ANNUAL REPORT 2017

PERFORMANCE INDICATORS

UNIVERSITY OF TORONTO | Engineering

U of T Engineering by the Numbers

2016–2017

144
years since the Faculty was established in 1873

7
degrees offered, including 2 undergraduate and 5 graduate degrees

25+
multidisciplinary research centres

$210M+
raised, surpassing our Boundless campaign goal of $200M

U of T Engineering Community

5,441
undergraduate students (ch.1)

2,365
graduate students (ch.2)

261
faculty (pg.9)

326
administrative and technical staff (pg.9)

50,000+
alumni worldwide (ch.7)

100+
countries our students and faculty call home (ch.1)

Research & Innovation

90
chairs and professorships (ch.3)

390+
industrial research partners worldwide (ch.9)

$31.1M
in Tri-Agency funding (ch.3)

6
NSERC CREATE grants (ch.3)

110+
spinoff companies since 1970 (appendix F)

20
new projects awarded through Dean's Strategic Fund (ch.11)

Transdisciplinary and Experiential Education

9
undergraduate programs and 8 Engineering Science majors (ch.1)

17
undergraduate minors and certificates (ch.4)

3
cross-Faculty Collaborative Specializations for graduate students (ch.2)

10+
MEng emphases (ch.2)

12,298
applicants to undergraduate studies (ch.1)

1,005
undergraduates in first year (ch.1)

40.1%
women in first year of undergraduate studies (ch.1)

93.2%
mean entering average of incoming Ontario students (ch.1)

160+
partner universities offering study-abroad opportunities (ch.9)

100+
student-run engineering clubs and teams (appendix A)

325+
companies hired more than 730 undergraduate students through the Professional Experience Year (PEY) internship program (ch.4)

Message from the Dean

It is my privilege to present our *2017 Annual Report of Performance Indicators,* which includes data spanning the last decade and highlights of initiatives we launched in 2016–2017. Through critical reflection and review over the past year, this data along with our achievements informed a comprehensive self-study of our Faculty, in preparation for our external review. This annual report will serve as a vital resource as we formalize our ambitious goals and begin to implement our 2017–2022 Academic Plan.

As engineers, our quest to innovate, create new technologies and address some of the world's most complex and pressing challenges is unyielding. Excellence is achieved through creativity and collaboration among people with diverse backgrounds and experiences. As the top-ranked engineering school in Canada and one of the world's best, we are leading the way.

Our vibrant U of T Engineering community includes students and faculty of the highest calibre from more than 100 countries – diversity that deepens the creative process and enriches our endeavours with a vast array of perspectives. We foster a thriving culture of engineering excellence that inspires and accelerates innovation. Students are drawn to our classrooms, laboratories and makerspaces by our outstanding undergraduate and graduate programs, exceptional multidisciplinary research, and rich opportunities for experiential learning and entrepreneurship.

Through strategic recruitment, outreach and our commitment to inclusivity, we have achieved the highest proportion of women among our undergraduate students and faculty members in our history, and more than one-third of our Canada Research Chairs are held by women. We are taking a leadership role in reducing the gender gap within our profession, driving Engineers Canada toward its '30 by 30' objective of 30% female representation among newly licensed engineers by 2030.

We also lead in educational innovation, developing pedagogies for active and experiential learning that are transforming our engineering programs. Our new Hart Teaching Innovation Professors and Technology Enhanced Active Learning (TEAL) Fellows are developing strategies that enhance the academic environment and prepare students for their careers.

One illustration of our commitment to engineering education and research excellence is the forthcoming Centre for Engineering Innovation & Entrepreneurship (CEIE). When it opens to our engineering community in spring 2018, the CEIE will be home to collaborative research institutes and dynamic experiential learning spaces, including TEAL rooms, design studios and fabrication facilities, that will unleash our students' creative and entrepreneurial spirit.

We continue to build on our strengths in transformational fields such as artificial intelligence, data analytics, robotics, health engineering, sustainability and water by making strategic investments and by nurturing brilliant scholars in these priority areas. In 2016, U of T Engineering established the U of T Havelaar Electric Vehicle Research Centre, the Institute for Water Innovation, and a new research partnership with industry and the federal government to advance autonomous navigation by unmanned aerial vehicles. In addition, research spinoff companies such as ModiFace and Deep Genomics are applying the latest in machine learning and augmented reality to critical applications, from computer image recognition to the treatment of genetic diseases.

Our collective achievements in the past 12 months reflect our unwavering pursuit of excellence in engineering research and education. The culture of innovation, diversity, creativity and service that defines our Faculty empowers the next generation of engineering leaders and innovators to strengthen communities, and transform our shared future for the better.

Cristina Amon, Dean

Faculty Leadership, 2016–2017

Dean
Cristina Amon

Vice-Dean, Graduate Studies
Markus Bussmann

Vice-Dean, Research
David Sinton (Interim, to February 28)
Ramin Farnood (Interim)

Vice-Dean, Undergraduate
Thomas Coyle

Associate Dean, Cross-Disciplinary Programs
Bryan Karney
Jonathan Rose (Acting)

Chair, First Year
Micah Stickel

Director, University of Toronto Institute for Aerospace Studies
Christopher Damaren

Director, Institute of Biomaterials & Biomedical Engineering
Christopher Yip

Chair, Department of Chemical Engineering & Applied Chemistry
Grant Allen

Chair, Department of Civil Engineering
Brent Sleep

Chair, The Edward S. Rogers Sr. Department of Electrical & Computer Engineering
Farid Najm

Chair, Division of Engineering Science
Mark Kortschot (to December 31)
Deepa Kundur

Chair, Department of Materials Science & Engineering
Jun Nogami

Chair, Department of Mechanical & Industrial Engineering
Jean Zu
Chi-Guhn Lee (Interim)

Assistant Dean, Administration
Lisa Camilleri

Chief Financial Officer
Brian Coates

Executive Director, Advancement
Gillian Sneddon

Executive Director, Communications
Catherine Riddell

Faculty Registrar
Don MacMillan

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Selected Achievements Under the Academic Plan: 2011–2016

On October 6, 2011, the Faculty of Applied Science & Engineering approved our Academic Plan 2011–2016, which outlined our strategic goals in key areas: positioning; culture of excellence; educating future engineers; student experience; research foci; outreach, collaboration and influence; and resource allocation. We have made tremendous progress towards achieving, and in many cases surpassing, our ambitious goals.

The full Academic Plan is available at uoft.me/engacademicplan, and our *Final Report on Progress and Achievements* was published in November 2016, and is available at uoft.me/AcademicPlanFinal.

Positioning

The past five years have been characterized by exceptional opportunities to enhance our reputation as Canada's top-ranked engineering school and one of the world's best among regional, national and international stakeholders.

Highlights

- Proactively increased the visibility of the Faculty by publishing more than 1,100 stories on U of T Engineering News, and securing more than 28,000 media stories that include the University of Toronto and the key word "engineering" since 2014; 57% of those mentions were by international media outlets.
- Expanded the reach of the Faculty's social media channels: Facebook engagements grew 447% and Twitter engagements (i.e., interactions) grew by nearly 600% between 2015 and 2016; relaunched our Instagram channel in January 2016 to showcase our vibrant student life and thriving sense of community, and have increased our followers by roughly 250%.
- Refreshed the Faculty's website with an increased emphasis on streamlining design, refining content and promoting news.
- Increased readership of our quarterly alumni e-newsletter by 1,100 to more than 22,000 subscribers as of June 2016 and increased open rate to 37.3%, 15 percentage points higher than the industry benchmark in Higher Education.
- Garnered 14 prestigious communications awards and the Engineering Strategic Communications team was named the Not-for-Profit Communication Department of the Year at the world conference of the International Association of Business Communicators (IABC).

Culture of Excellence

U of T Engineering established ambitious goals in areas of research, education, outreach and collaboration, as well as resource management. Our ability to meet — and in many cases, surpass — those goals has had an exponentially positive impact on our standing as a leader among the world's very best engineering schools.

Highlights

- Earned an average of 25.4% of the major national and international awards won by engineering professors in Canada over the past five years, including the L'Oreal/UNESCO for Women in Science Award, Killam Prize in Engineering, NSERC Brockhouse Canada Prize and Engineers Canada Gold Medal Award.
- Earned 16 major education awards at university, national and international levels, including the 3M National Teaching Fellowship, Engineers Canada Medal for Distinction in Engineering Education, OCUFA Teaching Award and the U of T President's Teaching Award.

- Significantly increased the percentage of women professors in our ranks to 21.0% by 2016, adding 18 women professors, an increase of 35.5% over five years.
- Strengthened gender diversity among students: women comprised 30.0% of all undergraduates and 40.1% of entering first-year engineering students in fall 2016, up from 23.2% in fall 2011. Women graduate students increased to 26.1% compared to 24.9% in 2011.
- Increased the proportion of international graduate students to 33.7% in 2016, up from 19.3% in 2011, and the proportion of international undergraduate students to 27.0%, up from 19.1% at the start of the Academic Plan.
- Hosted the biannual Educational Technology Workshop "EdTech" to enable instructors to share best practices for innovative teaching and learning.
- Conducted external reviews of all eight of our academic units; reviewers spoke highly of the calibre of our programs and students, as well as the excellence and dedication of our faculty and staff.
- Recognized 45 staff and faculty through internal awards for excellence in research, teaching, leadership and dedication to improving the student experience; these awards are presented at the annual Celebrating Engineering Excellence event, established by Dean Amon and held each spring.

Educating Future Engineers

U of T Engineering has built a global reputation for excellence that attracts bright students from around the world to our programs. Our curriculum, experiential learning opportunities and co-curricular programs demonstrate our commitment to developing future generations of makers, innovators and global engineering leaders.

Highlights

- Expanded the broad-based admissions process for candidates applying to our undergraduate programs with videos and timed essays; this pilot project, the first of its kind among Canadian engineering schools, gives more comprehensive knowledge of each applicant.
- Expanded the number of undergraduate minors and certificates offered to 15 from 9 in 2011. In 2015–2016, more than half of all graduating undergraduate students completed either a minor or certificate.
- Developed the multidisciplinary capstone design projects course offered by the University of Toronto Institute for Multidisciplinary Design & Innovation; 350+ students have participated from across all undergraduate programs since its inception in 2012.
- Introduced two new Engineering Science majors: Biomedical Systems and Robotics Engineering.
- Launched the first-year course APS100 Orientation to Engineering, one of several initiatives that help students transition into the engineering academic environment.
- Expanded the number of first-year online courses to four and video captured lectures in most first-year classes, allowing students more choice in how they access education material.
- Introduced the inverted classroom model to several second-year courses, requiring students to watch lectures online prior to class and use classroom time to engage in experiential learning.
- Surpassed our goal of enrolling 2,000 graduate students by 2015 two years ahead of schedule, now at 2,365, and increased the proportion of graduate students in our overall student body to 32.9%, bringing us closer to our longer-term goal of 40% by 2030.
- Increased the total number of full-time equivalent professional master's students to surpass the number of full-time equivalent MASc students (56%, goal was 50%).
- Grew the number of full-time equivalent MEng students by 54% between 2011–2012 and 2015–2016.
- Strengthened MEng offerings by launching 5 new emphases, bringing the total to 12 from 7 in 2011.
- Launched two new MEng programs: a Master of Engineering in Cities Engineering and Management (MEngCEM) and a MEng in Biomedical Engineering that focuses on medical device design.
- Developed four online courses for the MEng ELITE program.
- Created the Collaborative Program in Engineering Education (EngEd) in fall 2014 for master's and doctoral students from Engineering and U of T's Ontario Institute for Studies in Education (OISE).
- Increased the number of students in our PhD program by 19.6% over the past five years.
- Created a Technology Enhanced Active Learning (TEAL) classroom in 2014 to pilot new models of teaching courses.
- Increased the number of engineering students participating in the Professional Experience Year (PEY) internships to 790 in 2015–2016 with 79 international placements, from 581 in 2011–2012 with 34 international placements.
- Established the U of T Engineering International Scholar Award, an entrance scholarship for international students that covers the full cost of tuition (up to $45,700) and is renewable for four years.

Student Experience

U of T Engineering has developed programming to offer students unparalleled opportunities to develop competencies in leadership, communication, multidisciplinary collaboration, entrepreneurship and cross-cultural fluency through a range of innovative curricular and co-curricular programming.

