted to do."

Giving Back: Kirk Drabble

At age 25, Kirk Drabble (BEng '22) has already been giving back for some time, starting with his lacrosse coaching debut at age 14. While studying industrial engineering at Dalhousie, Drabble took an interest in various university societies. This included playing a role in creating the Dalhousie Denim Engineering Jacket, helping revive the Sexton Campus newspaper, and eventually serving as president of the Dalhousie Undergraduate Engineering Society.

During his senior year, his team competed in the Atlantic Engineering Competition, and he was part of the team recognized by the Eldon Gunn Award, for the best industrial engineering solution provided to a client for the senior Capstone project in industry.

Drabble says he chose Industrial Engineering because he was drawn to "systems thinking, seeing the bigger picture, and working with people." Those are the qualities that have served him well in his volunteer efforts. Ask him about his contributions, and he is quick to credit other people.

"I believe our planet is at the forefront of Dalhousie students' minds, as well as understanding how we can help."

He recognized the levels of extracurricular involvement on the engineering campus and hoped to bring awareness to it by working with classmates and the engineering society to create a custom Levi's denim jacket for Dalhousie Engineering students. Drabble recalls meeting an alum who had designed an earlier jacket and being inspired by seeing an old leather Engineering jacket at the library. "I saw the opportunity to boost student spirit and recognize students' involvement in various societies with patches on those jackets," Drabble says. "We have such a strong community at Dal — we just didn't have a jacket at the time, and others seemed interested in the idea." A group of classmates wore the initial run of 10 jackets, and as others noticed them, they started to catch on. Soon, orientation leaders were wearing them, and they took off from there.

During his time at Dalhousie, he participated in the engineering co-op program, completing his senior work term in the industrial engineering department at Michelin North America (Canada) Inc., in Granton, Nova Scotia. After graduating from Dalhousie on June 1, 2022, Drabble returned to Michelin for a full-time position, on June 6, 2022, as an industrial engineer-in-training. He describes his role as, "modelling systems and optimizing decision policies, as well as quantifying process improvement opportunities with both economic and environmental justification."

And that aligns with the values of both his Dalhousie cohort and the Industrial Engineering program. "During our senior courses, we had valuable discussion surrounding the pillars of sustainability," he says. "I believe our planet is at the forefront of Dalhousie students' minds, as well as understanding how we can help."

Drabble has continued involvement with his alma mater through supporting organization of the annual Engineering Golf Tournament, as well as serving as a judge for the Designing Productivity conference.

REACHING NEW HEIGHTS:
Holly MacLeod's Path from Environmental Engineering to Tower Engineering

Since earning her Environmental Engineering degree, Holly MacLeod (BEng'22) has taken her career to new heights—literally.

It all began when she joined Tower Engineering Professionals' Canadian Division (TEP

Canada) as a Field Engineer. Strapping on her safety gear, she often climbs hundreds of feet into the sky, inspecting the structural integrity of telecommunications towers across the region.

The climb doesn't scare her. In fact, she thrives on the thrill of making it to the top. From that high above the ground, the world looks different, but for MacLeod, the view is just another perk of the job.

"When I was first taught to climb, I was told, 'How do you eat an elephant? One bite at a time," she recalls. "That's exactly how I approach every climb. Once you get to a certain height, it doesn't really change. You just keep going."

Rain, snow, wind, or shine, MacLeod performs tower assessments year-round. Only a few situations, such as thunderstorms, prevent her from making the climb.

A Team Effort

While climbing towers may seem like a solo endeavor, safety is always the top priority. Each new climber undergoes extensive in-house training, covering fall arrest, tower climbing techniques, safety planning, tower rescue procedures, and first aid. And no one climbs alone.

"We always work in a two-person team," explains MacLeod. "There's always someone on the ground ready to do a rescue if needed." This collaborative approach ensures that climbers remain safe and efficient while working at extreme heights.

"When I was first taught to climb, I was told, 'How do you eat an elephant? One bite at a time.' That's exactly how I approach every climb."

MacLeod climbs a variety of structures, including guyed towers, self-supporting towers, and monopoles, often owned by organizations such as Bell, Rogers, and Eastlink. But climbing is just one piece of the puzzle. While climbing she performs a detailed structural inspection, assessing the condition of steel, checking for corrosion, and identifying any major structural deficiencies.

Leading the Way

Since being hired as a Field Engineer after graduation, MacLeod's responsibilities have expanded.

