Strategic Plan

Annual Progress Report 2020

Faculty of Engineering and Applied Science

Memorial Engineering
November 2020

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1 Introduction

Over the past year, the Faculty continued to show significant achievements toward the goals and objectives of its strategic plan. As outlined in this annual progress report, many successes in teaching, learning, and research grants / contracts occurred in the past year. Faculty members received prestigious national and international awards. Engineering students also had impressive accomplishments. But COVID-19 and its impact on the delivery of academic programs and research have been among the Faculty's major challenges over the past year.

Since March 23, 2020, FEAS moved to remote teaching, learning and administrative operations due to the global pandemic. To maintain academic continuity of programs, the Spring and Fall 2020 semesters were delivered remotely. This large number of courses has only been offered in-person before so the transition to remote delivery was exceptionally challenging. Most courses had in-person lab components so replacement lab activities were required.

The Faculty received updates from the Accreditation Board that temporary changes to program delivery to accommodate COVID-19 public health requirements did not constitute "substantial program modifications" and therefore would be acceptable. CEAB recognized that on-site labs will likely be unavailable and that programs will need to adjust in other ways during the pandemic. CEAB understands that programs will return to regular hands-on lab experiences in subsequent terms after the global pandemic has passed. Due to various logistical, privacy and other challenges with in-person and invigilated final exams, instructors have pursued other forms of academic assessment including take-home exams, in order to uphold principles of academic integrity and quality standards.

The Faculty has contributed to a province-wide initiative called TaskForceNL to increase PPE supplies (masks, gloves, shields) and fabricate other items such as ventilators. This effort has used our engineering facilities in partnership with Eastern Health, Faculty of Medicine and industry. Special thanks to Prof. Andy Fisher and Rick Meaney, Director, Technical Services, as well as a number of faculty members who re-directed their research efforts to fight the spread of COVID-19 in the province, e.g., Drs. Lesley James, Kelly Hawboldt, Ting Zou, among others.

A COVID-19 Student Survey was conducted in the Spring semester. Over 270 engineering students completed the survey about their remote learning experience. Not surprisingly, many students were feeling stressed, and worried about grades, educational quality, and job prospects. Students were feeling disengaged, unfocused, lonely and disconnected. Suggestions were also submitted by students. The Faculty has followed up to make best efforts to address these concerns. Special thanks to Dr. Janna Rosales for conducting the survey.

In the graduate return back to campus, a number of PPE, administrative, and other engineering safety controls in the engineering buildings have been adopted, including signage, floor markings, PPE access, and workspace reconfigurations. Also, in response to student needs, individual and group study spaces have been provided in the SJ Carew Building.

EN 2004 (Cafeteria) was opened in the Fall semester for individual and group study spaces. Also, EN 2007 can be reserved by a faculty member for group meetings between an instructor and a group of students. These rooms have a proximity to the front entrance of the building, where a monitoring individual checks that people have appropriate authorization to enter, and then directs them to their designated seat number.

Detailed and ongoing coordination has continued with Health and Safety, CEP, and custodial staff to monitor and provide access to study spaces in a safe manner, particularly with respect to building density numbers. Increased CEP presence, signage, and increased sanitization, are occurring to ensure the safety of students, staff and faculty members during the pandemic.

For the Winter 2021 and beyond (until a vaccine is available), additional principles have been developed for a measured, gradual and safe return to campus. Accommodations and equitable accessibility will continue to be provided for students including those outside of St. John's. Programs are assembling those designated labs that require in-person hands-on experience, as determined by each department, into a modified format that requires each student to travel to St. John's sometime prior to graduation.

After the Department of Electrical and Computer Engineering (ECE) moves to the new CSF building in September 2021, the vacated space in the SJ Carew Building will be reallocated to the three remaining departments (Civil, Mechanical, and Ocean and Naval Architectural Engineering). Over the years, a significant issue has been a lack of adequate space for student teams. EN 1040 will be reallocated to collaborative space for student teams, manufacturing and assembly areas, and space for testing of concepts and prototypes. Adequate space is important for students to be able to compete successfully in national and international competitions and enjoy a quality learning experience that raises the University's reputational visibility.

The provincial government has paused the growth funding of the Engineering Expansion Strategic Initiative but recently requested a plan for reactivating the expansion in the high demand area of Computer Engineering. Over the past year, FEAS has been challenged with expectations of growth in high-demand areas while simultaneously absorbing budget cuts and attrition as a result of lower operating grants from the Province to Memorial University. Previous annual progress reports on the strategic plan reconsidered and paused the Faculty's original growth plan in light of the current budgetary climate.

This progress report provides an overview of the achievements toward the Faculty's strategic plan [1] over the past year. It provides a summary of actions completed on each of the four theme areas of the strategic plan – student success; research excellence; external partnerships; and distinguished workplace. The initiatives are aligned with the University's capstone strategic plan and frameworks. Progress indicators are included in the Appendix as comparators with benchmark data from a national survey [2] of engineering schools across Canada and Memorial's Fact Books [3]. This report will examine prior actions from the strategic plan which have either been completed, or else became repetitive each year without any substantive changes, as they are now firmly established and regularized elements of the Faculty.

2 Alignment with MUN's Strategic Framework

A new strategic planning process is currently underway to develop the University's next strategic plan. At the time of this report, MUN's Capstone Plan comprised the university's three strategic frameworks in teaching and learning, research, and public engagement. As outlined in Table 1 below, the FEAS strategic plan goals, priorities and action plans are well aligned with the directions outlined by these strategic frameworks of Memorial University.