Highlights

- Increased the undergraduate retention rate from first-to-second year to a record 93.8% in 2014, up from 91.1% in 2011.
- Launched 34 startups through The Entrepreneurship Hatchery since it was created in 2012.
- Recognized students via the co-curricular record (CCR) for the competencies gained through their non-academic activities. In its pilot year (2013–2014), the CCR recognized 15 roles, and in 2015–2016, it recognized 215 roles.
- Established a cross-cultural capstone course with Peking University, recently expanded to Tsinghua University, where student teams in each institution partner together on an industry-sponsored design project; 70 students have participated to date.
- Developed partnerships with institutions around the world, including Addis Ababa University, Peking University, Hong Kong University of Science and Technology, and ETH Zurich.
- Formalized two collaborative programs with Shanghai Jiao Tong University (SJTU) in 2015–2016, a long-standing partner with our aerospace program. These agreements enable SJTU master's students to obtain a U of T Engineering MEng, and select students to participate in a joint-placement PhD.
- Developed 3+1+1 programs with South China University of Technology, Shanghai University and Tianjin University to enable select students from these institutions to complete their fourth year of undergraduate studies at U of T Engineering, with conditional acceptance to our MEng program.
- Increased the number of students participating in outgoing exchanges to peer institutions to 89 in 2016 from 61 in 2011.
- Established a flex-time PhD option in several departments that allows students who are employed full-time and have a master's degree in engineering to pursue a PhD; this specialty degree is a partnership between a student, an employer and a supervising professor.
- Launched the Engineering Instructional Innovation Program (EIIP) in 2013, which makes strategic investments that will lead to better learning and teaching pedagogies and improvements in the learning experience for our students.

Research Foci

U of T Engineering's innovative research programs have contributed to our global ranking as the top engineering school in Canada and is a major factor in our ability to attract outstanding faculty and students. Our strategic focus on initiatives that nurture a culture of collaboration and cross-disciplinarity are key elements of our reputation and success.

Highlights

- Created the following nine multidisciplinary research centres and institutes between 2011–2016:
  - Centre for Power and Information (2015)
  - Centre for Aerial Robotics Research and Education (2015)
  - Institute for Water Innovation (2015)
  - University of Toronto Transportation Research Institute (2014)
  - Toronto Institute of Advanced Manufacturing (2014)
  - Institute for Sustainable Energy (2013)
  - Centre for Research in Sustainable Aviation (2012)
  - Centre for Resilience of Critical Infrastructure (2011)
  - University of Toronto Institute for Multidisciplinary Design & Innovation (2011)
- Partnered with the Faculties of Arts & Science, Medicine, Pharmacy and U of T-affiliated hospitals to create Medicine by Design (MbD), a regenerative medicine initiative made possible by a $114-million grant from the Canada First Research Excellence Fund, the largest research grant in U of T's history.
- Established the Translational Biology and Engineering Program (TBEP), led by Engineering faculty in collaboration with the Faculties of Medicine and Dentistry, and completed the $10-million TBEP laboratory in MaRS, part of the Ted Rogers Centre for Heart Research.
- Reached goal of $25 million per year in Tri-Agency funding in 2012–2013, three years earlier than originally targeted. Subsequently increased goal to $32 million by 2015–2016. Faculty achieved a record $31.8 million in 2014–2015.
- Increased the number of Canada Research Chairs by eight (to a total of 30), increased Industrial Research Chairs by six (to a total of 10) and increased Endowed Chairs and Limited Term Chairs by 13 (to a total of 40).
- Created EMHSeed in 2015, a seed-funding program supporting collaborative research projects that bring together co-principal investigators from U of T Engineering and either the Faculty of Medicine or an affiliated hospital.
- Established the Percy Edward Hart and Erwin Edward Hart Professorships, and the Hart Teaching Innovation Professorships from a $20-million endowment from the Hart Trust; awarded 13 inaugural professorships.
- Collaborated on research with more than 300 industry partners, from large multinationals such as Apple, Intel and General Electric to local businesses such as the Greater Toronto Airports Authority and U of T spinoffs such as ModiFace.

Outreach, Collaboration & Influence

Our outreach and collaborative initiatives and activities enable U of T Engineering to leverage our local, regional and global community of partners to attract top students, expand and strengthen the impact of our research, and build capacity.

Highlights

- Created the annual Young Women in Engineering Symposium, now in its fourth year, which attracts top female high school science students from across the Greater Toronto Area.
- Created Girls' Leadership in Engineering Experience (GLEE) in 2012, a weekend-long program for female students with offers of admission.
- Strengthened ties with our alumni around the world by establishing Engineering Alumni Network chapters in San Francisco and Hong Kong.
- Hosted 316 networking and professional development events for alumni around the world, including 84 events in 2015–2016.
- Grew our Alumni Mentorship Program in 2015–2016, with 162 mentors and 241 mentees taking part, increases of 224% and 435%, respectively, since 2011–2012.
- Expanded engagement with current students — our future alumni — by creating a new Alumni Outreach Director position in the Engineering Society, initiating the inaugural Engineering Society Heritage Awards Celebration of current and past officers of the Engineering Society, and increasing participation in Graditude, a fundraising initiative aimed at graduating students.
- Engaged with programs that support student mobility, including the MasterCard Foundation Scholars Program, International Foundation Scholars Program and Ciência sem Fronteiras (formerly Science Without Borders).
- Improved engagement of the Toronto chapter of the Engineering Alumni Network by encouraging active participation in strategic Faculty events such as Convocation Plaza, Spring Reunion and the U of T Arbor Awards.
- Created the Young Alumni Board, comprised of recent graduates who are recognized leaders in their fields and philanthropic supporters of the Faculty to engage and involve younger alumni in fundraising and community-building initiatives.
- Launched the CONNECT alumni network social media platform across three departments in 2015–2016, with a Faculty-wide rollout in spring 2017.
- Inspired more than 9,000 youth through our pre-university outreach programs, reaching students in Grades 3 through 12 and allowing participants to explore cutting-edge engineering applications such as sustainable energy, biomedical engineering and robotics.
- Hosted Innovate U, Canada's largest science, technology, engineering and math (STEM) event for children in Grades 3 to 8 in May 2016. This event was run in partnership with Google Canada and Actua and attracted more than 1,400 students and teachers from across the Greater Toronto Area.
- Engaged with more than 300 industry partners from across Canada and around the world, including multinationals such as Airbus, Apple and Manulife Financial, and Ontario companies such as St. Mary's Cement and Geosyntec Consultants.
- Created the positions of Director, Corporate, Government & International Partnerships and Director, Foundation and Corporate Partnerships, to identify areas where our partners' medium-to-long-term strategic priorities overlap with the expertise of our professors, facilitating a move from one-time, project-based collaborations to a more strategic approach that includes a suite of projects related to common areas.
- Partnered with U of T's Office of the Vice-President, Research & Innovation and the Ontario Council of University Research in 2015–2016 to successfully make the case to Ontario's Ministry of Research, Innovation and Science to improve transparency in its review process for the Ontario Research Fund – Research Excellence program.
- Worked with the Ontario Centres of Excellence (OCE) in 2013 to harmonize the applications process for OCE partnership grants and allied NSERC Collaborative Research and Development submissions.
- Actively contributed our expertise on NSERC and other government agency panels, as well as on CEAB accreditation review teams. The faculty members who participate not only strengthen these organizations, but also gain valuable insight into how we can enhance our own programs and internal systems to align with the best practices they observe.

Resource Allocation

Strengthening our resources — personnel, space, infrastructure and budget — is critical to our ability to achieve our mission and Academic Plan goals. They support and enhance each of the strategic areas outlined in our plan: our culture of excellence, reputation, student experience, curriculum and experiential learning opportunities, research and innovation, and outreach, collaboration and influence. Since 2011, we:

Highlights

- Began construction on the Centre for Engineering Innovation & Entrepreneurship (CEIE), which will enable a new standard of excellence in engineering education and research.
- Received the NSERC Design Chair in Multidisciplinary Design and developed a suite of industry-supported multidisciplinary senior design projects to unite design initiative across the Faculty and foster collaboration, design and innovation.
- Increased total Canada Foundation for Innovation (CFI) funding over the last five years to $34.8 million.
- From 2011 to 2016 raised $180 million of our $200-million Boundless campaign goal.
- Provided resources through the Dean's Strategic Fund to add a total of 234 study spaces to engineering buildings in the past five years to enhance interactive learning and socialization for students.
- Invested over $48-million in improvements to over 90 laboratory and high-impact facilities through the federal government's Post-Secondary Institutions Strategic Investment Fund (SIF) and the Dean's Infrastructure Improvement Fund (DIIF). This enabled us to bring our facilities in line with our position as the top-ranked engineering school in Canada.

Comparison of U of T Engineering with Ontario and Canada, 2016–2017

The table below compares U of T Engineering metrics against those of engineering Faculties in Ontario and Canada for 2016–2017. Within Canada, we awarded 7.3% of all undergraduate engineering degrees, 10.4% of all engineering master's degrees and 9.9% of all engineering PhD degrees this past year.

Our internationally renowned scholars have received the single largest proportion of Natural Sciences and Engineering Research Council (NSERC) engineering funding in 2016–2017, despite the fact that they make up only 6.2% of Canada's tenured and tenure-stream engineering professors.

	U of T Engineering	Ontario	U of T % of Ontario	Canada	U of T % of Canada
Undergraduate					
Enrolment (FTE)	4,681	38,685	12.1%	83,124	5.6%
Degrees Awarded	1,048	6,693	15.7%	14,403	7.3%
% Women	26.2%	20.2%		19.4%	
Master's (MEng, MASc and MHSc)					
Enrolment (FTE)	1,169	5,912	19.8%	14,594	8.0%
Degrees Awarded	669	3,330	20.1%	6,453	10.4%
% Women	31.4%	26.8%		25.4%	
Doctoral (PhD)					
Enrolment (FTE)	852	3,455	24.7%	9,284	9.2%
Degrees Awarded	150	651	23.0%	1,511	9.9%
% Women	25.3%	23.3%		23.8%	
Faculty					
Tenured and Tenure-Stream	231	1,613	14.3%	3,733	6.2%
Major Awards					
Major Awards Received	19	40	47.5%	78	24.4%
Research Funding					
NSERC Funding for Engineering	$30.6M	$129.7M	23.6%	$307.6M	9.9%

Note: Unlike data contained in the rest of this report, enrolment (Full-time Equivalent, or FTE) and degrees awarded are based on the 2016 calendar year and come from Engineers Canada. Faculty data (tenured and tenure-stream) are based on November 2016 counts by Engineers Canada. Major awards are based on the 2016 calendar year and NSERC research funding is based on the 2016–2017 grant year (April to March).

Comparison of U of T Engineering with St. George Campus and University of Toronto, 2016–2017

The following chart compares U of T Engineering with the University of Toronto based on key metrics for 2016–2017. Since our activities are concentrated on the St. George campus, we also present our relative metrics where available.

	U of T Engineering	St. George Campus	Engineering % of Campus	University of Toronto	Engineering % of U of T
Student Enrolment					
Undergraduate	5,441	38,256	14.2%	65,185	8.3%
Professional Master's (MEng and MHSc)	880	7,837	11.2%	8,342	10.5%
Research Master's (MASc)	608	2,919	20.8%	3,045	20.0%
Doctoral (PhD)	877	5,907	14.8%	6,217	14.1%
All Students	7,806	54,919	14.2%	82,789	9.4%
Degrees Awarded					
Undergraduate	1,123	7,715	14.6%	12,320	9.1%
Professional Master's (MEng and MHSc)	508	3,600	14.1%	3,895	13.0%
Research Master's (MASc)	200	1,263	15.8%	1,305	15.3%
Doctoral (PhD)	150	818	18.3%	879	17.1%
Total Degrees	1,981	13,396	14.8%	18,399	10.8%
Faculty and Staff					
Professoriate	261			2,965	8.8%
Administrative and Technical Staff	326			6,808	4.8%
Research Funding					
Sponsored Research Funding	$74.2M			$400.3M	18.5%
Industry Research Funding	$7.6M			$18.8M	40.2%
Space					
Space (NASMs)	64,471	634,209	10.2%	835,159	7.7%
Revenue					
University-wide Costs	$65.6M			$527.0M	12.4%
Total Operating Revenue	$210.9M			$1,958.6M	10.8%

Note: Student enrolment is shown as of November 1. Degrees awarded are based on the 2016–2017 academic year. Professoriate includes tenured, tenure-stream and teaching-stream faculty members. Administrative and technical staff include full- and part-time staff. Research funding is based on the 2015–2016 grant year (April to March). Space is measured in Net Assignable Square Metres (NASMs). Revenue is based on the 2016–2017 U of T fiscal year (May to April).