"I manage our local field team, handling scheduling, client communication, and special access coordination. Before, I was just tagging along while our crew lead made those decisions and now, I'm leading the process"

Her fieldwork has also evolved beyond structural and maintenance inspections to include tower re-tensioning—adjusting the tension of guy wires on guyed towers to keep them properly aligned. This process requires a combination of engineering calculations and physical adjustments using turnbuckles.

Some of her projects have even taken her to remote locations in Northern Labrador, where helicopter access is often required.

"Planning helicopter access is no small feat," MacLeod explains. "Cloud coverage can prevent us from landing, and there's always the risk of being stranded if conditions shift. Effective coordination and contingency planning are essential."

But for MacLeod, the helicopter rides have been one of the most exciting parts of her job.

"I've been on two trips to Labrador where we chartered a helicopter and flew to sites. It was an incredible experience and something that I feel like most people my age don't have the opportunity to do."

From Capstone to Career

Looking back, MacLeod credits her engineering education, and particularly her capstone project, with preparing her for the challenges of her role, including the responsibility of managing a team.

"When you're a co-op student or just a student, you think the cheapest option is always the best," she says. "But experience has shown me that strategic investments whether in materials, tools or planning can save time and money in the long run."

Her experience in the field has also reshaped her perspective on engineering and her career path. Initially, she envisioned a more traditional engineering desk role, never expecting she'd be climbing towers for a living.

"Now I'm doing a bit of structural work, which I never thought I would do. What I've learned is that you can change your original idea of what your career is going to be and that career paths aren't always linear" she says. "I know that I can learn new skills and adapt to whatever challenges come my way".

For MacLeod, the sky is quite literally the limit.

"When you're a co-op student or just a student, you think the cheapest option is always the best. But experience has shown me that strategic investments whether in materials, tools or planning can save time and money in the long run."

EXPLORING DALHOUSIE'S NEW COMPUTER ENGINEERING PROGRAM

Dalhousie Engineering has officially launched a new computer engineering program. Previously an option within the electrical engineering degree, computer engineering is now its own distinct degree program, reflecting the growing demand for expertise in this field.

With the rise of artificial intelligence, cybersecurity, and smart technologies, industries such as telecommunications, healthcare, aerospace, and finance increasingly rely on computer engineers to develop cutting-edge hardware and software solutions. But what is computer engineering, and how does it compare to related disciplines?

To find out, we spoke with two Dalhousie engineering professors, Dr. Rob Adamson, who played a key role in launching the program, and Dr. Colin O'Flynn, who will be teaching upcoming computer engineering courses. Both shared insights into what sets computer engineering apart and why students should consider the program.

Q: WHAT IS COMPUTER ENGINEERING, AND HOW DOES IT DIFFER FROM COMPUTER SCIENCE?

Computer engineering is a field that integrates computer science, electrical engineering, and electronics engineering to design and develop computer hardware and software. The field focuses on how computers operate internally, including hardware functionality and system architecture. It involves interfacing computers with external devices, specialized networking, and understanding the relationship between hardware and software—areas that set it apart from computer science.

"There's a lot of overlap, and we do get this question quite a bit. People do cross over. There are courses that cross over between them," says O'Flynn. "It's common for computer engineering students to take electives in computer science. There are also more opportunities in computer engineering if you want to be involved with power engineering or RF (radio frequency) engineering because we offer those courses."

"Some of the new courses that we're introducing are coming from computer science and they've been absolutely great partners in putting this proposal together," adds Adamson. "I think one of the benefits that we'll get from the program starting is a closer collaboration with computer science."