Memorial's Capstone Goals	**Strategic Plan Goals**
Teaching and Learning Framework	
1. Build relationships – Memorial University establishes connections among educators, students, staff and members of the broader community.	1.2.2, 3.2.2
2. Engage people – Memorial University recognizes that engagement is important in all settings where teaching and learning occur.	1.2.4
3. Create synergies – Memorial University maximizes the benefits that occur when various components of the teaching and learning enterprise come together.	1.2.3
4. Focus on the learner – Memorial University engages its students, educators and staff to develop curricula, programs, support services and spaces that address learner needs and support achievement of clearly identified learning outcomes.	1.1.4, 4.3.1
5. Provide support – Memorial University supports educators, staff and all students it admits by aligning its policies and procedures with the distribution of resources to advance teaching and learning.	1.1.1, 4.2.1, 4.2.2, 4.4.2
6. Commit to quality – Memorial University provides high quality curricula and learning experiences that are current, relevant, creative, innovative and appropriately challenging.	1.1.3, 4.3.3
7. Foster transformation – Memorial University provides a supportive and inclusive environment that fosters individual transformation.	1.2.1, 3.3.5
8. Value contributions – Memorial University recognizes and values the contributions of all individuals who are involved in the teaching and learning enterprise.	1.1.2, 4.1.1
9. Acknowledge responsibility – At Memorial University, educators, students, staff and the institution as a whole share responsibility and accountability for effective teaching and active learning.	1.1.5, 1.2.5, 4.4.1
10. Support lifelong learning – Memorial University models enthusiasm for continuous learning.	3.3.4
Research Framework	
1. Attract, retain, support and celebrate people engaged in and supporting research.	2.1.2, 2.2.3, 2.3.2, 4.3.2
2. Support an environment of research collaboration.	2.1.4, 2.2.2, 2.2.4, 3.1.1

3. Engage with community partners and collaborators locally, nationally and internationally.	2.3.1, 2.3.3, 2.3.4, 3.1.2
4. Support fundamental and applied research excellence in areas of strategic opportunity.	2.1.1, 2.1.3, 2.2.1
Public Engagement Framework	
1. Make a positive difference in our communities, province, country and world.	3.2.3
2. Mobilize Memorial for public engagement.	3.2.1, 3.3.6
3. Cultivate the conditions for the public to engage with us.	3.3.1, 3.3.3
4. Build, strengthen and sustain the bridges for public engagement.	3.3.2

Table 1: Alignment of FEAS Strategic Plan and MUN's Capstone Plan

The action items of strategic plan have been updated and adjusted over time to align with emerging opportunities / challenges in MUN's Capstone plans. These evolving initiatives will be described in the following sections.

3 Progress on Strategic Plan

The four primary pillars of the FEAS strategic plan – teaching; research; partnerships; and workplace – are outlined in this section, including specific outcomes that have been achieved over the past year towards the goals of these priorities. In each of the sub-sections, a selected list of completed action items over the past year will be provided. It is a sample list including some of the main outcomes but not an exhaustive complete list. Most items are new initiatives that have been launched over the past year, while others were continued from a prior year but recently completed this year.

3.1 Creating the Conditions for Student Success

FEAS has achieved a number of significant outcomes and accomplishments over the past year as part of the strategic plan goals for enhancing student success and providing an exceptional teaching and learning environment.

Goal 1.1: Support Teaching Excellence

Transition to fully remote teaching and learning since March 23, 2020, due to COVID-19 was made successfully in the Spring and Fall semesters.

Replacement online lab activities were adopted in the Spring semester. Selected in-person labs were conducted in the Fall term following consultation and approval from EHS.

The Faculty partnered with the School of Graduate Studies to offer an entrepreneurship training program (ETP), Thesis Boot Camp, and other career and professional development opportunities for graduate students.

Teaching Assistants (TAs) received training workshops before their assignment to courses. Five TAs were recognized with TA excellence awards over the past year.

Student class representatives met regularly with Department Heads to discuss teaching effectiveness of instructors in their courses, quality of instruction as reported in CEQ's, and other student feedback in courses.

The new Biomedical Engineering stream has been successful for the initial Classes of 2019, 2020, and 2021. There are approximately 15-20 students in each cohort who have chosen this stream. Going forward, a blended Mechanical / Electrical and Computer Engineering cohort would take the stream together.

The Mechanical / Electrical and Computer Engineering Departments partnered together on the development of a new joint program in Mechatronics Engineering. A draft curriculum and program were completed. A new Mechatronics graduate program is also in progress.

An active mentorship program has supported junior faculty members. Department Heads met regularly with instructors, and CEQ reports were referenced, to discuss teaching performance and identify any issues and actions for improvement.

Departmental academic development committees frequently reviewed the program curriculum, identified issues of concern, and implemented changes for continuous improvement.

Faculty and departmental advisory councils met a few times over the past year to provide guidance, review the program, advise on improvements, and help develop new initiatives.

The Ocean and Naval Architectural Engineering (ONAE) department engaged NRC-OCRE to offer undergraduate labs using their facilities and selected teaching labs were conducted at NRC-OCRE.

In the first Process Engineering curriculum committee meeting of each semester, the committee met with all instructors from the previous semester to jointly review the course outcomes in the previous semester, and discuss the course assessments.

Goal 1.2: Encourage Student Engagement

The Mechanical Engineering department expanded the opportunities for student teams, including the SAE Baja team, Paradigm Hyperloop, SAE Aero, Space Cube, and Mars Airlock teams.

The Engineering Co-operative Education Office ECEO) enhanced the job match process based on suggestions from the student societies and effectively managed the work term and travel disruptions resulting from COVID-19.

Community service learning and research work term initiatives for alternate delivery of co-op education were extended.

AutoCAD Club opportunities were made available to students during co-op semesters. Thanks particularly to Caroline Koenig, as this was a successful undertaking and helped to improve student employability on future work terms by adding this certification on the resume.

An investigation of the feasibility of incorporating extended co-op work terms was conducted. The new initiative was adopted by some departments and approved by Faculty Council. The initiative was successfully launched in the Fall semester.

Many community and industry site visits were arranged for students, e.g., ENGI 3600 (Process Engineering), Town of Clarke's Beach (Civil Engineering, Dr. Joe Daraio), among others.

Guest lectures were arranged with distinguished speakers from SPE and CIM (Process Engineering), University of California, Berkeley (Civil Engineering, ENGI 4717), among others.

Process Engineering students started a new student chapter of the Canadian Society of Chemical Engineering (CSChE), as well as a new student team for an international Chemi-car competition, with the support of a faculty advisor.

Student teams were formed to participate in new national competitions including the Hatch Design Competition, CSChE Poster Competition, and 3M Research Presentation.