U of T Engineering: A Decade of Achievement

The following timeline features select highlights of our Faculty's achievements over the past 10 years. For more information, please see the Annual Report for each academic year at uoft.me/EngAnnualReports.

2007-2008

- Created first MEng emphasis: Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE)
- Welcomed first cohort of TrackOne students
- Hosted first Dean's Town Hall, a forum for Faculty leadership and the Engineering Society to foster student engagement

- Launched Skule Sisters women's mentorship program, pairing current U of T Engineering students with high school students
- Established Office of the Vice-Dean, Graduate Studies
- Phased out Professional Development Centre and partnered with the School of Continuing Studies

2008-2009

- Launched undergraduate minors in Sustainable Energy and in Environmental Engineering
- Established the Task Force on Globalization and Engineering
- Launched Centre for Research in Healthcare Engineering (now Centre for Healthcare Engineering)
- Prioritized physical space improvement as a result of year-long Comprehensive Divisional Space Review

2009-2010

- Created the Cross-Disciplinary Programs Office to administer undergraduate engineering minors
- Launched First Year Office to support incoming undergraduate students

- Established the Centre for Global Engineering (CGEN)
- Created the Identity, Privacy & Security Institute (IPSI)
- Established the Engineering Outreach Office to coordinate pre-university STEM programs with a focus on engaging under-represented communities
- Created in-house communications team: Engineering Strategic Communications

Launched BioZone, a centre of applied bioscience and bioengineering

Launched the Centre for Resilience of Critical Infrastructure (CRCI)

Launched The Entrepreneurship Hatchery

Established the U of T Institute for Multidisciplinary Design & Innovation (UT-IMDI)

First cohort of students completed multidisciplinary capstone projects with industry clients

Formed strategic partnerships with five Canadian universities to promote engineering graduate studies across the country

2010-2011

Launched a minor in Engineering Business

Established the Institute for Leadership Education in Engineering (ILead)

Launched the Institute for Robotics & Mechatronics (IRM)

Earned the Canadian Green Building Award for the Goldcorp Mining Innovation Suite in the Lassonde Mining Building

Created the Dean's Strategic Fund to provide seeding funding for strategic Faculty initiatives

2011-2012

U of T allocated Site 10 location for the new Centre for Engineering Innovation & Entrepreneurship (CEIE)

Implemented new budget allocation model

Developed and hosted the first educational technology (EdTech) conference for U of T community

Hosted inaugural Girls' Leadership in Engineering Experience (GLEE) event for top female applicants

2012-2013

Created the Centre for Research in Sustainable Aviation (CRSA)

Held first Faculty-wide industry partners reception

Set $200M fundraising goal as part of U of T's Boundless campaign

Launched the Engineering Instructional Innovation Program (EIIP)

Opened new space flight laboratory for microsatellite research at UTIAS

2013-2014

Institute for Sustainable Energy (ISE) expanded to a cross-Faculty research unit

Completed construction of new floor in the Wallberg Building to house BioZone

- Educating Future Engineers & Student Experience
- Research Foci
- Outreach, Collaboration & Influence
- Resource Allocation

2014-2015

- Established Collaborative Program in Engineering Education in partnership with OISE
- Piloted new broad-based undergraduate admissions process

- Launched the Toronto Institute for Advanced Manufacturing (TIAM)
- Established the Ontario Centre for the Characterization of Advanced Materials (OCCAM)
- Launched U of T Transportation Research Institute (UTTRI)
- Hosted inaugural Young Women in Engineering Symposium (YWIES)

- Opened first Technology Enhanced Active Learning (TEAL) classroom

2015-2016

- Launched Start@UTIAS entrepreneurship incubator program
- Hosted top domestic prospective graduate students at the first Faculty-wide Graduate Research Days event
- Established Medicine by Design, supported by the largest single research grant in U of T history
- Launched the Translational Biology and Engineering Program (TBEP) at the Ted Rogers Centre for Heart Research in partnership with the Faculties of Medicine and Dentistry

- Established the Institute for Water Innovation (IWI)

- Partnered with Google Canada and Actua to host Innovate U, Canada's largest STEM event for kids

- Broke ground on construction of the CEIE
- Ontario government announced $15M investment in the CEIE

2016-2017

- Reached 40% women among first-year undergraduates

- Launched a new MEng program in biomedical engineering
- Established the Percy Edward Hart and Erwin Edward Hart Professorships and Hart Teaching Innovation Professorships from a $20M endowement
- Formed Engineering Indigenous Initiatives Steering Committee
- Expanded CONNECT alumni network social media platform across all departments
- Achieved Boundless fundraising goal of $200M and expanded target to $230M
- Began upgrades on 89 lab spaces through the Lab Innovation For Toronto (LIFT) fund

U of T Engineering: Then & Now

	THEN (2007-08)	NOW (2016-17)
Applications to undergraduate programs	6,829	12,298
Entering average of first-year students	86.7%	93.2%
Enrolment of undergraduate students	4,646	5,441
Proportion of students who move from first to second year (retention rate)	84.1%	93.8%
Students on PEY internship	458	734
Undergraduate minors and certificates offered	1	15
Undergraduate degrees awarded	879	1,123
Proportion of undergraduates graduating with an engineering minor or certificate	6%	55%
Applications to graduate programs	2,510	4,678
Enrolment of MEng and MHSc students / MASc and PhD students	306 / 1,105	880 / 1,485
PhD degrees awarded	84	150
MEng emphases offered	1	12
Ratio of undergraduate to graduate students	4:1	3:1
Tenure- and teaching-stream faculty	226	261
Research centres and institutes	12	26
Research chairs held by faculty	57	90
Engineering citations (AAU, indexed by Thomson Reuters)	4,149 (2003-07)	27,710 (2011-15)
Number of NSERC Collaborative Research and Training Experience (CREATE) grants held	3	6
Total research funding attracted	$54.0M	$74.6M
Proportion of international undergraduate students	11.3%	28.0%
Proportion of women in first-year engineering class	21.5%	40.1%
Proportion of international graduate students	17.4%	33.7%
Proportion of women in graduate programs	24.9%	26.1%
Proportion of women faculty	11.9%	21.1%
Number of STEM-outreach programs offered to pre-university youth	10	19
Number of alumni mentors / student mentees	89 / 145	142 / 241
Faculty footprint (NASMs) across the St. George campus	62,333	71,724 (incl. CEIE)
Total operating budget	$80.9M	$144.4M
Total revenue	$125.2M	$222.8M
Philanthropic support generated	$2.5M	$22M

Educating Future Engineers & Student Experience

Outreach, Collaboration & Influence

Research Foci

Resource Allocation

1

Our exceptional academic programs, unparalleled co-curricular opportunities, world-renowned research and teaching, and reputation as a global leader in engineering education continue to attract the most promising future engineering innovators and entrepreneurs from across Canada and around the world.

We received a record number of undergraduate applications in 2016, enabling us to be more selective than ever in our offers of admission: for each space in our programs, we received more than 12 applications. Our students are entering with high achievements and grade point averages, which demonstrate the overall quality of our applicants. Once they are here, the depth and breadth of our resources that support student learning and well-being contribute to our increasing retention rate from first year to second year.

The thriving culture of inclusivity at U of T Engineering enhances creativity, collaboration, communication and innovation, which are at the heart of the engineering profession. In 2016, our entering undergraduate cohort was one of the most diverse first-year classes in our history. Women comprised 40.1% of our first-year class — the highest proportion of any engineering school in Canada — and more than one in four entering undergraduates came from outside of Canada. We also continue to work closely with U of T's First Nations House to strengthen our relationship with Indigenous peoples and communities and intensify our outreach and recruitment efforts.

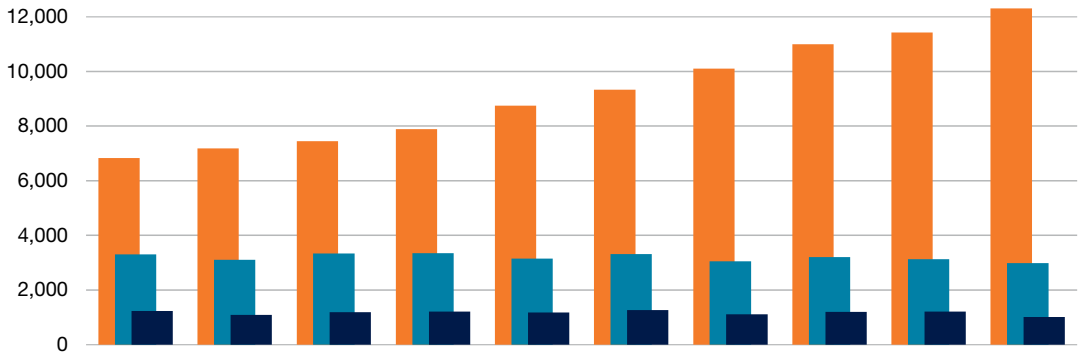
We enhance the student experience by enriching our courses and co-curricular activities with opportunities for experiential learning. Through online courses, our Technology Enhanced Active Learning (TEAL) classroom, a wide variety of design team opportunities, Professional Experience Year (PEY) internships and international exchanges, we offer the ideal environment for the next generation of global engineering leaders to prosper.

This environment will be further strengthened by the forthcoming Centre for Engineering Innovation & Entrepreneurship (CEIE), which will open its doors in 2018. The CEIE will set a new standard of excellence in undergraduate teaching and research, and will house facilities that support innovative pedagogies as well as makerspaces to enable multidisciplinary collaborations among students, industry partners and alumni.

Admissions and First-Year Students

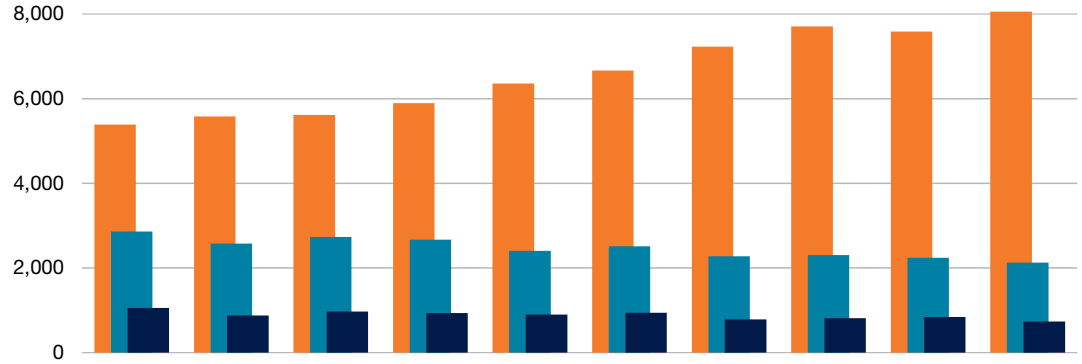
We received a record 12,298 applications for admission from across Canada and around the world in 2016, an increase of 7.7% from the previous year and more than 40.6% from five years ago. Our positive global reputation and the success of our international recruitment strategy drew 10.8% more international student applications than in 2015, while domestic student applications increased by 6.1%. *(For more details, please see Chapter 10: Diversity.)*

Figure 1.1a Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2007 to 2016



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Applications	6,829	7,173	7,446	7,881	8,745	9,326	10,095	10,989	11,418	12,298
Offers	3,300	3,107	3,329	3,347	3,149	3,309	3,042	3,203	3,126	2,983
Registrations	1,229	1,081	1,188	1,203	1,180	1,265	1,106	1,192	1,205	1,005
Selectivity	0.48	0.43	0.45	0.42	0.36	0.35	0.30	0.29	0.27	0.24
Yield	0.37	0.35	0.36	0.36	0.37	0.38	0.36	0.37	0.39	0.34

Figure 1.1b Applications, Offers, Registrations, Selectivity and Yield of Domestic First-Year Undergraduates, 2007 to 2016



