

Strategic Plan 2013 - 2020

Vision 2020

**Faculty of Engineering and Applied Science
Progress Report 2016/17**

**Memorial Engineering
December 2017**

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1 Introduction

The Faculty of Engineering and Applied Science (FEAS) had another productive and successful year in its Strategic Plan entitled “Vision 2020”. It completed Year 4 (2016/17) of 8 of the Engineering Expansion Strategic Initiative. The provincial government paused the Year 5 growth funding allocation in May 2017 so the growth plan was paused over the past year. Nevertheless the engineering expansion is proceeding amidst a challenging fiscal climate of budgetary reductions and attrition across units at Memorial University.

The Faculty of Engineering and Applied Science has received a positive accreditation decision for its six undergraduate programs from the Canadian Engineering Accreditation Board (CEAB) – for three years with an extension for up to three more years to 2023, subject to a written report after a few years to demonstrate progress related to graduate attribute assessments. A new accreditation model involving outcomes-based assessment, graduate attributes (GAs) and continual improvement (CI) processes was adopted by CEAB for the first time in Canada in 2016. In its review, the CEAB noted the high quality education with respect to our expanding programs and that our faculty's world-class (mandatory) co-op program is highly respected.

Also, the Canadian Association for Co-operative Education (CAFCE) awarded the faculty's co-operative education program full accreditation to December 2021 for its undergraduate programs in civil, computer, electrical, mechanical, ocean and naval architectural and process engineering. Our co-op programs were commended by CAFCE for their top-notch quality, student participation rates, detailed student handbook and innovative grading process whereby work term students not only receive an overall grade for work terms, but also separate grades for performance and communications skills.

The Faculty suffered losses over the past year with the passing of Dr. Angus Bruneau, Dianne Coffin, and Glenn St. Croix. Dr. Angus Bruneau, founding dean of the Faculty of Engineering and Applied Science at Memorial, passed away at the age of 81. Dr. Bruneau was an extraordinary visionary and made many outstanding contributions to the Faculty and Memorial University during his time as dean, from 1969-74. He introduced one of the first co-operative education programs in engineering in the country and created C-CORE, today a world-renowned research organization in remote sensing, ice engineering and geotechnical engineering. After leaving Memorial, Dr. Bruneau founded Fortis Inc. in 1987 and served as its president and CEO from 1987-1996 and chairman of the board of directors from 1998-2006.

FEAS continues to see significant enrolment growth in both undergraduate and graduate programs. The increased number of first year B.Eng. students accepted for the Classes of 2017-2022 is leading to incremental growth of about 5%/year of graduating students in Years 5-8 of the 8-year growth plan. Since 2012, the graduate student enrolment has approximately doubled to over 700 students (as of September 2017). The Faculty's growth has significantly outpaced the original projections made in 2012 as part of the Faculty Growth Plan. In particular, graduate student enrolment is far ahead of the projected enrolment of 570 by 2018.

This progress report provides an overview of the progress and achievements towards Vision 2020. 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 well aligned with the University's capstone strategic plan and frameworks.

2 Alignment with MUN's Capstone and Strategic Frameworks

MUN's Capstone comprises the university's three strategic frameworks in teaching and learning, research, and public engagement. The FEAS Vision 2020 goals, priorities and action plans are well aligned with the directions outlined by these strategic frameworks of Memorial University.

Memorial's Capstone Goals	FEAS Vision 2020 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 2: Alignment of Vision 2020 and MUN's Capstone

The action items of Vision 2020 plan have been updated and adjusted over time to align with emerging opportunities / challenges in FEAS and MUN's Capstone plans. These evolving initiatives will be outlined and discussed in the following sections.

3 Vision 2020 Progress Report

The four primary pillars of the FEAS strategic plan – 1) teaching, 2) research, 3) partnerships, and 4) workplace – will be 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 is provided (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 Vision 2020 goals for enhancing student success and providing an exceptional teaching and learning environment.

Goal 1.1: Support Teaching Excellence

- A joint appointment with CITL of a Senior Instructional Designer, Darlene Spracklin-Reid, was extended.
- An Undergraduate Technical Communications Co-ordinator (Sonya Rideout) was hired through external funding to the Cahill Engineering One Help Centre to improve learning outcomes for undergraduates with respect to written communication skills.
- Through the faculty mentorship program, Department Heads connected new faculty with well-established teachers to seek their advice and guidance on effective teaching.
- The Department Head and Associate Dean followed up with instructors who received low CEQ scores to offer advice and provide a path for enhanced teaching and learning.
- The Teaching and Learning Chair (Dr. Janna Rosales) arranged instructor development and collaborative initiatives in teaching and learning, including guest speaker sessions on best practices and joint initiatives with the other Chairs, as well as a contractual position of a Student Engagement and Retention Project Coordinator (Thelma Coley).
- The Director of First Year Engineering (Dr. Geoff Rideout) worked with instructors and committees to on new initiatives to enhance student engagement in first year courses, particularly ENGI 1020 (Introduction to Programming), 1040 (Mechanisms and Electric Circuits) and 1010 (Engineering Statics).
- The Associate Dean of Undergraduate Studies (Prof. Andy Fisher) participated in national initiatives in engineering education, e.g., Engineering Change Lab.
- The Director of First Year Engineering met regularly with Engineering One students to seek feedback on continual improvement initiatives and develop survey tools.
- New student surveys were introduced in ENGI 3101 (Engineering Professionalism I) and 8152 (Engineering Professionalism II).
- Graduate attributes and indicators were developed and Vena software was adapted to manage the continuous improvement process.
- The capabilities and features of D2L were promoted from a student perspective and there was a shift in marks submission focus to D2L.