A new Student Design Hub (launched by Prof. Andy Fisher) and Engineer in Residence position were created to support student teams and strengthen their competitiveness at national and international competitions.

New initiatives were launched to improve student awareness of Process Engineering in first year courses, including a "Coffee Experiment" case study in ENGI 1040, new course content of mineral processing in ENGI 1050, and engineering sustainability content in CHEM 1051.

An external review was conducted on the program name of Process Engineering, the program's close similarity with Chemical Engineering, and the pros / cons of a potential name change. The external panel included respected experts from across Canada (Dr. Tom Duever, Ryerson University; Dr. Paul Amyotte, Dalhousie University; Dr. Paula Klink, Queen's University).

New academic offerings in bio-processing and mining within Process Engineering have been examined. The province has a wealth of bio-resources (e.g., fisheries waste, forestry).

In cooperation with the Process Engineering department, the national organization CIM and mining industry responded to the provincial post-secondary review on the need for Memorial to deliver a mining engineering program or other form of enhanced curriculum offering. A new co-operative education initiative of online learning modules was developed and successfully launched.

Significant changes were introduced in the delivery of ENGI 200W (Professional Development Seminars, now in Engineering One) both in timing of delivery and content. Senior students for each program volunteered on student panels to share their experiences with students.

Mock interviews to prepare for co-op work terms were introduced in ENGI 200W. Senior undergraduate students were hired to interview students taking this course.

A new pan-University Certificate in Innovation and Entrepreneurship was developed (Dr. Carlos Bazan) to stimulate interest in innovation and new venture creation in partnership with other faculties / schools (Business, Music, Science, Humanities and Social Sciences, CITL, MCE).

Civil Engineering students participated in the Capstone Project Competition (CSCE annual conference) and Great Northern Concrete Toboggan Race (46th GNCTR, Jan. 29 – Feb. 2, 2020, Toronto), among other local and regional events such as the CSCE-MUN Student Chapter and Civil Engineering Nights.

A new Initiative of Sustainable Infrastructure (SI) is currently under development in Civil Engineering. It aims to develop and grow a cluster of expertise and active collaboration in SI practice and policy for sustainable communities and society. The key components include a new sustainable infrastructure center for research, outreach for potential new course-based MASc and certificate programs for curriculum development and education in sustainable infrastructure, environmental sustainability and climate change.

New faculty advisors were identified to support and assist students during the COVID-19 pandemic, as well as additional meetings with student class representatives, newsletters, welcome letters at the start of the semester, and an inventory of student needs and concerns.

The Ocean and Naval Architectural Engineering department supported student teams (SNAME, RINA), invited guest speakers through the SNAME Student Section, engaged industry partners and RINA in Term 8 capstone design projects, and arranged field / ship visits (ONAE 3001).

3.2 Increasing Research Capacity

Very good progress was also made over the past year on the strategic plan goals of increasing research capacity and intensiveness, as described in the following selected examples.

Goal 2.1: Attract, Retain and Support Research Activities

Continued and increasing success was achieved in the NSERC Discovery Grant competition, for example, with 100% success of all Discovery Grant applications awarded in 2015 – 2020 in Mechanical Engineering.

Research work terms were expanded and extended by the Engineering Co-operative Education Office (ECEO) including more positions through Mitacs and NSERC-USRA programs.
Several major research programs in Ocean and Naval Architectural Engineering (ONAE) were secured or extended, e.g., Future Ocean and Coastal Infrastructures, Ocean Frontier Institute ($4M, Dr. Lorenzo Moro, co-led by Dr. Paul Foley, Grenfell campus, involving over 60 partners), NSERC / Husky Energy Industrial Research Chair in Safety at Sea (Dr. Brian Veitch).

The Engineering Research Office (ERO) worked with RGCS to modify procedures, expedite grant applications / contracts, and improve the account opening procedure. The turnaround time for receiving institutional approval has been reduced over the past year.

The FEAS indirect cost policy was updated over the past year to reflect the new creator owned IP policy of the University.

The Faculty's post-award management policy was formalized to assist researchers and administrative staff in navigating through the lifecycle of awarded research grants. The document outlines the roles and responsibilities of principal investigators, ERO and the Engineering Finance Office (EFO).

The ERO worked with the Technology Transfer and Commercialization Office (TTCO) to increase the awareness among researchers on how they can maximize opportunities for technology commercialization, including workshops on IP and commercialization of research.

ERO worked with research account officers and the Office of Graduate Studies to update procedures and ensure more timely turnaround for graduate student payments, approvals for student presentations, proposals, PhD defenses, and intellectual property restriction.

A total of 142 new grant / contract applications (full applications and Expressions of Interest) were processed during the academic year and 47 applications were awarded, totaling $10.7M.

Federally funded Canada Research Continuity Emergency Funds (Stage 1) were utilized to recover lost wages (approx. $120K) for research staff and additional funds in Stage 3 (approx. $44K) supported research costs and ongoing commitments during COVID-19.

ERO successfully managed and administered many "return to research" requests to bring researchers and lab activities back to campus in a safe manner during COVID-19.

The Faculty's overall success in the 2019-20 NSERC Discovery Grant competition was 89% (total $2M) and 57% for the Research Tools and Instrument (RTI) grant competition ($599K), which are well above the national average and a further improvement over the previous year.

The ERO hosted a Discovery Grant workshop to prepare successful applications and a workshop on how to prepare a competitive NSERC RTI application.

The Faculty improved its internal success in the CFI John R. Evans Leaders Fund (JELF) with 4 successful applications at the university level and 2 applications eventually submitted to CFI for consideration.

Faculty members took advantage of the new NSERC Alliance COVID-19 grant competition, including 6 applications (3 successful) and an application submitted to the CFI COVID-19 infrastructure competition (Dr. Lesley James).

Ongoing funding was provided to encourage senior undergraduates in high academic standing to pursue a fast-track to graduate studies after graduation.

Lunch and Learn sessions were held to engage student and faculty researchers on emerging and strategic themes, for example, initiatives of the Information and Communications Technology Council (ICTC) and how their Work Integrated Learning (WIL) program can benefit researchers.