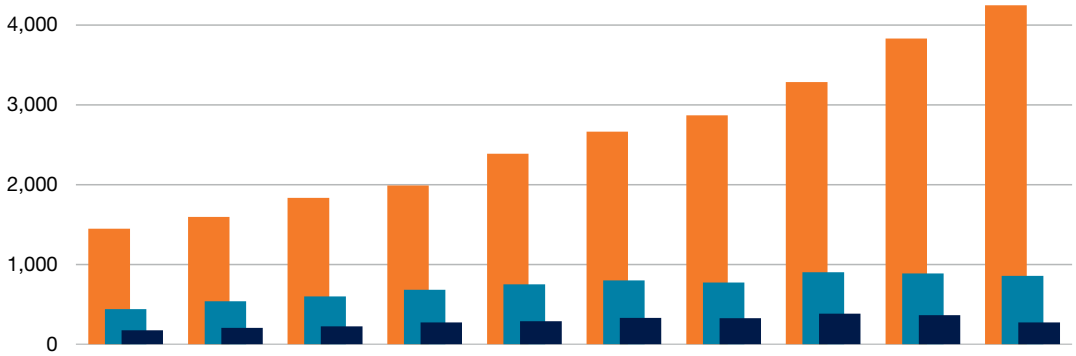
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Applications	5,383	5,581	5,612	5,892	6,359	6,662	7,229	7,705	7,588	8,053
Offers	2,860	2,572	2,733	2,665	2,400	2,510	2,272	2,302	2,239	2,128
Registrations	1,056	876	967	931	894	938	782	812	843	734
Selectivity	0.53	0.46	0.49	0.45	0.38	0.38	0.31	0.30	0.30	0.26
Yield	0.37	0.34	0.35	0.35	0.37	0.37	0.34	0.35	0.38	0.34

Data in this chapter are presented by academic year (September to August). Highlights are from July 2016 to June 2017.
Note 1.1a, b, c: Student counts are shown as of November 1. Applications and offers are for the fall admissions cycle.
Selectivity = offers ÷ applications and represents the proportion of applicants who were offered admission. Yield = registration ÷ offers.
Domestic students are defined as citizens (living in Canada or abroad) or permanent residents of Canada.

Our worldwide reputation as a leader in engineering education and research, strong global rankings, rigorous broad-based admissions process and targeted recruitment strategies resulted in one of the most accomplished entering classes in our history. In 2016, we increased our selectivity, resulting in offers of admission to 24% of applicants compared with 27% in 2015. The mean entering average of incoming Ontario secondary school students was 93.2%, up from 92.4% in the two previous years.

This year was the last in a three-year pilot project to assess applications using an enhanced broad-based process, which provides a more comprehensive understanding of each applicant's candidacy than grades alone. It allows us to extend offers to students who will best thrive in our enriched experiential and collaborative learning environment. This method considers both a candidate's academic record and co-curricular accomplishments in combination with an online questionnaire with timed written and video responses. Trained alumni evaluate the responses based on key engineering qualities, such as logical thinking, communication skills, adaptability and perseverance. In 2016, we enhanced this process by increasing our number of alumni evaluators from 30 to almost 60 to include those from outside of the Greater Toronto Area (GTA), and by incorporating the results from evaluations more specifically into the admissions process.

Figure 1.1c **Applications, Offers, Registrations, Selectivity and Yield of International First-Year Undergraduates, 2007 to 2016**



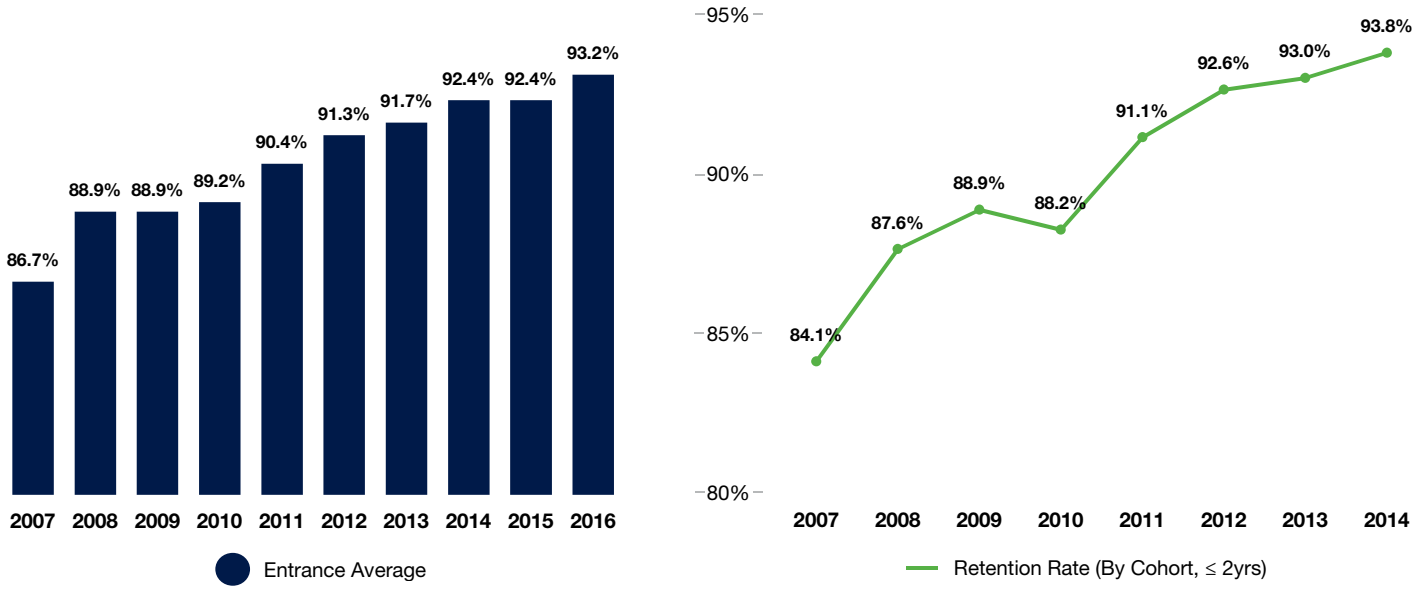
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Applications	1,446	1,592	1,834	1,989	2,386	2,664	2,866	3,284	3,830	4,245
Offers	440	535	596	682	749	799	770	901	887	855
Registrations	173	205	221	272	286	327	324	380	362	271
Selectivity	0.30	0.34	0.32	0.34	0.31	0.30	0.27	0.27	0.23	0.20
Yield	0.39	0.38	0.37	0.40	0.38	0.41	0.42	0.42	0.41	0.32

Our first-year undergraduate population was one of the most diverse in our history, which reflects our enhanced outreach and recruitment efforts and broad-based admissions process. Women comprised a record 40.1% of first-year students, the highest proportion of any engineering school in Canada.

At 27%, international students continued to account for a steady proportion of incoming students. Our ability to attract these students is enhanced by the Faculty's International Scholar Awards, the MasterCard Foundation Scholars Program and the Lester B. Pearson International Scholarships. *(For more details, please see Chapter 9: International Initiatives and Chapter 10: Diversity.)*

Our retention rate for students from first to second year increased to 93.8% (Figure 1.2), a new high, that can be attributed to our students' academic strength and the robust programs and initiatives that we make available to support their success. *(For more details, please see "Enriching the Undergraduate Engineering Experience" later in this chapter.)*

Figure 1.2 Ontario Secondary School Averages of Incoming First-Year Undergraduates and Retention Rate Between First and Second Year, 2007 to 2016



To enhance our ability to attract the top students from across Canada and around the world, we augmented our recruitment activities. For the 2017 admissions cycle, key initiatives included:

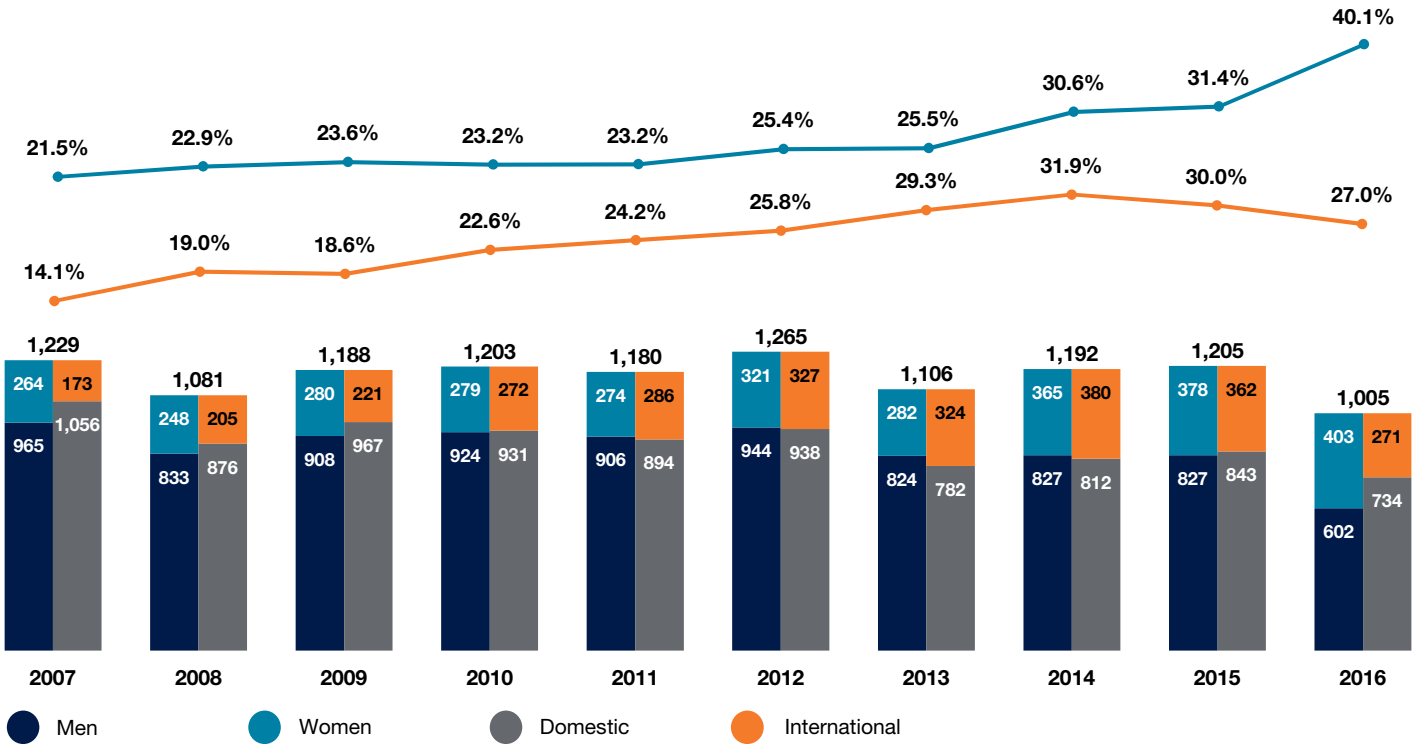
- **National Recruitment** — We attended the Ontario Universities Fair at the Metro Toronto Convention Centre, where we distributed more than 12,000 viewbooks over the course of the weekend. We increased the number of school visits in the Greater Toronto Area to 70, up from 60 in 2015 and 30 in 2014. The schools were selected on the basis of historic admission data, with an eye to our enrolment priorities. We delivered a full day of U of T Engineering programming, including course sessions and engineering complex tours, at U of T's Fall Campus Day for prospective students. We also conducted fall and winter recruitment activities in Ottawa, Montreal, Vancouver, Calgary, Mississauga and Markham.
- **International Recruitment** — We conducted extensive recruitment activities in the fall and winter, including school visits, applicant events, information sessions, conference presentations and science fair participation in 12 countries. We also led a Canadian university recruitment delegation to five Latin American countries, including Colombia, Costa Rica, Ecuador, Mexico and Peru.
- **Online Events** — We hosted 19 live-streamed events, panel discussions, live chats and videos throughout the admissions cycle to answer applicants' questions about such topics as completing an application, program showcases, PEY internships and living in residence. These events were highly successful and reached a total audience of more than 9,000 students, an increase of almost 7,000 from the previous year.
- **Young Women in Engineering Symposium (October 2016)** — The third annual YWIES attracted 53 top female Grade 12 science students from across the GTA. The event gave attendees an opportunity to learn more about engineering, participate in hands-on workshops and meet students, faculty and alumni. It also enabled us to connect with these students early in the 2016 admissions cycle. Thirty-one of the attendees applied to U of T Engineering.
- **March Break Applicant Event (March 2017)** — We hosted more than 700 applicants and their families during the invitation-only open house, which gave them an opportunity to learn more about the Faculty, specific programs, student life and our campus.
- **Engineer for a Day (March 2017)** — For this inaugural event we hosted 26 high-achieving Grade 11 math and science students from four Toronto District School Board schools that are typically underrepresented in our applicant pool, which enabled them to experience a day in the life of a U of T Engineering student.