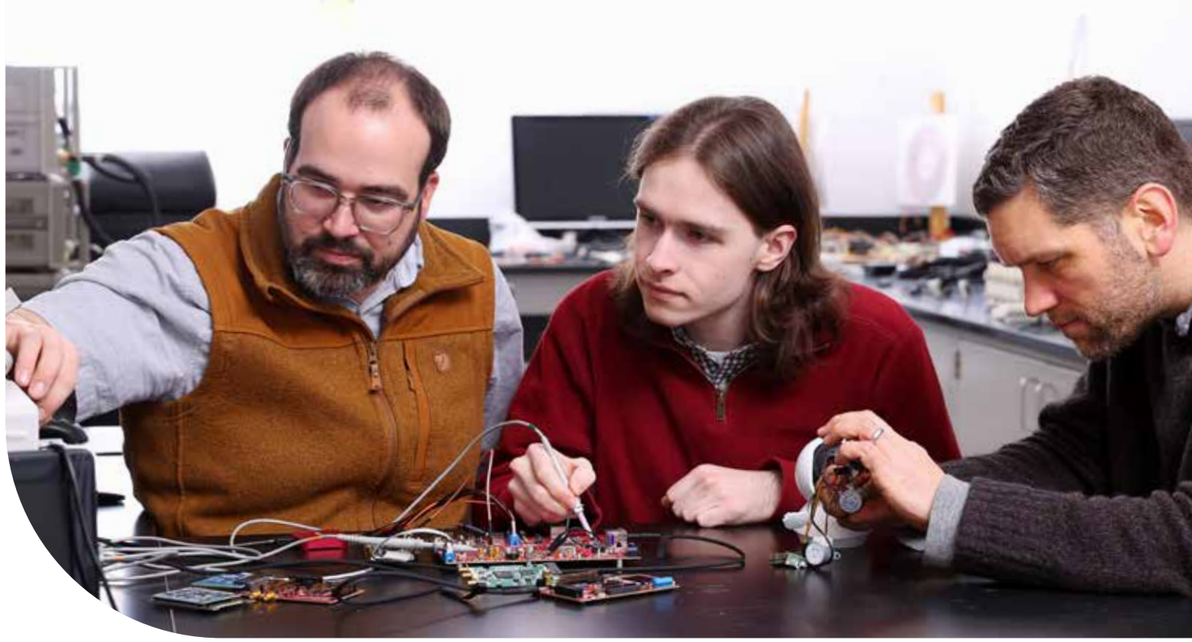
Q: HOW DOES COMPUTER ENGINEERING DIFFER FROM ELECTRICAL ENGINEERING?

Computer engineering provides deeper training in computer architecture and embedded systems, equipping students with the skills to design and lead projects involving new computing systems. While both computer and electrical engineers work with embedded computers, Electrical Engineering places more emphasis on analog systems, power systems, and hardware applications, whereas computer engineering focuses more on digital systems and software-hardware integration.

"If you think about what's in a cell phone, you have components like the microphone and speaker, which are designed by electrical engineers," says Adamson. "At the same time, there are multiple processors inside the device, a screen, and all of these must connect together. You also need efficient code to control them while conserving battery life. That's what computer engineers learn to do. Then, you'll want apps on the phone to run all the functions, and those apps are primarily written by computer scientists. That's one way to understand the distinctions between these fields.

Q: WHAT KIND OF CAREER OPPORTUNITIES ARE AVAILABLE TO GRADUATES OF THIS PROGRAM?

In a fast-growing field, computer engineering graduates can pursue careers in embedded systems development, hardware and software engineering, systems architecture, network engineering, and even biomedical engineering. Computer engineers specialize in managing resources efficiently to control independent computing systems. Electrical engineers however work with a broader range of electronics, including embedded systems and analog components like microphones, speakers, motors, and power systems. The demand for each depends on the specific job and industry needs.



"I think with advances in robotics, interconnected devices, and artificial intelligence, computer engineering is becoming a more sought-after area," says Adamson.

"There's also quite a bit of interest now in the cybersecurity of physical systems," adds O'Flynn. "Quite a few companies have been hiring in this area, and this is very much a computer engineering specialty because it deals with the interaction between computers and hardware. This makes it distinct from computer science. Companies like Nvidia, which develop highly specialized chips like GPUs, have been heavily investing in security-focused teams."

Q: WHAT SKILLS DO STUDENTS GAIN IN THE COMPUTER ENGINEERING PROGRAM?

Students develop a strong foundation in programming, circuit design, digital logic, microprocessor systems, and embedded software. They also gain experience with industry-standard tools, hardware design, and system optimization, making them well-rounded engineers capable of tackling both hardware and software challenges.

"Computer engineering provides more training on the actual architecture of how a computer functions. Today, IoT (internet of things) and embedded systems are everywhere," says O'Flynn. "While electrical engineers make use these systems in their designs, they're not typically designing entirely new architectures. In computer engineering, you gain the tools to do that—you have the skills to lead a project in that area."

Q: WHY SHOULD STUDENTS CONSIDER COMPUTER ENGINEERING AT DALHOUSIE?

Dalhousie's computer engineering program is designed to equip students with cutting-edge skills in this rapidly evolving industry. With state-of-the-art facilities, strong industry connections, and hands-on learning opportunities, students will be well-prepared for future careers. Plus, Halifax's growing tech sector provides excellent opportunities for co-op placements and post-graduation employment.