The Office of Graduate Studies worked with the School of Graduate Studies to recruit top students internationally (e.g., Vietnam, Malaysia, Indonesia, Nigeria, others) as well as 24 recruiting agents in various countries to recruit for course-based programs.

Goal 2.2: Support Research Excellence and Focus on Areas of Strategic Importance

The Engineering Research Office (ERO) supported undergraduate and graduate student research through NSERC USRA, Mitacs, and other programs. In total, 9 USRA awards were allocated over the past year, including a faculty contribution and facilitation of the application process through the Engineering Co-operative Education Office.

Mitacs Research Training grants (4) were awarded to undergraduate students. Several graduate students secured Mitacs E-Accelerate awards. Mitacs launched a pilot program, Lab2Market, which supported student entrepreneurship opportunities (9 applications awarded).

Several new interdisciplinary collaborations were initiated among departments and faculties / schools, including:

- Dr. Lorenzo Moro (co-led a multi-institutional project, OFI Phase 2 competition);
- Dr. Lesley James (led an NSERC COVID-19 Alliance and CFI application with the Faculty of Science and Faculty of Medicine);
- Dr. Steve Czarnuch (with Faculty of Humanities and Social Sciences on mental health and telemedicine);

- Drs. Mohamad Al-Janaideh and Helen Zhang (led NSERC RTI applications in partnership with the Faculty of Science); and

- Dr. Kelly Hawboldt (with Faculty of Science and University of Cape Breton on proposals submitted to Atlantic Fisheries Fund, CFI JELF and Horizon 2020).

Due to COVID-19, the annual research day was rescheduled and aligned with Memorial's annual research week. The event was held online with narrated presentations instead of posters.

Selected new research projects were submitted and secured by faculty members in Memorial's strategic thematic areas, including but not limited to:

1) Information and Communication Technology: Dr. Oscar Desilva (communications of UAVs and ground robots); Dr. Mohammad Al Janaideh (development of integrated circuits); Dr. Octavia Dobre (partnership with Huawei to develop next generation wireless and optical technologies).

2) Oceans Fisheries and Aquaculture: Dr. Neil Bose (oil spill response in harsh environments); Dr. Ting Zou (development of next generation underwater robots).

3) Environment, Energy and Natural Resources: Drs. Kevin Pope, Greg Naterer and Kelly Hawboldt (prototype thermochemical cycle for clean hydrogen production in partnership with Canadian Nuclear Laboratories and Ontario Tech University).

4) Arctic and Northern Regions: Dr. Lorenzo Moro (designing, safe, sustainable and inclusive coastal communities and industries for Atlantic Canada).

5) Well-being, Health and Biomedical Discovery: Dr. Ting Zou (remotely haptic controlled medical robots for telenursing without exposure to COVID-19); Dr. Steve Czarnuch (prevalence of mental health disorders among public safety communicators).

6) Governance and Public Policy: Dr. Joe Daraio (partnerships with communities to improve their climate change preparedness and develop training materials for professional engineers on the design of climate resilient infrastructure).

Civil Engineering faculty members increased dissemination of research with more than 6 refereed journal publications per faculty member on average over the past year, as well as numerous presentations at international conferences, workshops and patents.

Best Paper Awards were obtained by Dr. Octavia Dobre and her research team at the IEEE Wireless Communications and Networking Conference (WCNC20), May 2020, and IEEE Personal, Indoor, and Mobile Radio Communications Conference (PIMRC20), August 2020.

The Mechanical Engineering department has planned and acquired new equipment, facilities and laboratory to support teaching and research activities for a new Mechatronics Engineering program.

Goal 2.3: Expand Engagement with Partners

A national research and education network, CISMaRT (Canadian Network for Innovative Shipbuilding, Marine Research And Training), led by Dr. Wei Qiu, engaged partners nationally and internationally, including a recent $300K project on autonomous surface ships, and investments from Transport Canada on projects related to underwater noise and clean energy.

Civil Engineering expanded its partnership with the Department of Fisheries and Oceans Canada (DFO) including $997K funding support through the Multi-partner Research Initiative (MPRI) Ocean Protection Plan.

ONAE and Mechanical Engineering partnerships with the National Research Council (NRC) continued to expand through new collaborations between faculty and NRC researchers, e.g., Drs. Lorenzo Moro, Brian Veitch, Rocky Taylor, David Molyneux, Wei Qiu and Neil Bose.

Through new research grants / contracts, Civil Engineering faculty members secured new community and industry partnerships, e.g., City of St. John's (Dr. Carlos Bazan), MPRI / DFO (Drs. Bing Chen, Helen Zhang), ExxonMobil (Dr. Assem Hassan), Canadian Agriculture Partnership (Dr. Noori Saady).

International partnerships with institutions abroad were expanded to attract graduate students through sponsorship programs, e.g., Vietnam (VIED), China (CSC), Iraq (Iraqi MOHE), Mexico (CONACYT), Brazil (SWB), Indonesia, Norway, Finland, Malaysia, Germany, Nigeria, Ethiopia and Ghana.

Grant Facilitation Officers in ERO developed procedures to engage their counterparts in other faculties / schools to promote interdisciplinary partnerships, including a resource database that allows GFOs to share resources and help with research applications and partner engagement.

ERO has expanded its external communications, for example, by extending invitations for the Annual Research Day, and Lunch and Learn sessions, to the general public through The Telegram, VOCM, and Marketing and Communications, to also expand the Faculty's research dissemination and engagement with the general public.

The ERO hosted networking events to expand interdisciplinary partnerships, including joint events with the Faculties of Education, and Human Kinetics and Recreation, as well as workshops in partnership with the TTCO to highlight funding opportunities through Springboard Atlantic for commercialization of research outcomes.

Civil Engineering faculty members developed new partnerships with communities across the province, e.g., Town of Pouch Cove (Drs. Bing Chen, Helen Zhang, site remediation); Dr. Ashutosh Dhar (pipe network maintenance and planning), Corner Brook Pulp and Paper Mill (Dr. Tahir Husain), and City of St. John's (Environment and Sustainability Experts Panel).