Note 1.2: Entrance average is calculated based on Ontario secondary school students. First- to second-year retention rate is indicated above year of first-year enrolment and is calculated as of November 1.

- **Admitted Student Calling Campaign (March/April 2017)** — Current U of T Engineering students called all admitted applicants from across Canada, U.S., Mexico, South America and the Caribbean to congratulate them on being accepted and answer their questions about our programs, with a focus on student experience.
- **Alumnae Calling Campaign (March/April 2017)** — This campaign connected more than 100 admitted female students across Canada and the U.S. with U of T Engineering alumnae who live in their regions.
- **Customized Individual Advising for International Students (March/April 2017)** — More than 700 admitted international applicants received personalized academic advising via Skype.
- **Girls' Leadership in Engineering Experience (GLEE) (May 2017)** — This annual, weekend-long program inspires and empowers women who have received offers of admission to our programs by connecting them with female faculty members, students and alumnae. Ninety-nine of the 115 students participating in GLEE accepted our offers of admission.
- **Welcome to Engineering (May 2017)** — This full-day event gave admitted students an opportunity to learn more about U of T Engineering before their final deadline to accept offers from Ontario universities. More than 300 admitted students attended this event.

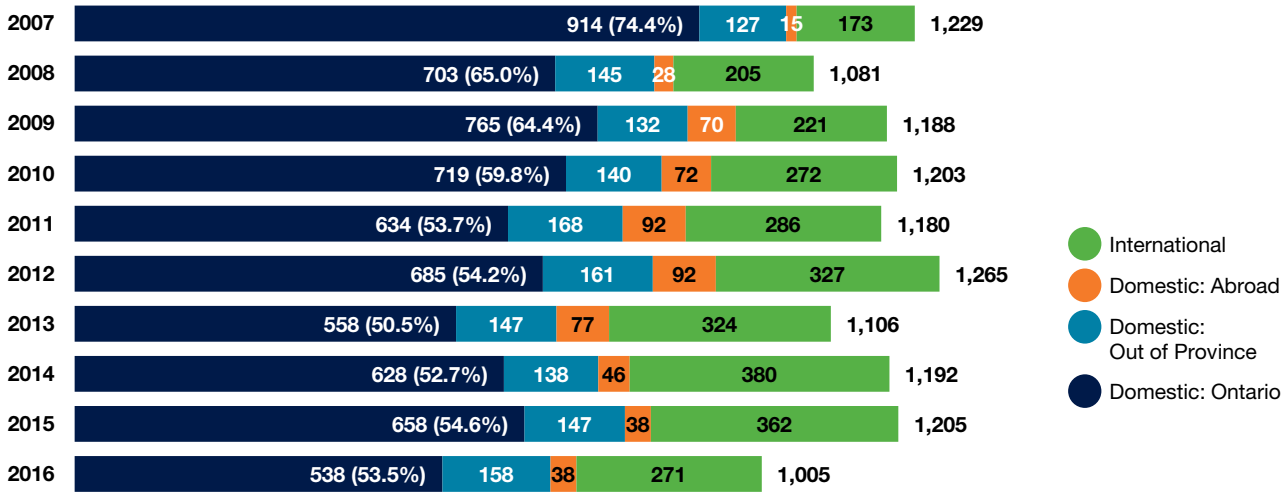
The Faculty is working with U of T's First Nations House and with Indigenous peoples and communities to increase the number of Indigenous students who apply to and enrol in U of T Engineering programs, and to ensure a welcoming, supportive and inclusive environment for students, faculty and staff. In winter 2017, U of T Engineering established the Eagles' Longhouse: Engineering Indigenous Initiatives Steering Committee, with members from across the Faculty and the Oneida Nation. The steering committee has a mandate to engage Indigenous representatives and engineering educators to design a *Blueprint for Action* to effect immediate and ongoing improvements in the relationship between the Faculty and Indigenous communities, including facilitating greater integration of existing outreach, recruitment and retention initiatives, both within the Faculty and across the University, that affect Indigenous engineering students. *(For more information, see Chapter 10: Diversity.)*

Figure 1.3 **Incoming First-Year Undergraduates with Percentage of Women and International Students, 2007 to 2016**



Note 1.3: Student counts are shown as of November. 1. Domestic students are defined as citizens or permanent residents of Canada.

Figure 1.4 **Incoming First-Year Domestic and International Undergraduates, 2007 to 2016**

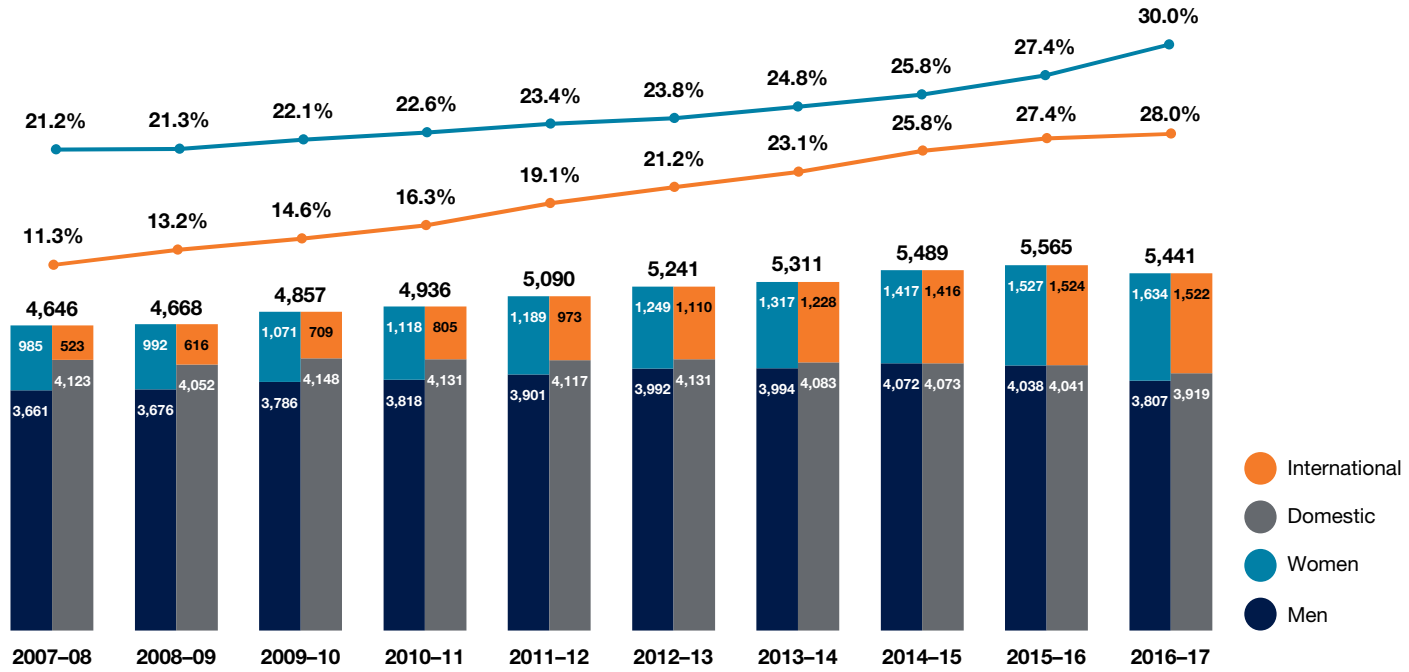


Enrolment

In 2016, enrolment by women increased across all programs and our overall female undergraduate population reached 30.0%, up from 27.4% in 2015–2016. This growth is expected to continue as the number of women students in our entering class increases year over year.

Our international student population continued to grow and enrich our global U of T Engineering community with diverse perspectives. International students now comprise 28.0% of all undergraduates, up from 11.3% in 2007–2008.

Figure 1.5a **Undergraduate Enrolment with Proportion of Women and International Students, 2007–2008 to 2016–2017**



Note 1.4: Student counts are shown as of November 1. Domestic students are defined as citizens or permanent residents of Canada.
Note 1.5a: Includes full- and part-time students and those on Professional Experience Year (PEY) internships. Does not count students with special (non-degree) status. Student counts shown as of November 1. Domestic students are defined as citizens or permanent residents of Canada.

Figure 1.5b **Women as a Proportion of Total Enrolment by Program, 2007–2008 to 2016–2017**

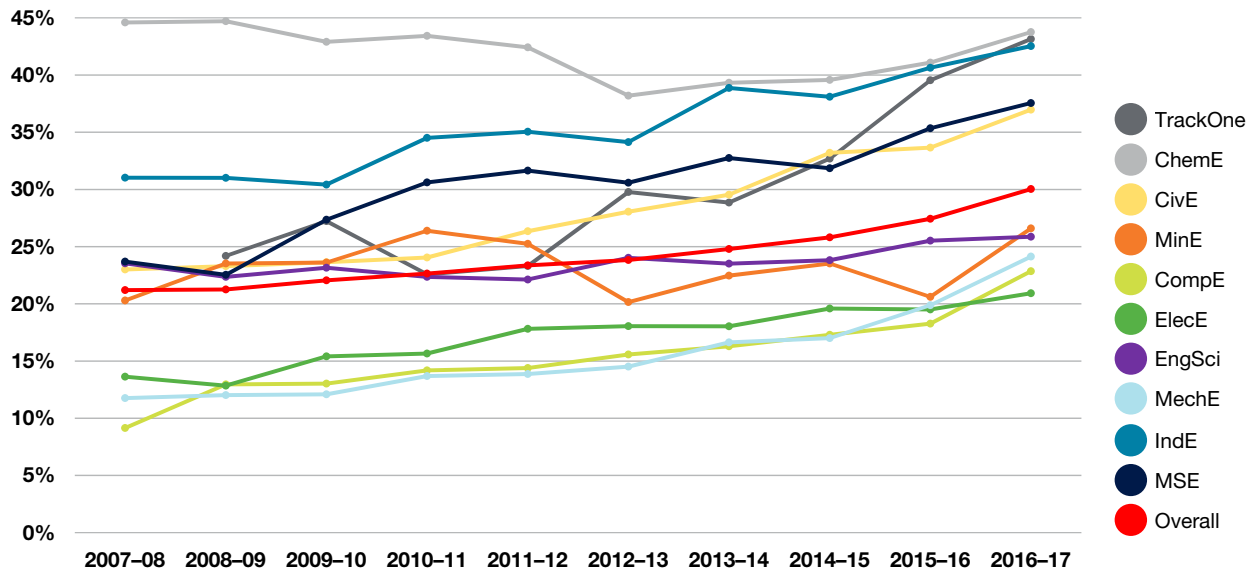
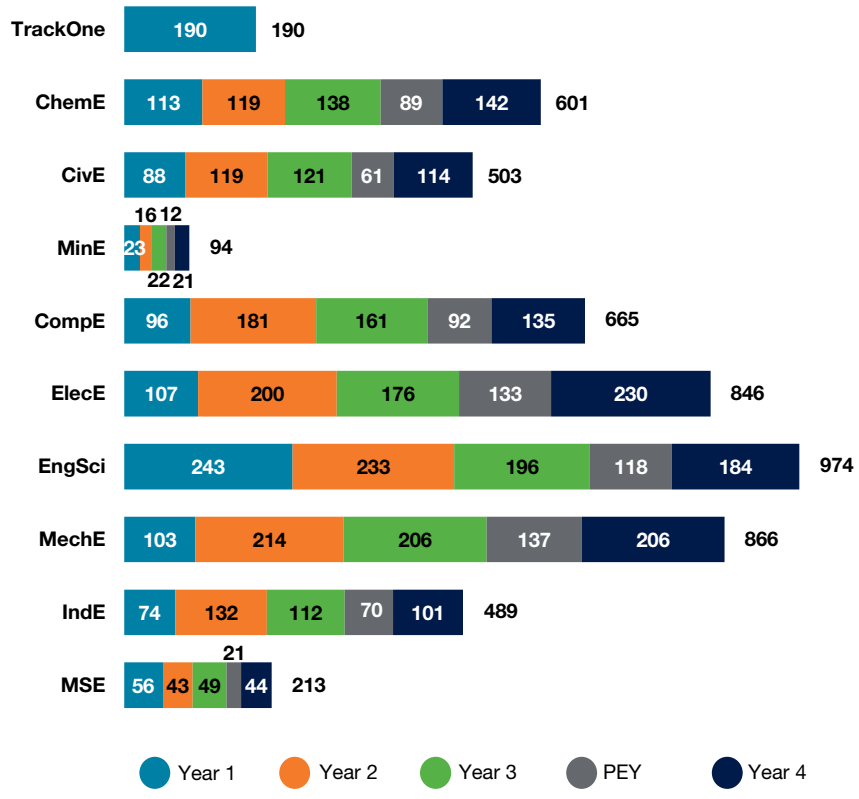