- Lecture capture facilities were incorporated in a few major classroom upgrades.
- A new model is under development to more effectively assign TA hours to instructors in a transparent and equitable manner.
- A review is underway to more effectively coordinate the graduate courses to be offered in the following academic year and delivery of the PhD comprehensive exam.
- Instructors in each department matched outcomes to course objectives and ensured assessments aligned with learning outcomes.
- Alignment was completed between course content, teaching methods, learning outcomes and assessment criteria for quizzes, exams, assignments, lab report and presentations prior to the accreditation visit.
- New problem-based learning approaches were introduced in design courses, such as ENGI 8713 (Municipal Engineering).
- Student competitions to enhance hands-on learning continued in courses such as the Cube Competition and Scavenger Hunt in Civil Engineering.
- Departmental curriculum committees completed the process of matching learning outcomes with course objectives for accreditation and the alignment of assessments with learning outcomes.
- A new course based graduate program in Ocean and Naval Architectural Engineering (ONAE) is under development.
- A detailed initiative was carried out following the CEAB accreditation visit to map assessments to learning outcomes through a new set of indicators for each program.
- Additional support and personnel was provided to Departments to support teaching and learning activities: Deputy Heads approved for each Department; Laboratory Instructor (CAD); Laboratory Instructor (Environmental Laboratory).
- Additional contractual hires over the past year are also supporting and enhancing teaching and learning activities: Laboratory Instructor (Programming); Employer Relations Officer (Co-op Education); Senior Programmer (ECS); Intermediate Clerk Stenographer (graduate course based programs).

Goal 1.2: Encourage Student Engagement

- The Chair for Teaching and Learning, Dr. Janna Rosales, led Memorial's first workplace-oriented mindfulness training program for students. The course, which included a 90-minute session per week and a two-hour capstone session at the end, was offered to students engaged in co-op work terms, internships or field placements for engineering and other programs.
- Mechanical engineering students showcased their senior design projects at the 2nd annual MUN CSME Design Competition. Five teams comprised of senior mechanical engineering students presented their design projects to a panel of judges. The winner was DuXion for its AC induction motor with a rotor integrated ducted fan.
- CEAB graduate attributes and learning outcomes are being incorporated into co-op work terms through a new initiative with online support modules in D2L.
- Over the past year, there has been positive feedback from stakeholders (students, community groups, faculty members) on new stipendiary experiential learning placements for co-op students. Placements with local not-for-profit community groups have taught students how engineers can have positive impacts on their communities and reinforce the values that engineers serve the world. For example, two students were placed at Deborah's Garden, a community garden in Pouch Cove where the students designed a greenhouse; two students at the St. John's Northwest Rotary Club where they designed a reliable power source for a school in Zimbabwe; one student at O'Donel High School in Mount Pearl who supported staff, students and teachers to enhance science, technology, engineering and math (STEM) education; and two students at Manuels River Hibernia Interpretation Centre where they designed a bridge to improve the trail connectivity.
- Startup support was provided to students through a new entrepreneurship centre that aims to support early-stage entrepreneurs to develop and launch their own businesses. The Memorial Centre for Entrepreneurship (MCE) – a campus-wide centre led by a partnership between the Faculty of Engineering and Applied Science and the Faculty of Business Administration – was created to promote entrepreneurship, support students, faculty and staff in developing their startup business ideas, and contribute to developing an attractive entrepreneurial ecosystem in Newfoundland and Labrador.
- The FMG leadership team (Faculty Management Group) worked with the EASAC Women in Engineering Committee to develop and implement recommendations through a short- and long-term plan to increase student diversity and women in engineering.
- An engineering student team travelled to Texas and California to present its design for a prototype of a high-speed ground transport vehicle that floats on air bearings in a vacuum tube in the international SpaceX Hyperloop pod competition. Their design was approved to move forward to the next phase of the competition: building the pod.

- The Eastern Edge Robotics Team won the fourth international ROV competition title. Eastern Edge Robotics, Memorial University's Remotely Operated Vehicles (ROV) team earned top honours at the 2016 MATE International ROV Competition held at the NASA Johnson Space Center's Neutral Buoyancy Lab (NBL) in Houston, Texas. The team includes students from various backgrounds including ROV technology, several engineering disciplines, computer science, ocean mapping, and business.
- The Baja SAE student team competed successfully again this year. The team of 11 students and faculty advisor (Dr. Geoff Rideout) participated in the competition in Peoria, IL. It was the eighth year that Memorial has competed in the Baja SAE international competition, which consists of three regional competitions where students are tasked to design and build an off-road vehicle that is pushed to its limits in competitions such as acceleration, hill climbing, maneuverability, suspension and traction and endurance racing. The team placed 4th in the overall design category at the international SAE competition.
- At Canadian Engineering Competition (CEC), hosted by McGill University, students Katy Warren and Peter Snow represented Memorial well and won second place in the re-engineering category. They secured their place at the national competition when they won first place in the re-engineering category at the Atlantic Canadian Competition (AEC) at the University of New Brunswick.
- Major revisions to ENGI 1040 (Mechanisms and Electric Circuits) were implemented to enhance engagement and student preparedness.
- Funded positions for student peer mentoring in Engineering One were appointed in efforts to improve student success in first year.
- An Engineering Student Engagement Partner (ESEP) co-op student program was launched to provide better communication and collaboration between students and instructors, and implement feedback regarding student challenges in courses.
- Banner historical undergraduate data was loaded into the Vena database for suitable metrics to be developed for regular review and continual improvement processes.
- Through the accreditation processes, several initiatives were completed, including curriculum mappings from each department; common course outlines with learning outcomes collected in the Vena database; and a data-mining project using Vena.
- New initiatives were undertaken for student orientation sessions, including an orientation presentation offered once every day during the first week of the Fall semester; streamlining of the check-in process to generate step-by-step guidelines on the web; and changes of the check-in process in the Office of the Associate Dean, Graduate Studies, to increase efficiency.