The Ocean and Naval Architectural Engineering (ONAE) department expanded its partnerships nationally through leadership at CISMaRT workshops (Quebec City, November 2019, on autonomous surface ships; next national workshop on November 25 – 26, 2021).

Electrical and Computer Engineering faculty members served in prominent leadership roles in technical societies, notably Dr. Cheng Li (Secretary, IEEE ComSoc Communications Switching and Routing Technical Committee, and General Chair, International Conference on Computing, Networking and Communications) and Dr. Octavia Dobre (Editor-in-Chief, IEEE Open Journal of the Communications Society, and Technical Program Chair, IEEE Wireless Communications and Networking Conference).

3.3 Expanding Partnerships

Numerous activities of external engagement, outreach and partnerships with industry, high schools and other organizations, have been pursued over the past year.

Goal 3.1: Expand Partnerships that Contribute to Research

The Faculty continued to extend partnerships at local, provincial, national and international levels. For example, Dr. Noori Saady established local partnerships with Lester's Farm and other farms in the province to investigate ways to harvest bio products from farm waste.

Dr. Neil Bose led an international effort for a field trial of oil spill response and dispersing technology (sponsored by DFO). Partners include the Canadian Coast Guard, US National Oceanic and Atmospheric Administration, US Coast Guard, Environmental Protection Agency and C-CORE.

Dr. Octavia Dobre formed a new partnership with Huawei to advance wireless and optical communication technologies. The partnership on optical communications led to a multi-institutional project with the University of Toronto, UBC, and Dalhousie University.

Dr. Bing Chen secured and led a new international PEOPLE network on oil spill mitigation through the NSERC CREATE program including over 130 collaborating academic researchers and 150 HQP, from over 20 Canadian and 13 institutions overseas, and over 40 Canadian partner organizations including 7 federal, 4 provincial / municipal, 9 industry and 7 NGOs.

Drs. Bing Chen, Helen Zhang, Tahir Husain, Faisal Khan, and Carlos Bazan established new partnerships with NORMAN, a leading organization in the EU on emerging contaminant R&D.

The Ocean and Naval Architectural Engineering (ONAE) department established a new collaboration centre with NRC-OCRE, called the Karluk Collaboration Space. The initiative launched 3 new infrastructure projects (over $1M) on high-performance marine simulations, underwater vehicles and ship noise.

Process Engineering faculty members, Dr. Syed Imtiaz and Dr. Salim Ahmed, joined the Karluk Collaboration Space with NRC-OCRE, on a project entitled “Development and Performance evaluation of Technologies for Greater Autonomy of Ships and Offshore Platforms”.

Exceptional achievements were demonstrated in national tri-council agency funding competitions, for example, Dr. Helen Zhang ranked 1st out of 58 applications, in Civil / Industrial / Systems Engineering in the 2019-20 NSERC RTI competition.

Faculty members established new partnerships with universities abroad, including the University of South China in Hengyang, China (course on “Separation Processes” by Dr. Yan Zhang) and several universities in Norway and Australia (Dr. Lesley James).

Goal 3.2: Expand Partnerships that Contribute and Strengthen our Programs

The Engineering Co-operative Education Office established new partnerships and signed MOUs with organizations to expand co-op work term opportunities, including with Hochschule Furtwangen University (Germany), ICTC-WIL Digital program (funded by the Government of Canada’s Student Work Placement Program) and Municipalities NL ($291K project on infrastructure development and maintenance projects with 20 municipalities across NL).

Community service learning and entrepreneurship work terms through MCE have been enhanced, expanded, and extended for co-op student opportunities.

Two-way student mobility initiatives were launched for co-op student exchange opportunities including 30 co-op placements completed in India and 3 co-op placements arranged in China but disrupted afterwards due to COVID-19.

Electrical and Computer Engineering faculty members served in prominent roles on NSERC and CFI panels: Dr. Weimin Huang (Section Chair, NSERC DG ECE Evaluation Group, 2020-21); Dr. Cheng Li (Member, NSERC DG CS Evaluation Group, 2020-23); Dr. Octavia Dobre (NSERC Committee on Discovery Research, 2020-23; Group Chair, NSERC DG ECE Evaluation Group, 2020-23); and Dr. Cecilia Moloney (Member, CFI Panel).

Graduate student recruiting efforts continued internationally in partnership with the School of Graduate Studies and Internationalization Office, including targeted missions to institutions in Vietnam, Ghana, Ethiopia, Brazil, India, and China.

In Civil Engineering, Dr. Helen Zhang was appointed as the member of NSERC Discovery Grant Evaluation Group (1506; 2020-23); and Drs. Assem Hassan and Bing Chen served as members of the NSERC RTI Selection Committee (2019-20).

IRAP funding was secured to hire co-op work term students for a number of industrial clients of the Office of Industrial Outreach (Dr. Steve Bruneau).

Goal 3.3: Improve Engineering and FEAS Profiles in the Community

Guidelines were developed to improve faculty research visibility by creating ORCID and Publons accounts and then connecting these with Web of Science and Scopus databases. A study was completed to verify faculty information in the Scopus database and ultimately improve the quality of information for THE, QS and Shanghai international ranking systems.

The Faculty hosted Lunch and Learn sessions to engage the university community and the public at large including presentations by Dr. Patrick Gamsby (open access publications and scholarly publishing) and Tim Perron (Work Integrated Learning).

Through ERO, a mentorship program provided guidance on grant applications to junior faculty members. It aims to also establish teams of established and early career researchers to prepare joint applications for larger size projects, as well as link researchers with industry partners who have established partnerships with Memorial.

A proposal was submitted by ONAE to Transport Canada to train non-ocean engineers in ONAE disciplines. The plan aims to deliver short courses to engineers in federal government agencies supporting the National Shipbuilding Strategy.