For students interested in working with devices rather than just software, computer engineering is a great choice, providing the background to not only program but also understand how a system fits into a larger device, how it connects to other components, and how it networks with other systems.

"I think one of our strengths is having Colin, who brings a unique background in cybersecurity as applied to embedded devices," says Adamson. "We're also about to make a new hire as a Tier 2 CRC (Canada Research Chair), bringing expertise in computer engineering as applied to ocean technology. We've got a fair amount of ocean expertise within the Faculty, which I think is quite unique. And I think our regional presence in Halifax, Nova Scotia, and the Atlantic provinces—being the leading engineering school in the region is important. With this new program we are adding a really essential discipline of modern engineering to the options available to our students."

WHAT IS ENGINEERING MATH?

When an earthquake strikes, several factors determine whether a building stands or collapses—one of the key ones is engineering mathematics. But what does that mean, exactly?

In the case of an earthquake, skilled engineers use precise calculations to predict how seismic waves will impact structures and design foundations accordingly. “When the ground shakes, sometimes the earth liquefies—and when that happens, you may be in big trouble,” explains Dr. Gordon Fenton, Department Head of Engineering Mathematics and Internetworking at Dalhousie University.

Ranked among the top 0.2% of scientists globally in Geological & Geomatics Engineering by Stanford University and Elsevier, Fenton specializes in applying complex mathematical models to assess the safety and reliability of building foundations.

“You think about the foundations for your house. It’s sitting on the ground, and the ground is spatially variable,” he explains. “You have a chunk of rock here, a bit of clay there, and gravel somewhere else—each with vastly different properties.”

The challenge, however, is determining how large a foundation should be to ensure safety. This requires modeling the ground as a randomly varying field—an approach that sets Fenton apart in the field of foundation engineering.

More Than Just Numbers

Engineering math, however, goes beyond simply predicting whether foundations will crumble—it’s about applying mathematical principles like calculus, differential equations, linear algebra, and probability to real-world engineering challenges.

“We have a math delivery program in the Faculty of Engineering at Dalhousie that is taught by engineers, which is quite unusual in Canada,” says Fenton. “In fact, I don’t think anywhere else does it. That means our math courses are specifically tailored to the needs of engineering.”

“One of the nice things about engineering math is that we can practice our research or collaborate with basically anybody,” he continues. “And we can also conduct research in any field.”

Faculty members within the department come from diverse engineering disciplines, including mechanical, electrical, and civil engineering. Their research also spans hydrodynamics, biomedical engineering, oceanography, and machine learning.

As a civil engineer, Fenton also chairs the Geotechnical Committees for both the Canadian Highway Bridge Design Code and the National Building Code of Canada, overseeing foundation design standards for highways and buildings.

“I’m well aware of the need for reliability-based design in our codes,” he says. “The goal is to create designs with a tolerable probability of failure, and to do that, you need to assess risk mathematically. That’s why I enjoy teaching probability and statistics.”

Reliability-based design is critical in engineering, striking a balance between safety and cost. Fenton explains that while anyone could build an ultra-reliable structure—like the pyramids—the cost would be astronomical. Modern engineering focuses on creating cost-effective designs that maintain the necessary reliability, whether for bridges, buildings, or everyday products.

For students considering engineering mathematics, Fenton emphasizes that it’s not just about solving equations—it’s about using those equations to build a safer, more efficient world.

Faculty News Snippets

Dr. Barret Kurylyk has been honoured with the AGU Hydrologic Sciences Early Career Award for his groundbreaking research on water resources and climate change impacts in coastal and Arctic regions.

Dr. Hany El Naggar received the prestigious G. Geoffrey Meyerhof Award for his revolutionary contributions to foundation engineering and seismic design.

Last November, Dalhousie Engineering celebrated Dr. Paul Amyotte, a professor in the Department of Process Engineering and Applied Science, who was inducted into the Discovery Awards Hall of Fame. Recognized for his groundbreaking contributions to process safety and risk management, Dr. Amyotte’s research has shaped safety practices worldwide, from dust explosion prevention to establishing one of Canada’s few mandatory process safety courses.

Beyond his global impact, Dr. Amyotte has been a dedicated mentor and educator, leaving a legacy within Dalhousie Engineering.