- A new initiative is underway to offer a one-week transitional program for new students prior to the beginning of the Fall semester, including the development of a program with sessions such as academic writing, counseling, career development and effective study strategies.
- Enhanced career development support was initiated by creating career sessions specifically for engineering students, where alumni shared their past experiences and career development workshops were provided.
- A new mandatory course for all graduate students, entitled Technical Writing for Graduate Engineers, was initiated and planned to be offered for the first time in the Winter 2018 semester.
- Several new co-op education initiatives have been successfully introduced and implemented, including initiatives outlined in a Work Term Retention and Development Plan; new continuous job match process (extended indefinitely); alternate delivery of co-operative education with experimental community service learning (extended for two years); study on the feasibility of work term duration (committee formed to investigate the viability of 8 month work terms); international work terms (ICEOP funding program); co-op education curriculum enhancement (linkage underway with graduate attributes).
- Team MUNEN placed 2nd among 49 international entries at the American Concrete Institute 2016 Mortar Workability Competition, Philadelphia, November 2016. Student members were Molly Noseworthy and Janice McCarthy, and the Faculty advisor was Dr. Assem Hassan.
- The “Together by Design” community project, led by Darlene Spracklin-Reid, had another successful trip this year on post-Katrina reconstruction projects in New Orleans, Louisiana. Student participants included Heidi Sullivan (Term 7 Civil), Rachel Delaney (Term 7 Civil), Craig Whittle (Term 7 Civil), Tori Barrett (Term 4 Civil), Christian Pelley (Term 4 Civil), Amanda Ryan (MEng, Civil) and Miya Janes-Green (Alumni, Class of 2016 Civil).
- Active industry engagement opportunities in courses were provided for students through site visits, e.g., Capital ready mix plant, Windsor Lake Water Treatment Plant, Robin Hood Bay Waste Management Facility, etc.
- Industry site visits were added in Process Engineering for ENGI 3600 (Introduction to Process Engineering), ENGI 8694 (Fluid-Structure Interactions), 8691 (Petroleum Production Engineering), 8692 (Drilling Engineering for Petroleum Exploration and production), 6602 (Offshore Petroleum Geology and Technology), 6671 (Process Equipment Design II), and 5671 (Process Equipment Design I).

- Guest lecturers from industry and other universities were invited as guest speakers in Civil Engineering courses, e.g., Design and Construction Considerations of Hebron GBS; Overview of Design, Fabrication, and Integration of Hebron Topside Modules; 39th Canadian Geotechnical Colloquium Lecture by Prof. Greg Siemens from Royal Military College, Kingston, etc.
- Guest lectures are arranged in ENGI 7640/8640 (Process Engineering Project) and ENGI 8676 (Design of Natural Gas handling Equipment).
- The ENGI 8926 Capstone design project featured many guest lectures from industry speakers, e.g., Verafin, VMT).
- A new initiative was launched to create discipline-specific streams within the MASCE (Master of Applied Science in Computer Engineering) program.
- A lab renewal plan for Electrical and Computer Engineering was completed including equipment upgrades and modernization of lab equipment.
- A newly launched SAE Aero Team will compete in 2018 in two categories.
- The MUN Engineering team was one of the top three finalists with a 1st place finish in the Business Plan Category in the CSME (Canadian Society for Mechanical Engineering) 2017 3-D Print Challenge.
- The 3rd Annual Symposium for Student Engagement in Mechanical Engineering was held to work on ways to improve student attendance and engagement.
- SNAME (Society of Naval Architects and Marine Engineers) and RINA (Royal Institution of Naval Architects) student groups had another active year of projects and activities including field / ship visits and networking with industry.
- ENGI 3001 (Ocean / Naval Architectural Design) featured regular ship visits.
- Two new experimental laboratories were created for courses in Process Engineering.

3.2 Increasing Research Capacity

Excellent progress has also been made over the past year on our Vision 2020 goal of increasing research capacity and intensiveness, as detailed in the following selected examples.

Goal 2.1: Attract, Retain and Support Research Activities

- Numerous major new research programs and research chairs were awarded over the past year, including the NSERC / Husky Energy Industrial Research Chair in Safety at Sea, two Canada Research Chairs (Offshore Safety and Risk Engineering; and Coastal Engineering), and Research Chairs in Subsea Engineering and Seafloor Mechanics.
- Drs. Faisal Khan and Kelly Hawboldt were part of a collaborative research project involving four universities in Alberta and Atlantic Canada. The project, Managing Microbial Corrosion in Canadian Offshore and Onshore Oil Production, received \$7.8 million in federal government funding to advance a four-year research project to improve pipeline integrity.
- New MAsc (Master of Applied Science) graduate programs were approved by Faculty Council in Energy Systems Engineering; and Safety and Risk Engineering; and anticipated to begin in the Fall 2018.
- A new professionally developed video was created and displayed widely on innovative research activities and programs in the Faculty of Engineering and Applied Science.
- The 3rd Annual Research Report was completed and several news stories were prepared and circulated to the news media on the most significant research impacts by faculty members.
- The 2nd Annual Research Day was successfully held with posters by graduate students and broad attendance including undergraduate students.
- A new initiative was started to adjust and streamline the admission process for graduate students in the OnBase system to make earlier decisions and attract the best prospective students.
- A new online system is being introduced to allow faculty members to more efficiently review graduate student applications.
- A new Research Video Competition among graduate students was held to improve communication skills among graduate students and enhance the visibility and awareness of graduate student research activities.
- To improve the conversion rate of accepted graduate students to those who ultimately arrive on campus, new initiatives were created for current students to interact with admitted students through Facebook online sessions; as well as enhanced engagement with admitted students through periodic emails regarding course selection, resources on campus and welcoming events.

- Active mentorship and peer review was coordinated for all applicants to the NSERC Discovery Grant competition. Department Heads also reviewed NSERC applications prior to submission.
- Two further new course based graduate programs in Ocean and Naval Architectural Engineering and Bio-engineering are under development and anticipated to be completed this year. These new programs would lead to more graduate course offerings and benefits for the research thesis-based graduate students.
- The student demand and interest in the MOGE (Master of Oil and Gas Engineering) program has grown substantively in the past year to over 60 students.
- As of September 2017, the graduate student enrolment will have doubled to over 700 students since the start of the Engineering Expansion Strategic Initiative in 2012.
- The recently launched new MEng and PhD programs in Process Engineering have also grown well to over 10 students in the past year.

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

- A new interdisciplinary centre of excellence was formed - Centre for Risk, Integrity and Safety Engineering (CRISE) - which leads interdisciplinary research on safety, integrity and sustainability of industrial processes and systems, with a particular focus on harsh environment operations. The centre is engaging highly qualified experts and fostering collaboration among faculty, researchers, industry partners, and other experts, nationally and internationally.
- Numerous graduate students were recognized for their outstanding research achievements and service contributions to the community. Han Byal Kim received the Best Young Presenter (under 30) Award at an international conference, IOR Norway 2017, for her graduate work on enhanced oil recovery using nanoparticles as a water additive for the Hebron field. Another graduate student, Javad Hashemi, secured a Gold Standard Award for Memorial in the Society of Petroleum Engineering for exceptional industry engagement and innovation. Earlier this year, Rajib Dey, received the Chancellor's Award with the Fry Family Foundation Award for exceptional leadership and volunteering contributions in the community.
- Continued promotion and communication initiatives were pursued to raise the profile, reputation and awareness of engineering research activities, through the annual research report, website, videos, program brochures, and notices on social media.
- All partnerships and funding were secured for a major project collaboration with Kvaerner, Norway, in the area of ice abrasion of concrete structures.