Civil Engineering faculty members served in prominent roles, provincially and nationally, at:

- Canadian Society for Civil Engineering (Dr. Joe Daraio, CSCE NL Section Faculty Advisor; Dr. Ashutosh Dhar, Chair of Geomechanics and Material Subcommittee of CSCE Engineering Mechanics and Materials Division; Dr. Bing Chen, re-elected as CSCE VP, International; Dr. Helen Zhang, CSCE NL Section Chair);

- Creative Destruction Lab, CDL Atlantic (Dr. Carlos Bazan, Memorial faculty lead);

- Canadian Association on Water Quality, CAWQ (Dr. Bing Chen, VP, Atlantic; Dr. Helen Zhang, Atlantic Regional Director);

- National Oceanic and Atmospheric Administration, NOAA (Dr. Helen Zhang, member of response oil assay working group);

- 72nd Canadian Geotechnical Conference (Technical Committee Co-Chair, Drs. Bipul Hawlader and Ashutosh Dhar);

- Editorial roles – Editor-in-Chief (Dr. Bing Chen, Environmental Systems Research, Canadian Water Resource Journal, and JEI Letters), Associate Editor (Dr. Bipul Hawlader, Canadian Geotechnical Journal; Dr. Helen Zhang, Canadian Journal of Civil Engineering).

Civil Engineering faculty members (Drs. Steve Bruneau, Bing Chen, Tahir Husain, Joe Daraio, Carlos Bazan) worked with NL communities, municipalities and governments (St. John's, Pouch Cove, Bay Bulls, communities in Baie Verte peninsula) on projects involving infrastructure adaptation to climate change, water safety/treatment, and highway maintenance.

The Engineering Co-operative Education Office (ECEO) actively participated in national and international co-op organizations including CEWIL and WACE.

The Process Engineering department established a strong involvement with the Association of Canadian Chairs for Chemical Engineering (ACCCE) and successfully organized the ACCCE 2019 annual meeting in St. John's.

3.4 Fostering a Distinguished Workplace

Continued solid progress was achieved over the past year towards the strategic plan goals and action items for a distinguished workplace.

Goal 4.1: Promote Workplace Excellence

Opportunities were provided for professional development. Staff members were encouraged and supported in continuing their education and enrolling in training programs such as:

- Banner Finance and Banner HR Excel;
- Supply Chain Management;
- My Career Recruitment;
- Introduction to Python.

Excellence in research, teaching and service was recognized by prestigious awards and honours, e.g., Dr. John Quaicoe (Professor Emeritus, Honorary University Research Professor), Dr. Brian Veitch (SNAME Webb Medal for Education), Dr. Octavia Dobre (IEEE Fellow), Dr. Yuri Muzychka (University Research Professor), SNAME Fellows (Drs. Brian Veitch, Dr. Claude Daley, Dr. Wei Qiu), and RINA Fellows (Drs. Brian Veitch, Dr. Wei Qiu).

The Mechanical Engineering department promoted the achievements of its faculty and students through national publications, for example, CSME Bulletin and Benchmarks articles, featured Drs. Rocky Taylor, Yuri Muzychka, and Ting Zou.

ONAE faculty members served in high-profile international technical organizations: Dr. Lorenzo Moro (ISSC Dynamics Committee); Dr. Bruce Quinton (ISSC Specialist Committee - Accidental Limit States); Dr. Wei Qiu (joint ISSC-ITTC Committee); and Dr. David Molyneux (VP, RINA). Civil Engineering faculty received awards and honours: Dr. Leonard Lye (Professor Emeritus), Drs. Bipul Hawlader and Ashutosh Dhar (2020 AG Stermac Award for outstanding service to the Canadian Geotechnical Society), Dr. Bing Chen (Fellow of CSCE), Dr. Helen Zhang (President's Award for Outstanding Research). Dr. Tahir Husain (Dean's Award for Research Excellence).

Goal 4.2: Promote Diversity, Equity and Inclusion

A detailed analysis of admissions data was completed by Dr. Dennis Peters to better understand the factors contributing to recruitment, admissions, and retention of women in engineering. The conclusions pointed to more focus needed on improving the conversion rates for females (conversion from admission to choosing the program) and enhancing the female applicant pool.

The Memorial Engineering Outreach (MEO) continued its outreach activities remotely to youth in under-represented groups and prospective female students.

The Cahill Engineering One Student Success Centre hired female students as tutors, mentors and SI (supplemental instruction) leaders to increase the diversity of role models for students.

Subcommittees of the Women in Engineering – Action Plan continued their work on the engineering image on campus; admissions and curriculum; graduate students and faculty diversity. The subcommittees reported regularly on their activities at Faculty Council.

At a department meeting and/or startup meeting of each search committee, the Department Head / Dean facilitated a discussion on the Faculty's "30 by 30" initiative including the objective of increasing the number of female faculty members.

The Aboriginal student admissions practice in Engineering was continued with the reserved seats program over the past year.

Indigenous related case studies were developed for engineering courses, including but not limited to, ENGI 3101 / 8152 (Engineering Professionalism) and ENGI 8104 (Critical Thinking about Technology, Science and Engineering). A new course proposal on Engineering on Indigenous Land was developed.

Goal 4.3: Provide Adequate Physical Work Space for Employees and FEAS Activities

New student meeting space was created in EN 1035D (accessible to students using space located on the mezzanine in the Fluids laboratory).

To accommodate individual and group meeting spaces for students during COVID-19, EN 2004 (Engineering Cafeteria) was arranged for approximately 70 desk spaces in the Fall semester.

For meeting space with faculty and students during COVID-19, room EN 2007 was arranged with appropriate safety controls for access.

Planning for occupancy of Electrical and Computer Engineering in the east pavilion of the new CSF building continued on schedule for its opening in September 2021.

The conceptual design of HERF (CFI funded Harsh Environment Research Facility) was completed on budget at a new site location near the west parking lot of NRC-OCRE.

Numerous renovations in the SJ Carew Building were planned and submitted to Facilities Management for vacated spaces after the Department of Electrical and Computer Engineering moves to CSF in September 2021, including a Student Design Hub for student teams, expanded female washrooms, Mechanical / Civil / ONAE junior design studios, and active learning spaces.

The Environmental Engineering Lab (EN 2076) was expanded northwards from EN 2076. Also an additional laboratory space, EN 1037E/G, was arranged for a new oil spill research facility – the first of its kind in Canada to support both inland and marine oil spill mitigation and simulation.

Process Engineering has upgraded IIC 1024 to a dual purpose classroom and computer lab with an upgraded audio / visual system. The computers will have a wide screen monitor.