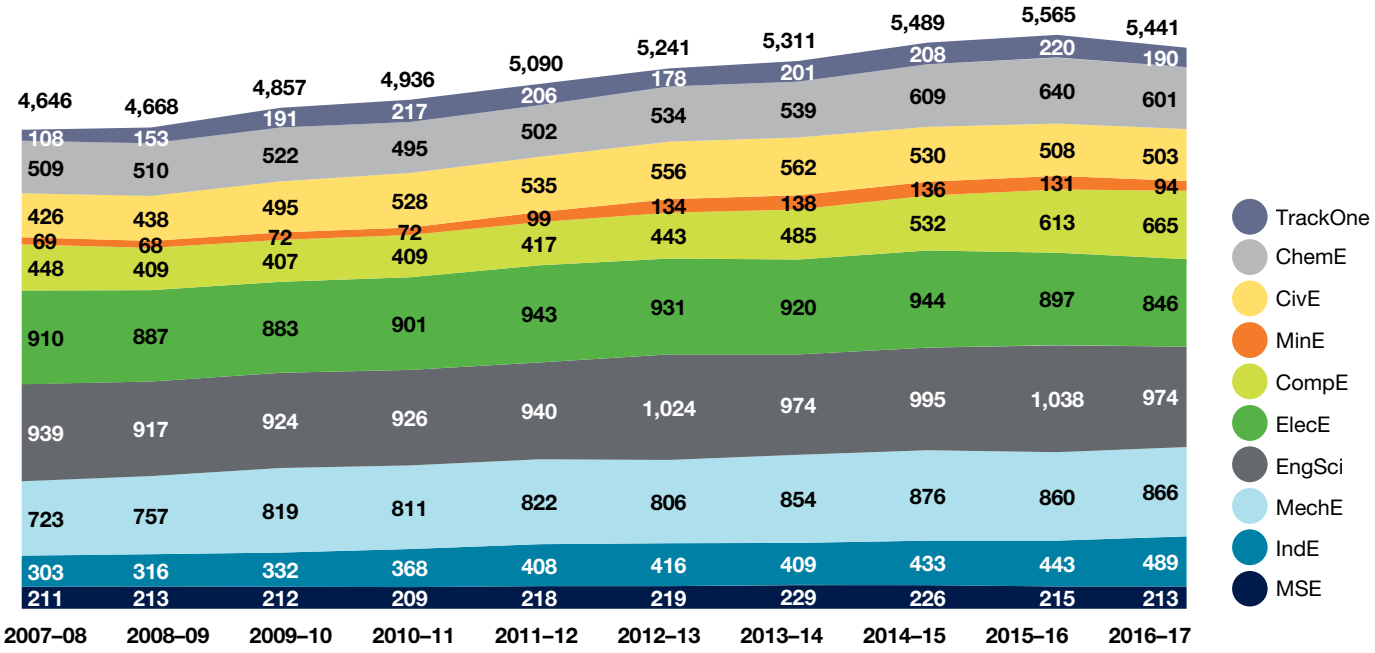
Figure 1.6 **Undergraduates by Program, Year of Study and Professional Experience Year (PEY), 2016–2017**



Engineering Science Majors	Enrolment
Aerospace Engineering	57
Biomedical Systems Engineering	48
Electrical and Computer Engineering	85
Energy Systems Engineering	34
Infrastructure Engineering	14
Mathematics, Statistics and Finance	43
Nanoengineering	2
Engineering Physics	29
Robotics Engineering	68
Total	**380**

Note 1.6: Student counts are shown as of November 1. Engineering Science Majors show only students in Year 3 and Year 4 and do not count students on PEY internships.

Figure 1.7 **Undergraduates by Program, 2007–2008 to 2016–2017**



Note 1.7: Student counts are shown as of November 1.

Need-Based Funding

We ensure that all students are able to enrol in our degree programs and complete their course of study regardless of financial means. We provide funding for undergraduate students through a variety of sources, including individual donors and the University of Toronto Advanced Planning for Students (UTAPS) program.

The number of undergraduate students receiving need-based awards in 2016–2017 was 1,518. The total amount of student support was $10.1 million. This funding is distributed relatively evenly across all four years of study.

The amounts shown in this chapter do not include merit-based scholarships or awards, or funding from provincial assistance programs such as the Ontario Student Assistance Program (OSAP).

Figure 1.8a **Number of Awards Received by Cohort with Total Number of Undergraduate Need-Based Award Recipients, 2009–2010 to 2016–2017**

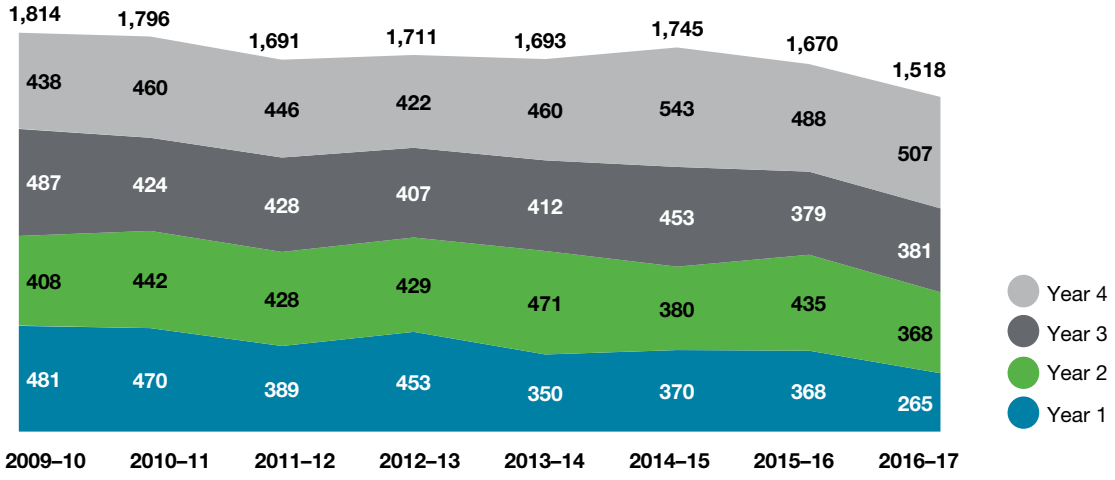
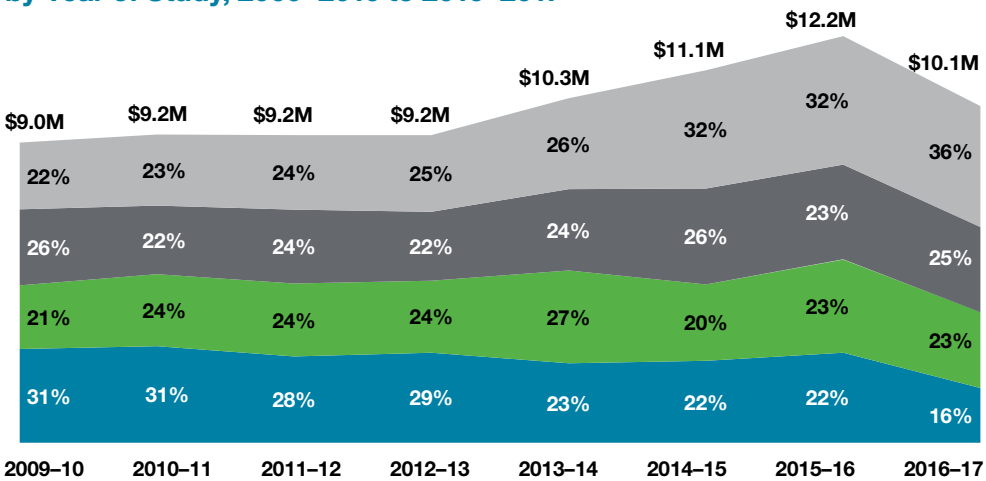


Figure 1.8b **Total Value of Undergraduate Financial Assistance and Percentage Distributed by Year of Study, 2009–2010 to 2016–2017**



	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Year 4	$1,995,808	$2,130,098	$2,229,278	$2,296,173	$2,725,785	$3,533,910	$3,853,161	$3,615,743
Year 3	$2,280,152	$2,049,237	$2,205,736	$2,061,174	$2,429,321	$2,870,812	$2,837,808	$2,548,988
Year 2	$1,897,712	$2,157,800	$2,185,640	$2,160,969	$2,781,695	$2,289,069	$2,792,715	$2,268,497
Year 1	$2,806,624	$2,886,898	$2,580,676	$2,686,997	$2,372,994	$2,450,470	$2,695,169	$1,636,299
Total	$8,980,296	$9,224,033	$9,201,330	$9,205,313	$10,309,795	$11,144,261	$12,178,853	$10,069,527

Note 1.8a, b: Data for these figures were obtained from the new Student Accounts Reporting Cube. In previous Annual Reports, data were obtained from the Faculty Registrar's Office. For more information, see Data Sources.

Degrees Awarded

U of T Engineering students earn either a Bachelor of Applied Science (BASc) or Bachelor of Applied Science in Engineering Science (BASc EngSci). Both degrees can be completed in four years. However, many of our second- and third-year students choose to complement their degrees with a 12- to 16-month PEY internship, which adds 12 months to their time-to-completion. *(For more information on PEY, please refer to Chapter 4: Cross-Faculty Education and Experiential Learning.)*