- A major UNDP-Sino-Canada Research Initiative on Marine Resources Sustainable Development and Environmental Management (MREM), led by Dr. Bing Chen, was secured and funded by UNDP and RDC.
- Another major new initiative, called the Research and Training Network on Persistent and Emerging Organic Pollution in Cold and Coastal Environments (PEOPLE), was initiated and led by Dr. Bing Chen. It includes researchers from 9 institutions across Canada, US and China and 10+ researchers from Memorial (Civil / Process / Ocean and Naval Architectural Engineering, Chemistry, Earth Sciences, Medicine, Economics). The 1st two-day workshop / symposium will be held in early October 2017.
- In addition to NSERC Discovery Grants, a range of other NSERC awards were secured in the past year including RTI awards (Dr. Kevin Pope, Dr. Mohamed Shehata), DG Accelerate (Dr. Weimin Huang) and Connect.
- A proposal for a Canadian CubeSat Project (CCP) initiative was submitted with C-CORE and the Canadian Space Agency (CSA).

Goal 2.3: Expand Engagement with Partners

- The 2016 Newfoundland Electrical and Computer Engineering Conference (NECEC 2016) celebrated its 25th anniversary of the conference. This year's conference brought together a diverse, technical program and explored a wide range of technologies, including process control, automation, electrical distribution, computer networks and consumer devices.
- A public lecture was held by Dr. Ray Gosine, Vice-President (Research) pro tempore, to discuss hydraulic fracturing and its implications for Western Newfoundland. In the presentation, Dr. Gosine, chair of the Independent Public Panel, provided an overview of hydraulic fracturing operations in the context of Western Newfoundland, discussed the review process developed by the panel, and presented the 2016 findings of the panel and its recommendations to the Government of Newfoundland and Labrador.
- A collaborative workshop on integrated operations in remote and harsh locations was held in collaboration with the Norwegian University of Science and Technology (NTNU). Memorial University and Dr. Lesley James hosted the NTNU-MUN INTPART Summer Program on integrated Operations in Remote and Harsh Locations.
- Ongoing international exchanges identified top universities in target markets and negotiated MOUs for research collaboration and graduate student and faculty mobility initiatives, e.g., Malaysia, China ("3+1+1" program in Safety Engineering with UPC), India, Vietnam, Indonesia.

- An Advisory Board of prominent industry leaders has been established in the Department of Ocean and Naval Architectural Engineering (ONAE).
- Ongoing project collaborations were pursued with the provincial government on engineering projects involving regional policy, drinking water, and waste management.
- A major ACOA grant was secured to maintain the positive momentum of building and expanding the new National Network for Innovative Shipbuilding and Marine Research and Training (iSMART), led by Dr. Wei Qiu, including C-CORE and MI, and in partnership with a number of universities, government agencies, and industry partners, across Canada. This network is fostering collaborations with national and international marine industry partners, shipyards and universities (particularly those in Europe and USA).
- In collaboration with the School of Graduate Studies, and the International Office, a number of international partnerships continue to grow with several universities abroad – Vietnam (Petro Vietnam University), Norway (NYNU), China (UPC), Iraq (Iraqi MOHE), Mexico (CONACYT), Brazil (SWB) and Indonesia.

3.3 Expanding Partnerships

An increasing number of activities of external engagement, outreach and partnerships with industry, high schools and other organizations, has been achieved over the past year.

Goal 3.1: Expand Partnerships that Contribute to Research

- Faculty members served on prominent technical committees of professional societies, e.g., Dr. Cheng Li (IEEE ComSoc Globecom / ICC Technical Content Committee, IEEE ComSoc Sensor Networks Technical Committee, General Chair of the IEEE WINCOM'17 Conference, Technical TPC Chair of the IEEE ICC'17 Conference), Dr. Octavia Dobre (IEEE ComSoc Awards Committee, Chair of the IEEE ComSoc Signal Processing for Communications and Networking Technical Committee), Dr. Weimin Huang (Technical Program Committee of the IEEE/MTS Oceans'17 Conference).
- Sabbatical leaves were granted to expand partnerships, e.g., Drs. Bing Chen, Helen Zhang, Tahir Husain, Leonard Lye, Steve Bruneau, Bruce Colbourne, Dan Walker.
- The Canadian Network for Innovative Shipbuilding, Marine Research and Training (CISMaRT), led by Dr. Wei Qiu, has expanded partnerships with C-CORE, MI, Canadian universities, government and industry. Three workshops were held (July 2016 at UBC, September 2016 at Memorial and July 2017 in Ottawa) to facilitate the collaborations.
- Through the CFREF program and OFI (Ocean Frontier Institute), collaborations between faculty in ONAE have expanded with Dalhousie University.

- Projects were pursued with NRC–OCRE on Marine Safety and further collaborations are being explored. Dr. David Molyneux, Director of OERC (Ocean Engineering Research Centre) had regular meetings with NRC to pursue collaborations. NRC is represented on the CISMaRT Interim Board.
- Several collaborations are underway with Norwegian institutions, particularly with the University of Stavanger (UiS) and NTNU. Drs. Lesley James and Faisal Khan are collaborating with the National IOR Center at UiS. Through the Statoil Academic Program, a co-supervised graduate student, Yuzhu Li, has completed an MEng degree at Memorial, and began a PhD degree at UiS, supervised by Dr. Ove Gudmestad and Vice Dean Bjorn Hjertager. Also, Dr. Steve Butt is collaborating with Dr. Bernt Aadnoy in the area of drilling and well engineering. Through an LRET program, Dr. Brian Veitch, has active student exchanges with Chalmers University of Technology and the University of Helsinki.
- Partnerships with Norwegian companies have expanded including with Statoil (through Statoil funded research chairs) and Kvaerner (through NSERC CRD / RDC funded project on ice abrasion of offshore structures).
- Collaborations with universities across Canada, including York University and Concordia University, have expanded through the CFI HERF (Harsh Environment Research Facility) program.
- Many new NSERC Engage and Mitacs grants were awarded over the past year to expand collaborations with local industry partners.
- A major industry led ACOA AIF project with Dr. Steve Butt and Anaconda Mining Inc. has expanded partnerships with the mining sector in the province.
- The 3rd Workshop and Symposium on Safety and Integrity Management of Operations in Harsh Environments, October 18 – 20, 2017, led by Dr. Faisal Khan, is attracting a large number of industry participants and partners that will contribute to enhanced research collaborations.