Last Fall Dalhousie Engineering celebrated two of our exceptional professors from the Department of Mechanical Engineering. Both have been recognized with prestigious 2025 Canadian Society for Mechanical Engineering (CSME) awards.

Dr. Ya-Jun Pan received the CSME Mechatronics Medal for her ground-breaking research in control, mechatronics, and robotics. From advancing intelligent robotics to pioneering cyber-physical systems, Dr. Pan is shaping the future of technology. She’s also a trailblazer in leadership, recently becoming the second-ever female VP of Membership Activities for IEEE’s Industrial Electronics Society.

Dr. Dominic Groulx, Head of Dalhousie’s Mechanical Engineering Department, was awarded the CSME Jules Stachiewicz Medal for his remarkable contributions to thermal science and engineering. Dr. Groulx’s research in heat transfer and thermal energy storage is driving innovation and sustainable solutions on a global scale. Dr. Groulx was also elected as an ASME Fellow for his pioneering work in thermal energy storage and renewable energy systems.

Jon Totten, an instructor in Dalhousie's Department of Process Engineering and Applied Science, has been named the 2024 recipient of the Sexton Award for Teaching Excellence. This prestigious award recognizes educators who enhance teaching and learning in the Faculty of Engineering through their commitment and innovation.

Known for his unique approach and supportive nature, Totten serves as a mentor both inside and outside the classroom. He emphasizes that success isn't defined by perfect grades but by maintaining balance and prioritizing mental health.

Dr. Noreen Kamal's *Innovations Beyond Boundaries* exhibit took center stage last Fall, celebrating technological breakthroughs from equity-deserving groups across the globe. The impactful exhibit was part of the IDEA-NS Improving Diversity in Engineering Across NS initiative, spearheaded by Dr. Kamal, a professor in Dalhousie's Department of Industrial Engineering. Through this inspiring showcase, Dr. Kamal demonstrated how diverse perspectives fuel innovation and drive change,

On December 6th, members of Dalhousie Engineering remembered the victims of the 1989 Montreal Massacre. A vigil, hosted by the Dalhousie Women in Engineering society, was held on Sexton Campus.. The ceremony paid tribute to the 14 women who were shot and killed at l'École Polytechnique in Montreal in 1989. The vigil also celebrated the resilience of women today and a national movement to end gender-based violence.

Ten Dalhousie Engineering varsity student-athletes achieved U Sport Academic All-Canadian status during the 2023-2024 year. Their hard work and success was celebrated at the annual Academic All-Canadian Celebration. To qualify as an Academic All-Canadian, student athletes must maintain a GPA of at least 3.50 over the academic year while competing in a varsity sport. Hard work, dedication, sacrifice and support are crucial for success.

In celebration of International Women's Day, Dalhousie Engineering proudly hosted its 7th annual Women in STEM Networking and Panel Event—an inspiring evening dedicated to empowering young women pursuing STEM studies.

In partnership with Dalhousie's Faculties of Computer Science and Agriculture, the event provided students with the opportunity to connect with accomplished female leaders who shared their personal journeys, challenges, and successes in STEM fields.

Our distinguished panel featured Dalhousie Engineering alum Denise Pothier (BEng'93), now Chief Operating Officer of the Canadian Council for Indigenous Business. Over the years, Pothier has served as an inspiration to countless Dalhousie Engineering students, for her leadership, mentorship and dedication to advancing women in engineering.

A thank you to our alumni and friends who came out to the 15th Annual Engineering Golf Tournament last September. The event was a fantastic celebration of community and generosity. Each year proceeds from the tournament directly support the Engineering Student Experience Fund, empowering students to take part in extracurricular projects that foster innovation and help them excel beyond the classroom.

In March, students from Dalhousie Engineering's Undergraduate Society and the Dalhousie Commerce Society came together to raise funds for the Canadian Cancer Society. In what has become one of the year's most anticipated events, the two groups faced off on the ice for the third annual Eng vs. Comm charity hockey game. Through their efforts, the students raised $62,000 for this important cause, demonstrating their commitment to community engagement and showcasing their significant impact beyond the classroom.

For the first time in 32 years, Dalhousie Engineering hosted the 2025 Canadian Engineering Competition (CEC). Led by Co-Chairs Ali Brennan and Carter McNeil, a team of 41 Dal Eng students organized the prestigious event, bringing together 200 of Canada's top engineering undergraduates to Halifax. The competition challenged participants to solve real-world problems while providing leadership opportunities for the student organizers.

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