New shared office space was created for MOGE and MSRE graduate students on the IIC 3rd floor, as well as a graduate student computer lab on the 3rd floor.

A space renovation plan was completed by Mechanical Engineering to improve junior and senior design workspaces. The plan involves a blended model consisting of a large (over 80 students) shared design / study room in EN 2048, group meeting / study space (EN 2042), and computer modelling lab (EN 2067).

Goal 4.4: Promote a Safe, Healthy and Respectful Work Environment

In reviewing and approving research activities on campus during COVID-19, ERO ensured that researchers adhered to necessary safety controls when conducting lab activities.

The Faculty has continually promoted safety training in the workplace, including training sessions and workshops such as the OHS Committee Training, Emergency Warden Training, WHMIS, Transportation of Dangerous Goods, First Aid and CPR Training, Ergonomics and Wellness Training, and Psychological First Aid, among others.

Due to the public health advisory, administrative offices have functioned remotely during the pandemic to manage Faculty operations and administration.

Hazard and risk registries were developed under the guidance of EHS for departmental teaching and research labs.

Faculty and staff members completed workplace health and safety sessions through EHS including Workplace Violence, Workplace Harassment and Respectful Workplace, Sexual Harassment and Sexual Assault training.

The Building OH&S Committee has been active over the past year and met quarterly to discuss and prepare reports on workplace safety related issues.

The Faculty held a number of social events to build camaraderie, including an annual Year in Review meeting with award presentations, and Academic Year Faculty & Staff Kick-off meeting.

The Faculty Social Club events included birthday celebrations, Free Coffee Fridays, and numerous themed events throughout the year.

Faculty members conducted research on mitigating the spread of COVID-19, e.g., Dr. Lesley James ($50K NSERC Alliance Special Grant with Medicine and Science for testing of face masks), Dr. Kelly Hawboldt (analysis of disinfectants to fight the coronavirus).

4 Progress Indicators

4.1 Student Data

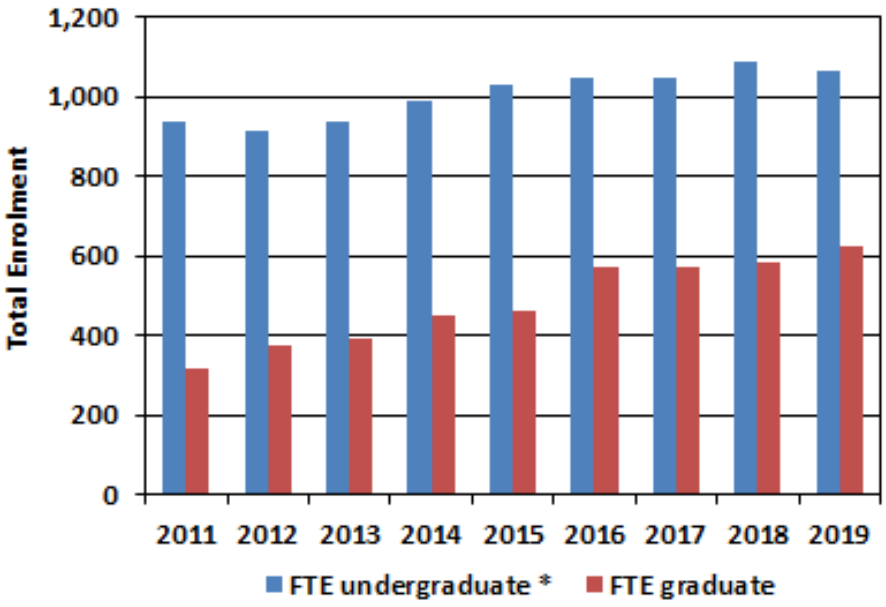

Figure 1: Full-time equivalent undergraduate and graduate student enrolments as reported in NCDEAS survey [2] (* not included are students who are unplaced in a co-op work term or hired into a work term after the end of the regular registration period)

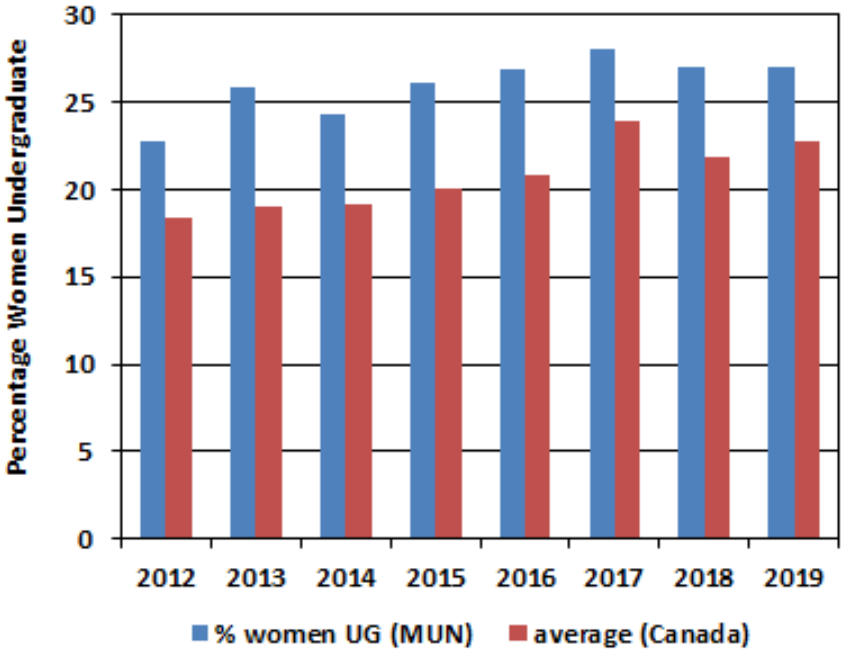

Figure 2: Percentage of female undergraduate students in engineering [2]