Goal 3.2: Expand Partnerships that Contribute and Strengthen our Programs

- Engineering professors were appointed to prestigious international technical committees. Dr. David Molyneux was appointed to the Ice Committee of the International Towing Tank Conference (ITTC) and Drs. Wei Qiu, Lorenzo Moro and Bruce Quinton were appointed to the I.1 Environment, IV.2 Design Methods and V.6 Arctic Technology committees, respectively, of the International Ship and Offshore Structures Congress (ISSC).

- New Minors in Applied Science for Physics (with Electrical Engineering) and Chemistry (with Process Engineering) were introduced, along with reciprocal Minors in science for engineering students, to expand partnerships between departments that contribute and strengthen our programs.
- Professors worked with CITL to offer and develop distance delivery courses (ENGI 4012 – Engineering Economics; ENGI 8151 – Technology, Sustainable Society and International Development) and further co-op work term content in D2L is under development.
- Six new multidisciplinary graduate diplomas programs were created in the past year in areas needed by industry (Arctic Engineering; Communications Engineering; Geotechnical and Structural Engineering; Mechanics and Materials Engineering; Mechatronics Engineering; and Thermofluids Engineering).
- Faculty funding was provided to host co-op work term positions as research assistants to expand partnerships with other units, e.g., with Medicine (3-D Printing), C-CORE, Technical Services, Facilities Management.
- The Canadian Network for Innovative Shipbuilding, Marine Research and Training (CISMaRT), led by Dr. Wei Qiu, was officially formed in September 2016 with \$300K from various funding sources to support the full implementation of the network; strengthen the collaborations, research and engagement with industry and other organizations; and develop a framework for Marine Education and Training particularly as it relates to Canada's National Shipbuilding Strategy.
- ASMs-CE, faculty members, Department Heads and the Dean have travelled across Canada and internationally to expand industry partnerships, e.g., Toronto, Houston, Calgary, etc. for research and co-op student work term job development.
- A joint appointment of a Senior Instructional Designer was extended to enhance our partnerships with CITL in D2L development and blended offerings of ENGI 3731 (Materials for Construction) and 6749 (Construction Planning Equipment and Methods).
- The Engineering Co-op Education Office is partnering with industry and employers in long-term work-term position development; consulting with a range of stakeholders on additional flexibility of work term duration; and the improvement of work-term learning.
- Program partnership agreements are being developed with other Canadian universities, for example, the University of New Brunswick, to improve student recruitment.
- Faculty members delivered guest lectures at international conferences and universities around the world, e.g., Sakhalin State University, Russia, University of Tasmania, etc.

- New marketing materials were developed or updated (e.g., brochures, presentations, newsletters) to enhance promotional materials for expanding partnerships.
- Dr. Greg Naterer completed his two-year term as chair of the National Council of Deans of Engineering and Applied Science (NCDEAS) of Canada. In this role over the past year, Dr. Naterer led a number of national engineering initiatives including the startup of a national pilot project involving 12 engineering schools across Canada to streamline and shift the accreditation process toward an outcomes-based model. Dr. Naterer also led new advocacy initiatives to the federal government for the importance of engineering in innovation and productivity in Canada, and a new liaison committee with the National Sciences and Engineering Research Council to engage a broad range of stakeholders including industry and government.

Goal 3.3: Improve Engineering and FEAS Profiles in the Community

- Gordon Jin was appointed chair of the Canadian Society for Civil Engineering's (CSCE) Honours and Fellowships Committee for a two-year term.
- The Doctor Who writer was inspired by Dr. Andrew Vardy's swarm robotics research. The season's second episode, titled Smile, had "The Doctor" taking his newest companion, Bill, to the colony world of Gliese 581 D, a bright, sunny world tended to by a swarm of tiny bird-like robots called Vardies and their user interface, the Emojibots.
- Graduate student Rajib Dey was awarded the prestigious Chancellor's Award and Fry Family Foundation Leadership Award. The Chancellor's Graduate Award is awarded to given at convocation to the student of the graduating class who has demonstrated the greatest leadership contribution to graduate student life and other areas of the community during his / her university years.
- Engineering students held the 11th Annual Winter Charity Ball in support of the Autism Society of NL. The annual event has made a positive impact on the community and gained popularity in recent years. More than \$19K was raised in support of the Autism Society.
- Dr. Cecilia Moloney was selected to serve in a prestigious appointment of the Board of Directors of the Canada Foundation for Innovation (CFI).
- New outreach activities were launched, including a "teen circuit" camp, a project to identify new initiatives (e.g., Night in Engineering), and participation in a new "Science Rendezvous" initiative.