Figure 1.9a **Undergraduate Degrees Awarded by Program, 2007–2008 to 2016–2017**

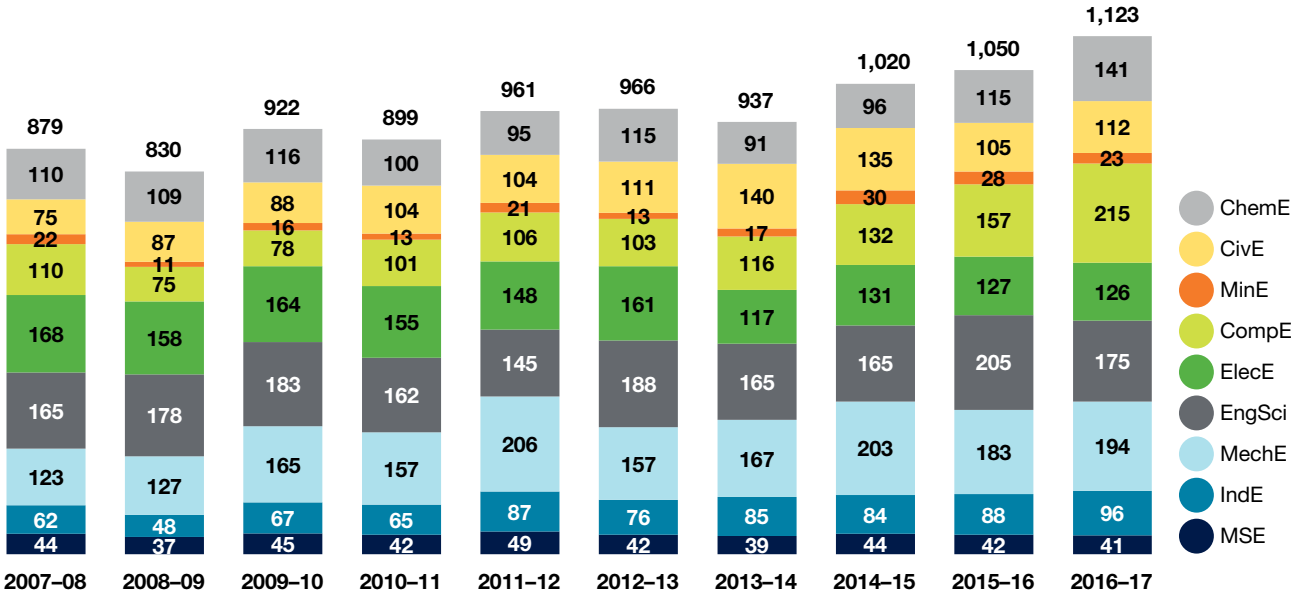
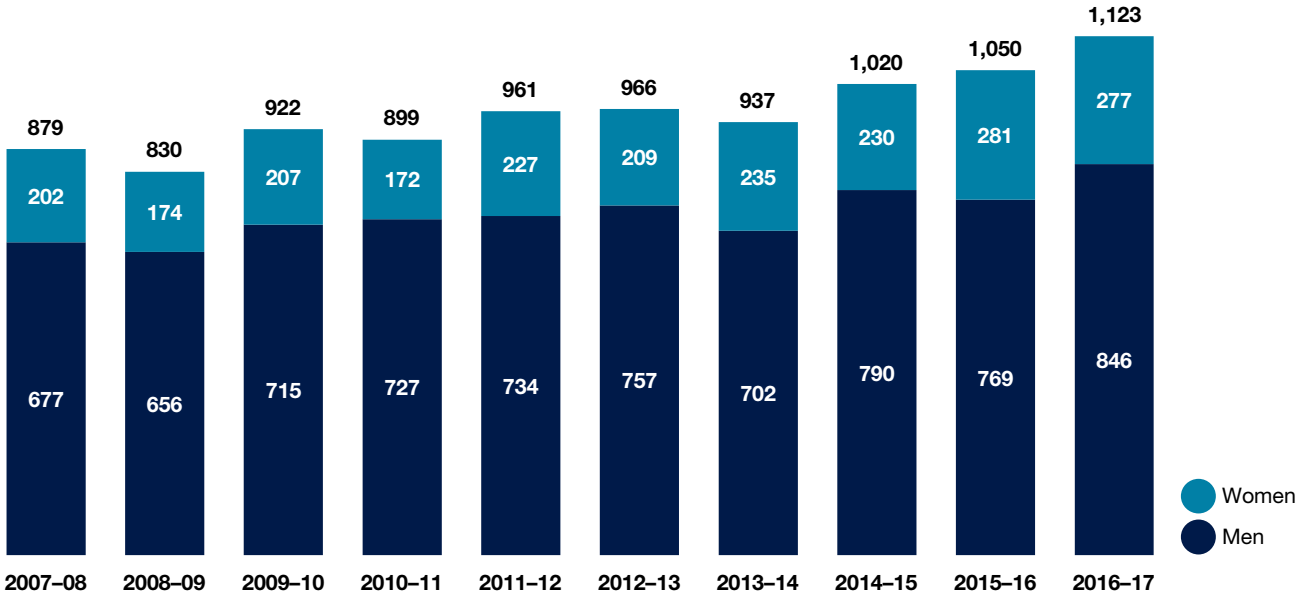
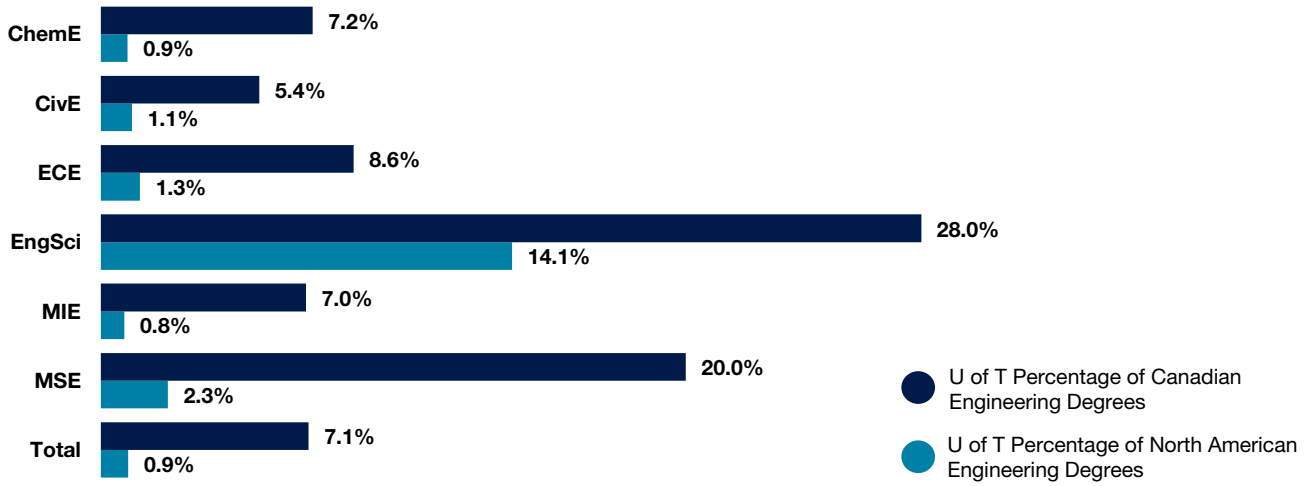


Figure 1.9b **Undergraduate Degrees Awarded by Gender, 2007–2008 to 2016–2017**



Note 1.9a, b: Data reported by academic year (September to August).

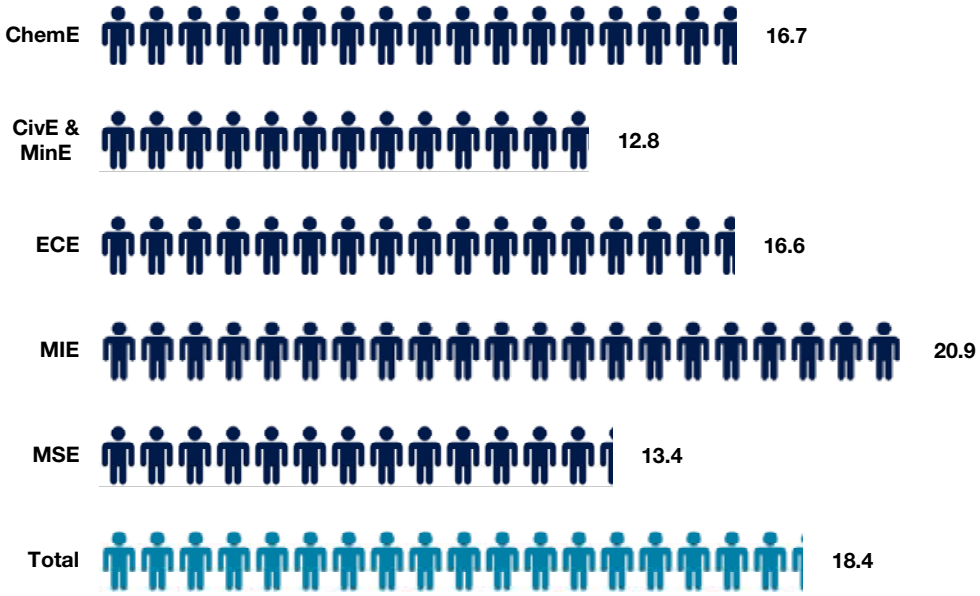
Figure 1.9c **U of T Engineering Degrees Awarded by Academic Area Compared with Canadian and North American Degree Totals, 2015**



Student-to-Faculty Ratios

Figure 1.10 shows the number of undergraduates relative to the number of faculty in each department. Students in programs that employ a cross-faculty teaching approach, such as Engineering Science and TrackOne, are included only in the "Total" bar. The overall student-to-faculty ratio has decreased to 18.4 from the previous year's value of 19.0 as a result of the addition of 14 new faculty members.

Figure 1.10 **Undergraduate Students per Faculty Member by Academic Area, 2016–2017**



Note 1.9c: Data sourced from reports produced by Engineers Canada and the American Society for Engineering Education. Total percentages represent all engineering degrees in North America, including those in fields that are not specifically identified at U of T.
Note 1.10: Student and faculty counts are shown as of November 1. For full-time equivalency (FTE), each part-time student is counted as 0.3 FTE. Students with special (non-degree) status or on PEY internships are not included. Faculty counts include tenure-stream and teaching-stream faculty.

Dean's Honour List

In 2017, 41.6% of graduating students achieved Honours or High Honours (Figure 1.11a). To graduate with Honours, a full-time student must achieve a cumulative average of higher than 79.5% across second, third and fourth years and a weighted sessional fourth-year average of 74.5% or higher. The designation of High Honours, created in June 2015, distinguishes students who obtain a cumulative average of 87.5% or higher and a weighted sessional fourth-year average of 82.5% or higher. Both designations provide a measure of the outstanding achievement of our students.

The number of students who attained Dean's Honour List standing in 2016–2017 reached its highest ever, reflecting the high calibre of our students and the many programs we offer to support students throughout all years of study.

Figure 1.11a **Number of Students and Percentage of Class Graduating with Honours, 2008 to 2017**

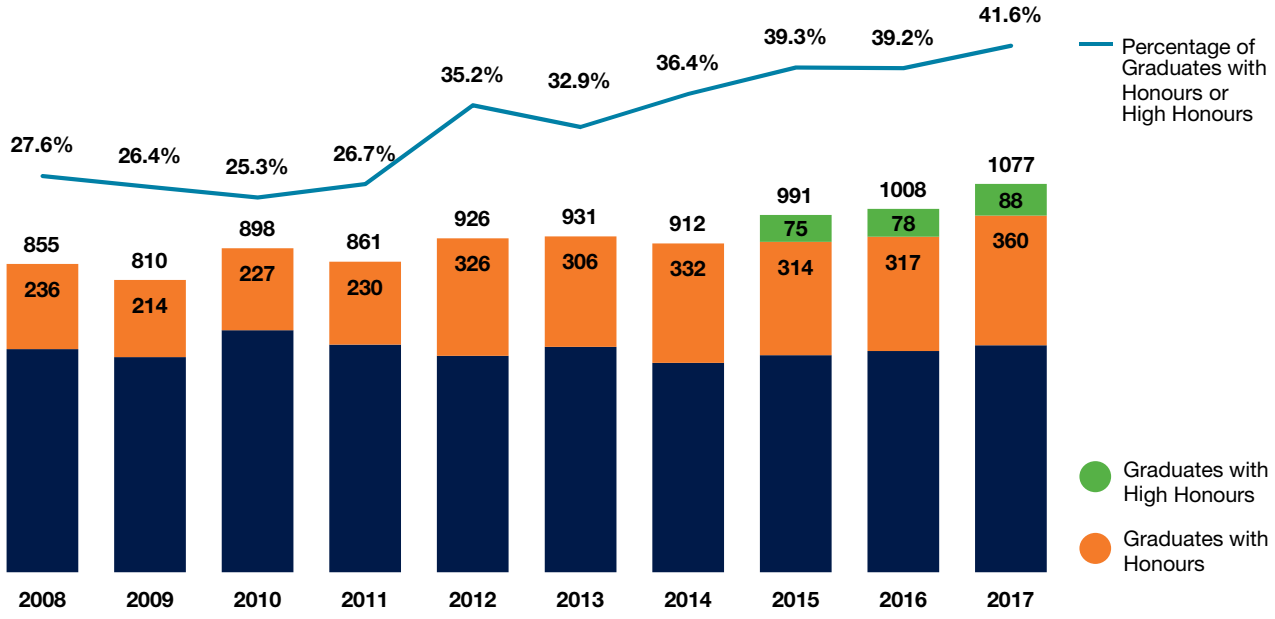
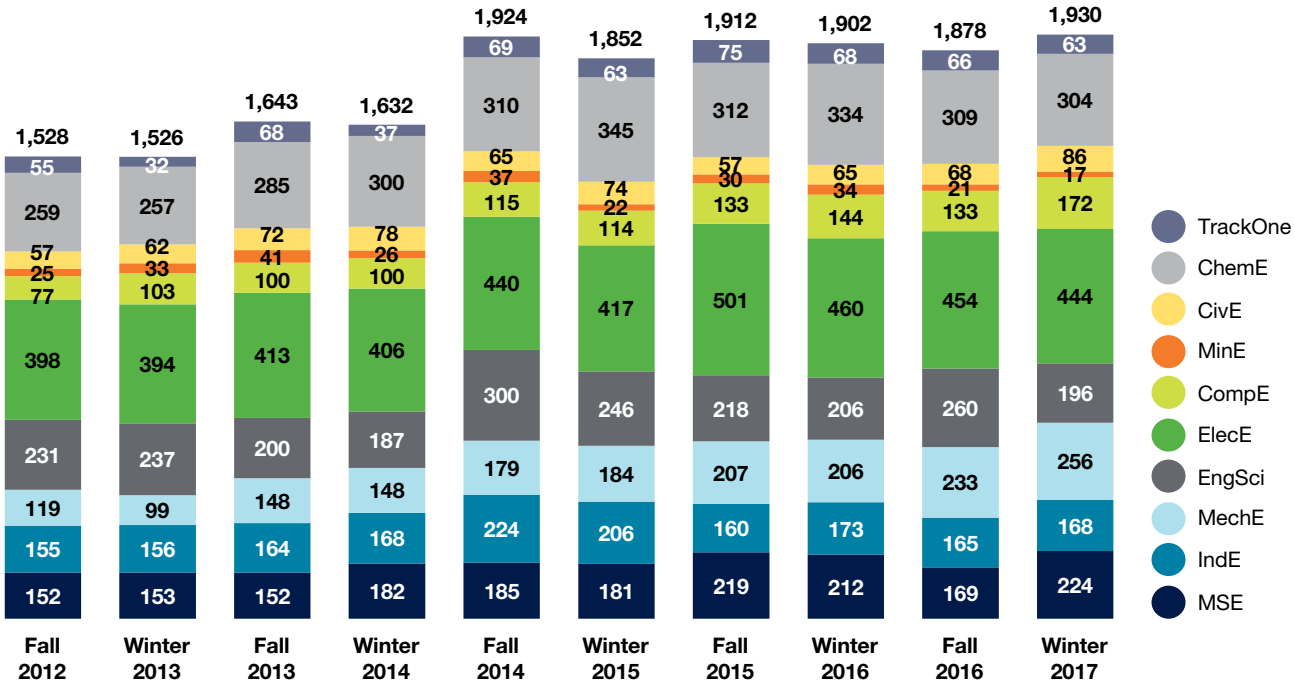