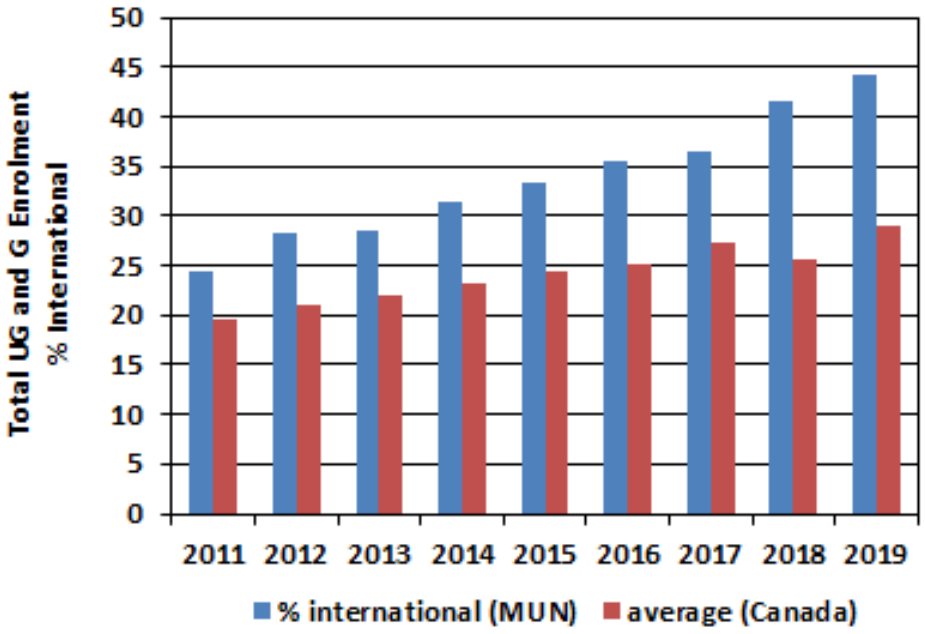

Figure 3: Percentage international of total undergraduate and graduate students [2]

4.2 Faculty Data

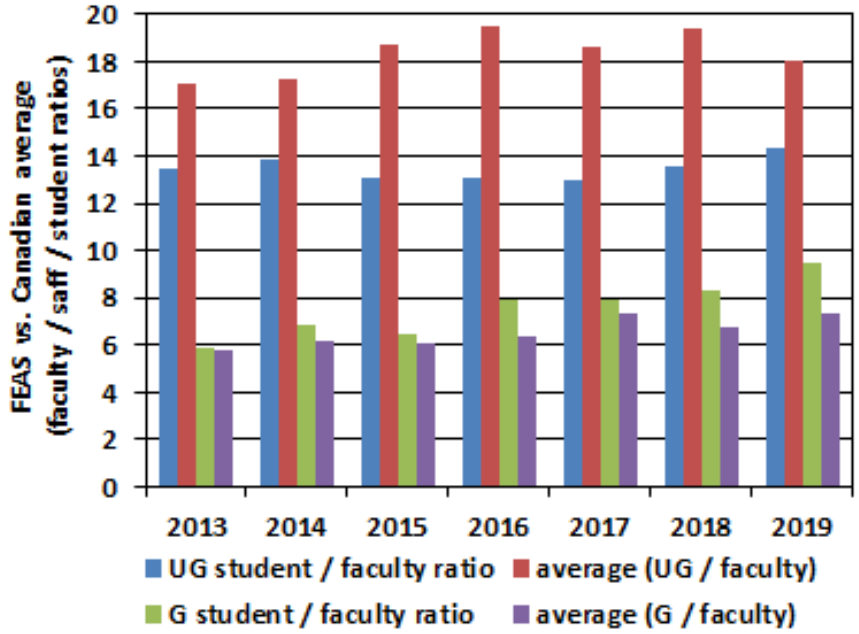

Figure 4: Undergraduate and graduate student to faculty ratios relative to other schools [2]

4.3 Research Impacts

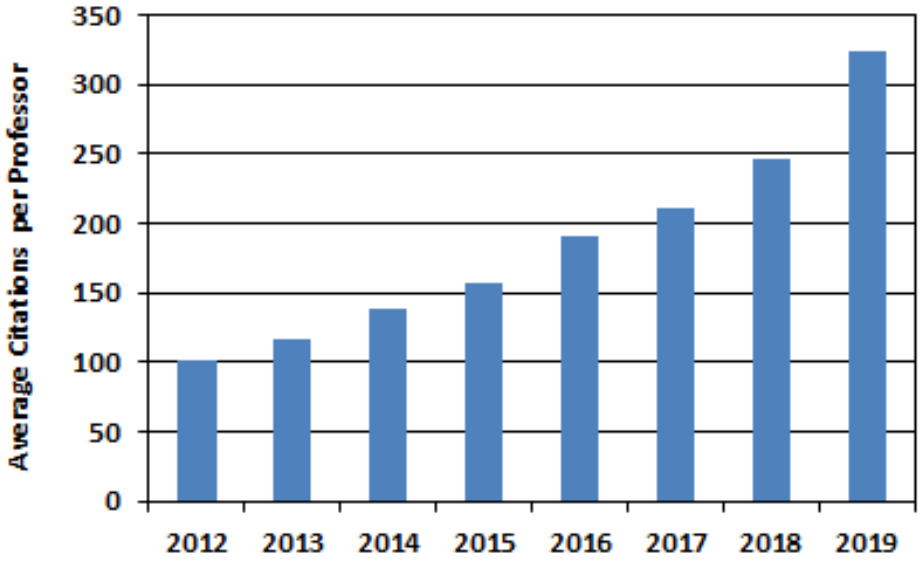

Figure 5: Average Google Scholar citations to research papers per professor per year

5 Acknowledgements

The input and contributions to this progress report from Department Heads (Drs. Bing Chen, Cheng Li, Yuri Muzychka, Wei Qiu, Syed Imtiaz), Associate Deans (Drs. Dennis Peters, Faisal Khan, Octavia Dobre), Director of Engineering Co-operative Education (Anil Raheja), and Senior Administrative Officer (Barb Elliott) are gratefully acknowledged.

6 References

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2) Resources Survey of Engineers Canada, National Council of Deans of Engineering and Applied Science, 2020.
3) Fact Books, Centre for Institutional Analysis and Planning, Memorial University, St. John's NL, 2009 – 2020.