- Enhancements to existing outreach / camp programs were introduced, including the CodeNL program, 4th annual open house and continued participation in high school fairs, various youth groups (Beavers) and other various forms of outreach to local schools.
- Collaborations were continued and strengthened with PEGNL (Professional Engineers and Geoscientists of Newfoundland and Labrador), e.g., Dr. Leonard Lye (Vice-Chair of PEGNL Registration Committee, Experience Review Committee, and Examiner of confirmatory exams for APEO and APEBC), Darlene Spracklin-Reid (elected Chair of the PEGNL Board), professors regularly assist in reviews of foreign applications for P.Eng. registration and OPEO National Exams for P.Eng. qualifications.
- Significant news coverage of the Muskrat Falls development has occurred over the past year and Dr. Bipul Hawlader was selected to serve on the “Muskrat Falls Expert Review Panel: Geotechnical External Peer Review Panel on the North Spur Stabilization”.
- Civil Engineering faculty members served on prominent roles over the past year in professional societies which have enhanced our profile and reputation in the technical community, e.g., Dr. Leonard Lye (Associate Editor, Canadian Journal of Civil Engineering, Canadian Water Resources Journal), Dr. Bipul Hawlader (Associate Editor, Canadian Geotechnical Journal), Dr. Joe Daraio (Guest Editor, ASCE Journal of Professional Issues, in Engineering Education and Practice on Infrastructure Education in Civil and Environmental Engineering).
- ONAE faculty members are actively engaged in SNAME (Society of Naval Architects and Marine Engineers) and RINA (Royal Institution of Naval Architects), e.g., VP of SNAME, Section Chair of RINA.
- ONAE faculty members also serve in high-profile international technical organizations: ITTC (International Towing Tank Conference) and ISSC (International Ship Structure Congress), e.g., Dr. David Molyneux (ITTC Ice Committee), Dr. Lorenzo Moro (ISSC Dynamics Committee), Dr. Bruce Quinton (ISSC Ice Committee) and Dr. Wei Qiu (Chair of ITTC Ocean Engineering Committee, ISSC Environment Committee, and joint ISSC-ITTC Committee).
- Online course modules are under development through a Digital Oilfield initiative involving Process / Electrical Engineering, MI, and the Faculty of Business Administration, in partnership with CITL.
- Process Engineering faculty members led and/or contributed to national workshops and conference organizing committees, e.g., Drs. Steve Butt and Lesley James (SPE Well Integrity Workshop), Dr. Faisal Khan (3rd Workshop and Symposium on Safety and Integrity Management of Operations in Harsh Environments), Dr. Kelly Hawboldt (CSChE Annual Conference, 2016).

- Process Engineering faculty members contributed to professional societies and funding agencies, e.g., Dr. Lesley James (2016 VP Technology, 2017 President Elect for Society of Core Analysts, CEAB Accreditation Site Visit Committee), Dr. Kelly Hawboldt (IRC Selection Committee, Strategic Network Review Committee, Chemical Engineering RTI Committee, PEGNL Registration Committee), Dr. Faisal Khan (Chemical Engineering Discovery Grant Committee, RCRA Panel).
- Reunion 2016 was another successful event that celebrated the Classes of 1976, 1981, 1986, 1991, 1996, 2001 and 2006. Reunion 2017 was also successfully organized and held on September 8, 2017, for the Classes of 1982, 1987, 1992, 1997, 2002 and 2007.

3.4 Fostering a Distinguished Workplace

The Faculty continues to have steady progress on the Vision 2020 goals and action items for a distinguished workplace.

Goal 4.1: Promote a Culture in which All Work is Valued

- More than 50 engineering faculty and staff, family and friends of Diane gathered for a walk on Sept. 29 in memory of Dianne Coffin and raise funds for her family. Diane was a well-respected and loved employee in the faculty, who passed away last July. The day of the walk would have been her 40th birthday.
- Memorial recognized engineering alumni who have achieved distinction in their fields and made outstanding contributions to their communities, as recipients of the 36th annual Alumni Tribute Awards - Darlene Spracklin-Reid (Senior Instructional Designer) and Gary Follett (Acuren Group).
- Drs. Brian Veitch and Claude Daley were inducted as fellows of the Canadian Academy of Engineering (CAE) during the academy's annual general meeting in Ottawa in June, 2017. Dr. Yuri Muzychka was selected as Fellow of the Canadian Society for Mechanical Engineering (CSME).
- Dr. Leonard Lye, Associate Dean, Graduate Studies, was inducted as a Fellow of the Engineering Institute of Canada (EIC) for his exceptional contributions to the engineering profession.
- Dr. Ali Nasiri was awarded the Robert L. Peaslee Brazing Award. The award is presented by the American Welding Society to the professor who submits the best original contribution to the society for the metal-joining technology of brazing.
- Dr. Glyn George received the President's Award for Distinguished Teaching, which recognizes teaching excellence and outstanding achievement in teaching effectiveness.

- Jinghua Nie received the President's Award for Exemplary Service, which recognizes outstanding service to the Memorial community by administrative and support staff who make significant contributions beyond normal employment responsibilities.
- Jinghua Nie received the prestigious Canadian Bureau for International Education (CBIE) Chair's Award for Meritorious Service for her outstanding service to international education at Memorial University.
- Dr. Lesley James won the prestigious and highly competitive Society of Petroleum Engineers (SPE) Regional Distinguished Achievement Award for Petroleum Engineering Faculty. Dr. James received the award for her excellence in teaching, research and contributions to the petroleum engineering profession as well as special effectiveness in advising and guiding students.
- Dr. Bing Chen was inducted into the Royal Society of Canada's College of New Scholars, Artists and Scientists.
- Dr. Kevin Pope was honoured with a national award from the Canadian Society for Mechanical Engineering (CSME). He received the CSME I.W. Smith Award for his outstanding achievement in creative mechanical engineering.
- Dr. Wei Qiu received the Professional Engineers and Geoscientists of Newfoundland and Labrador's (PEGNL) Teaching Award for 2016. He received the award for his outstanding contributions to engineering education and his guidance of students and researchers to achieve research and learning excellence.
- The following faculty and staff were recognized by the 2016 Dean's awards:
 - Dr. Weimin Huang, Dean's Award for Teaching Excellence;
 - Dr. Lihong Zhang, Dean's Award for Research Excellence;
 - Dr. Brian Veitch, Dean's Award for Excellence in Graduate Student Supervision;
 - Vanessa Coish, Dean's Award for Exemplary Service;
 - Matthew Curtis, Dean's Award for Exemplary Service;
 - Gary Follett, Dean's Award for Outstanding Contributions.

Goal 4.2: Promote Excellence through Personal Growth

- Mentorship of junior faculty and staff members was provided by supervisors, colleagues and managers.

- Encouragement of staff members was provided to further their education and enroll in applicable training and professional development programs.
- Staff members participated in the professional development, training opportunities, and workshops / courses, including but not limited to:
 - Supply Chain Management;
 - Fundamentals of a Research Enterprise;
 - Use of NSERC Grant Funds;
 - Functional Responsibilities of a Supervisor;
 - SharePoint Site Collection and Administration;
 - Supervisory Skills Development Program;
 - National Initiative of Capacity Building and Knowledge Creation for Engineering Leadership;
 - Engineering Change Lab;
 - Banner Training (Finance & HR);
 - Happiness at Work;
 - Adobe Acrobat Pro.

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

- Equipment and facilities were upgraded and modernized in several classrooms and labs.
- A new multi-media system was installed in the Civil Engineering Senior Design Lab.
- Mechanical Engineering upgraded facilities in several labs (Materials / Mechatronics / Thermal Labs) and improvements were made to the Mechanical Design Room.
- New equipment was acquired and installed for Welding and Materials instruction, Thermo-fluids, and Solid Mechanics courses.
- Room EN 3000/29 was upgraded to a dual purpose classroom.
- Numerous completed renovations over the past year to accommodate engineering expansion include: ER 4014 (graduate student assigned spaces); ER 4014A / ER4015 (C-RISE; 14 spaces); EN 3011 (spaces increased for work term students); EN 1038 (ECE; added tables / chairs and audio visual facilities for presentation purposes); EN 2006 (Bruneau Lecture Theatre; revitalized, with increased seating capacity from 213 to 236 including 4 height adjustable accessible tables); EN 2050 (Civil Engineering Design Room; new instructor's desk and upgraded audio-visual facilities); IIC 1021 (Process Engineering Department Office); EN 3075/38 (redeveloped into the Memorial Centre for Entrepreneurship)

- Coughlan College space was reassigned to Engineering and up to 70 graduate students were assigned desk spaces.
- Additional renovation projects were initiated and Facilities Management has assigned Project Managers: Shane Russell (multiple projects); Gina Myrick (washroom review and roof repairs); William Noseworthy (baffles on building exterior).
- Off-campus storage space was used on the Mount Scio Road site for storage of less used equipment.
- The Offices of the Associate Dean, Undergraduate Studies, and Co-op Education were opened up to each other for better work flow, the Director of First Year Engineering was moved to this area, and two meeting spaces, EN 4018F and EN 4030, were created.
- The Printing Satellite Centre was replaced with a new 3-D Printing Laboratory.

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

- The Faculty promoted safety in the workplace and staff members participated in the following training workshops:
 - OH&S Committee;
 - Warden Fire Safety;
 - Compressed Gas;
 - Chain Saw Operations;
 - First Aid/CPR;
 - Fall Protection;
 - Transportation of Dangerous Goods;
 - WHMIS;
 - Strain Gauge;
 - Mental Health in the Workplace.
- The Building OH&S Committee was active throughout the year and met to discuss issues quarterly.
- The Faculty held its annual Academic Year Faculty and Staff Kick-off Meeting and Social in September.
- Retreats were held for staff members (10th Annual Retreat, Wild's, Oct. 2016), faculty / staff members (Clovelly Facility, Nov. 2016) and Faculty's leadership team (July 2017) to discuss professional development, accreditation, team building exercised, and ongoing initiatives.

- The annual Year in Review meeting was held in December 2016 including breakfast and award presentations.
- The Faculty's Social Club had another successful year with 17 events held this past year, compared to 15 last year, and membership increased from 83 to 88 – staff (34), faculty (36) and co-op members (18). The Social Club recognized milestone events of members and made monetary contributions towards collections for non-membership milestones.

4 Year Ahead

Based on departmental feedback on progress in the “Vision 2020” Strategic Plan and a retreat of the Faculty leadership team (FMG; Faculty Management Group), a group of short-term (1-year) and long-term (5-year) priorities was developed. A summary is provided in the table below, including responsible individuals to lead each corresponding initiative.

Short-term priorities (1-year)	Responsible individual(s)
Space: additional space for laboratories, offices, graduate students, student meeting spaces	Dean
Undergraduate / graduate programs: accreditation follow-on, enrolments, curriculum innovation	Associate Deans, Undergraduate / Graduate Studies
Research: tri-council program success, number of applications, success rates, streamlined processes	Associate Dean, Research
Co-op education: job placement, placement rates, report on feasibility of 8-month work term option	Director, Co-op Education
Long-term priorities (5-year)	
Reputation: international rankings, brand, new centres, strategic areas of excellence	Responsible individual(s)
Reputation: international rankings, brand, new centres, strategic areas of excellence	Dean, Associate Deans
Space	Dean
Undergraduate / graduate programs: new and expanded programs, enhanced co-op curriculum	Associate Deans, Undergraduate / Graduate, Director, Co-op Education
Research: research chairs, growth of funding and citations, international collaborations	Associate Dean, Research

Over the next year, the priorities for undergraduate programs will be focused on:

- Accreditation follow-on: mapping of indicators and their assessments, enhancement of the Vena software platform, and integration of feedback into departmental review processes;
- Co-op education: integration of work term learning outcomes with on-line modules and materials using D2L, updates of employer assessment process to respond to new CEAB Indicators in an electronic form, report on the viability of 8-month work term option;

- Admissions: revised admissions process, new regulations in 2018, E-proctored ESL test.

For graduate studies, the priorities will be focused on:

- Thesis based programs: increase quality of graduate applicants;
- Course-based programs: enhance conversion rate from admitted students to registrants;
- Student and faculty support: academic support to students, streamlining of the admission process in OnBase, TAs, comprehensive exams, research proposals, courses;
- Communications: updates of graduate program brochure and website, promotional video of graduate programs;
- Partnerships: identify new opportunities and expand international partnerships and collaborations especially those attracting government sponsored students.

5 Progress Indicators

5.1 Faculty and Staff Data

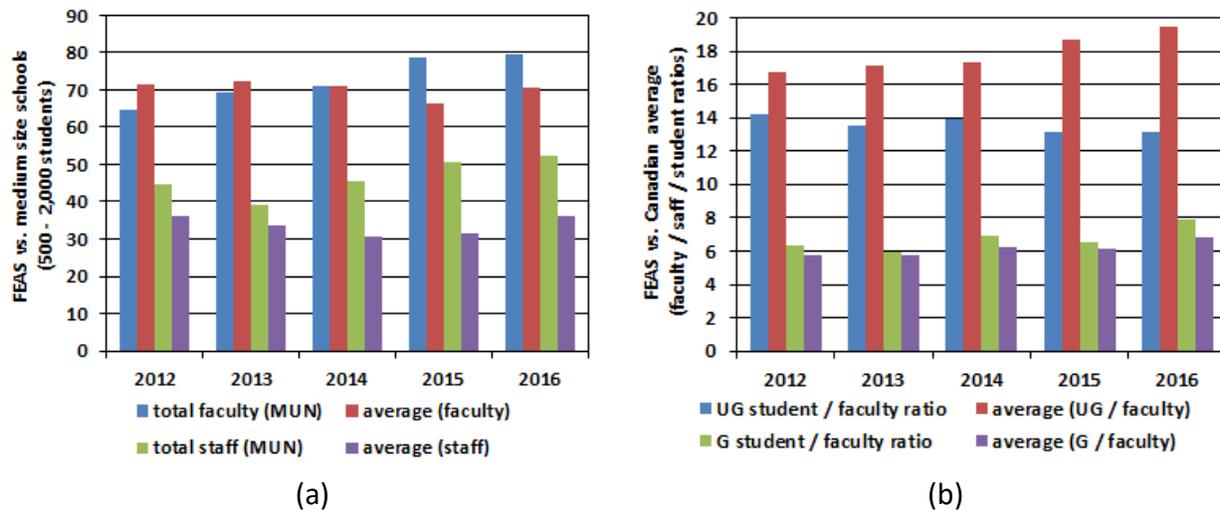
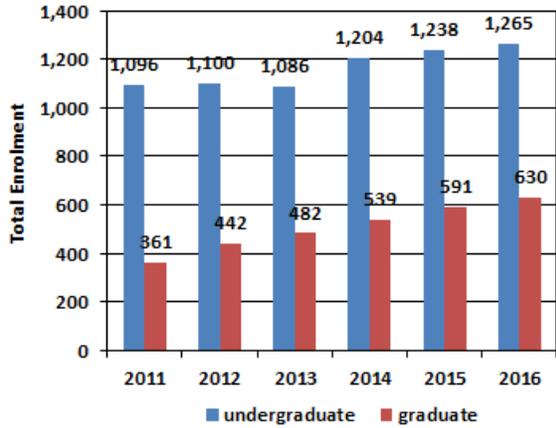
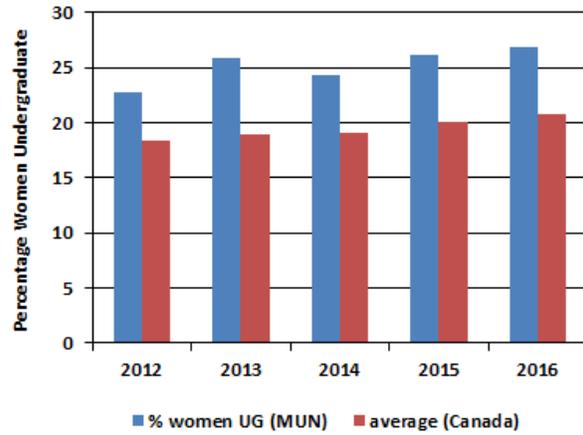


Figure 1: Number of FTE (a) faculty, staff and (b) per faculty ratios [2]

5.2 Student Data



(a)



(b)

Figure 2: (a) Undergraduate, graduate, and (b) female student enrolments [2]

5.3 Operating Funds

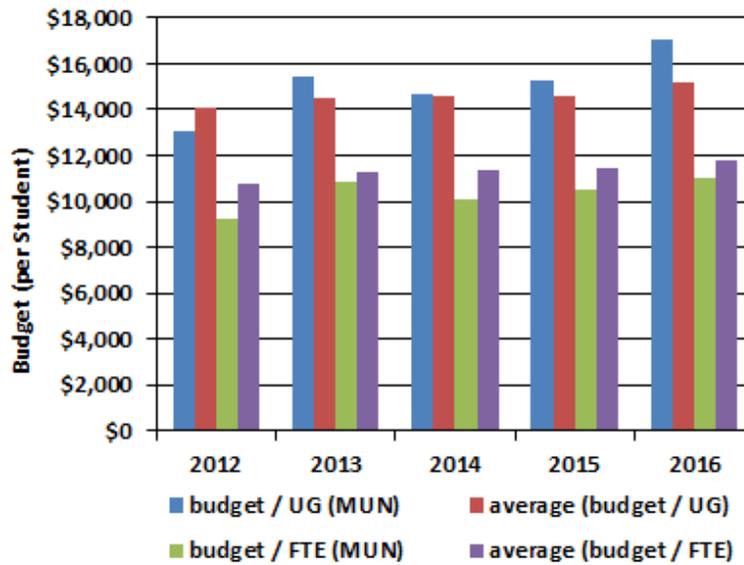


Figure 3: Operating budgets and resource allocations for students [2]

5.4 Research Grants and Contracts

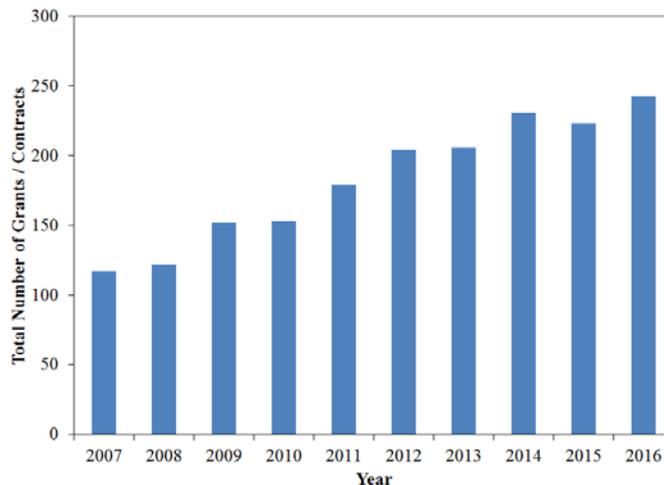


Figure 4: Total external research support through grants and contracts

6 Acknowledgements

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7 References

- 1) Vision 2020, Strategic Plan of the Faculty of Engineering and Applied Science, Memorial University, St. John's NL, July 3, 2013.
- 2) Resources Survey of Engineers Canada, National Council of Deans of Engineering and Applied Science, 2016.
- 3) Fact Books, Centre for Institutional Analysis and Planning, Memorial University, St. John's NL, 2009 – 2015.