Figure 1.11b **Number of Students on the Dean's Honour List by Term and Academic Area, Fall 2012 to Winter 2017**



Enriching the Undergraduate Engineering Experience

We continue to strengthen our rich undergraduate programming, including innovative curricular and enhanced experiential learning opportunities, co-curricular and entrepreneurship offerings, and multidisciplinary collaborations, to ensure that our students are prepared to address the world's most pressing challenges.

In 2016–2017, we introduced 16 new undergraduate courses:

- APS110 Engineering Chemistry and Materials Science
- APS447 The Art of Ethical & Equitable Decision Making in Engineering
- BME430 Human Whole Body Mechanics
- CHE416 Chemical Engineering in Human Health
- CHE450 Bioprocess Technology & Design
- CIV401 Design and Optimization of Hydro and Wind Electric Plants
- ECE412 Analog Signal Processing
- ECE424 Microwave Circuits
- ECE430 Analog Integrated Circuits
- ECE437 VLSI Technology
- MIE311 Thermal Energy Conversion
- MIE465 Analytics in Action
- MIE519 Advanced Manufacturing Technology
- MIE523 Engineering Psychology and Human Performance
- MSE438 Introduction to Computational Materials Design
- MSE451 Advanced Physical Properties of Structural Nanomaterials

Our First-Year Summer Research Fellowship launched in summer 2016 with its first cohort of eight research fellows. The Fellowship provides $5,000 in support to students seeking to gain research experience immediately after their first year of study. Students from all Core 8 programs, Engineering Science and TrackOne are eligible.

Enrolment in all four of our online first-year courses increased from their 2015–2016 numbers:

- APS160 Mechanics rose 11.6%
- APS162 Calculus I rose 14.6%
- APS163 Calculus II rose 65%
- APS164 Introductory Chemistry from a Materials Perspective rose 575% (inaugural cohort was four students in 2015)

In fall 2017, we will launch one new minor and one new certificate. The minor in Advanced Manufacturing will draw on the Faculty's strengths in three key areas — advanced materials, processing and logistics — to prepare

Note 1.11b: Honours standing is normally granted to students carrying a full academic load (2.5 credits per session, excluding extra courses) if the session is not being repeated. During fourth year, a student may reduce their course load in either semester (but not both) and still be eligible for Honours standing, provided the other conditions are met.

tomorrow's engineering leaders to design the products of the future, as well as the systems for fabricating their components and delivering them to customers. It will include courses that emphasize management competencies, delivered in collaboration with the Institute for Leadership Education in Engineering (ILead). Our new certificate in Forensic Engineering will enable students to find and analyse data from disasters, automobile and aircraft accidents and product failures, and to present an unbiased assessment of the underlying cause(s).

The first cohort of TEAL Fellows was named in spring 2017. This program provides support to enable 23 instructors to design or redesign courses to include active learning approaches that leverage the unique nature of the TEAL classroom environment. U of T Engineering currently has one TEAL classroom, and will add five more in the forthcoming CEIE.

For the second year, we delivered a weeklong Calculus Summer Boot Camp for entering students who want to review key foundational mathematical concepts. Enrolment for the boot camp more than doubled, from 103 students in 2015 to 207 in 2016. We also deliver an array of programs to first-year students to support their learning, including:

- **Success 101**, a three-day mini-course that is part of the First Year Foundations program, that runs three times over the summer, providing guidance on time management, effective note taking and classroom etiquette and communication;
- **T-Program**, a Transition Program that allows first-year students faced with academic challenges to redistribute their course load, defer courses to the summer session and retake up to three fall courses in the winter term;
- **Peer-assisted** study sessions delivered by upper-year students;
- **Embedded counsellors** who provide students with personalized support for learning strategies, health and well-being, and international transition;
- **Engineering Learning Strategist**, a new full-time staff member who develops academic programming and workshops to assess and enhance students' academic competencies related to task prioritization, note taking, critical thinking, problem solving, exam preparation, and coping with stress and anxiety.

(For further information about experiential learning and multidisciplinary collaboration, please see Chapter 4: Cross-Faculty Education and Experiential Learning.)

Pre-University Engineering Outreach

The Engineering Student Outreach Office designs and delivers more than a dozen programs that engage students in Grades 3 to 12 in science, technology, engineering and mathematics (STEM). The aim is to inspire pre-university students to pursue careers in science and engineering, recruit undergraduate students by giving them positive engineering educational experiences, enhance the student experience for our current undergraduate and graduate students, and foster positive relationships between the University and the community.

The U of T Engineering students who provide instruction and support for these programs serve as ambassadors for the Faculty. They gain valuable experience in youth education and project management, strengthen their leadership, team-building and communication competencies, and deepen their understanding of basic engineering principles. We also bring together elementary and secondary school teachers to share innovative ways to bring STEM into their classrooms.

Every summer, our Da Vinci Engineering Enrichment Program (DEEP) Summer Academy draws motivated high school students from around the world to weeklong courses, where they explore a variety of engineering, business and science disciplines. We also offer March Break and summer camps, Saturday programs and in-school workshops that inspire elementary school students to explore topics ranging from aerospace engineering to coding to regenerative medicine. We are particularly proud that our programs successfully connect girls and youth from underrepresented communities — including Indigenous youth —with STEM.

In 2016–2017, we reached more than 5,000 pre-university students through our outreach programs. See Appendix B for a full list of these programs.

Highlights of our outreach programs include:

- **Go North**, Canada's largest STEM event for children in Grades 4 to 8. This one-day event, held in May 2017, was run in partnership with Google Canada and Actua, a national STEM charity. It attracted more than 1,200 students and teachers from across the GTA.
- **Engineering for Educators**, a day-long event held in November 2016 that brought together science and math teachers from across the GTA for a series of interactive and collaborative workshops on teaching and learning STEM.

(For more information on these initiatives, see Chapter 10: Diversity.)

Selected Undergraduate Highlights

First-year engineering students inspire retrofit for U of T's Fisher Rare Book Library

As part of their first-year Engineering Strategies and Practices (ESP) course, a team of six students designed a strategy to prevent rising humidity levels in U of T's Thomas Fisher Rare Book Library. When the library's insulation began to fail, causing condensation, increased humidity and a greater risk of mold, property managers, building engineers and architects recommended reinsulating the building from the inside, necessitating removing the collection and closing the library. In 2014, the library turned to students in the ESP course for other options. The team of Jennifer (Yewon) Son, Michael Lancaster (Year 3 MIE), Jackie Lunger, Toby (Yishun) Ou, Alice Wolfe (Year 3 MIE) and Tom Zhang (Year 3 EngSci) explored more than 50 ideas before settling on their final solution: installing a heated envelope and insulated external surface over the existing concrete, with a finishing layer that replicates the current appearance. Over the next two years, the concept to repair the building from the outside received approvals from the University's administration, and architectural firms were brought in to draft models and ensure the idea would work. After adjustments to the design, in November 2016 — nearly three years after the students were first assigned the project — the retrofits to the Thomas Fisher Rare Book Library began. Construction is scheduled to be complete in summer 2017.

U of T Engineering student athletes recognized for excellence

Twenty-five U of T Engineering student athletes were honoured at the seventh annual U of T Varsity Blues Academic Excellence Breakfast. Each received special pins to mark the achievement. Recipients included:

- Corrine Bertoia (CivE MASc candidate) – lacrosse
- Paige Clarke (Year 3 MinE) – mountain biking
- Lia Codrington (Year 2 EngSci) – cross country
- Caitlin Elliott (Year 3 MechE) – curling
- Keith Eriks (Year 4 MechE) – swimming
- Antonina Gorshenina (Year 3 EngSci) – tennis
- Brandon Hadfield (Year 3 EngSci) – baseball
- Matthew Hart (Year 4 MinE) – water polo
- Liam Horrigan (Year 3 MechE) – water polo
- Beston Leung (Year 2 CompE) – fencing
- Jonathan Luk (MechE 1T1, MIE MASc candidate) – mountain biking
- Alex Magnan (Year 3 CivE) – swimming
- Caitlin Maikawa (Year 4 ChemE) – ice hockey
- Nathalin Moy (Year 4 EngSci) – swimming
- Osvald Nitski (Year 2 MechE) – swimming
- Kylie O'Donnell (MASc 1T4, ChemE PhD candidate) – fast pitch softball
- Nicole Parkes (Year 3 ChemE) – soccer
- Ross Phillips (Year 4 ChemE) – swimming
- Yusuf Shalaby (Year 3 IndE) – squash
- Sever Topan (Year 4 CompE) – water polo
- David Urness (Year 4 EngSci) – rowing
- Christopher Vinelli (Year 4 IndE) – golf
- Marko Vojinovic (Year 2 IndE) – rowing
- Jacob Weber (Year 2 EngSci) – curling
- Tanner Young-Schultz (Year 3 CompE) – baseball

U of T Engineering student earns Rhodes Scholarship

Stephanie Gaglione (ChemE 1T7) was selected as a 2017 Rhodes Scholar, a prestigious annual scholarship to the University of Oxford. She plans to use the scholarship to continue postgraduate study in biomedical engineering, and hopes one day to advance biomaterial platforms for vaccines and drug delivery. Last year, she received a Fulbright Canada undergraduate scholarship and spent 10 months studying at in the lab of Professor Robert Langer at the Massachusetts Institute of Technology, where her work focused on drug delivery to cells in the immune system.

U of T Engineering welcomes two new Schulich Leaders

James Xu and Kevin Han (both Year 1 EngSci) were named 2016 recipients of the Schulich Leader Scholarship. Established in 2012 by businessman Seymour Schulich, the Schulich Leader Scholarships were created to foster the next generation of global pioneers in science, technology, engineering and mathematics (STEM).

2

The exceptional quality of our research- and professional-stream graduate programs and outstanding global reputation for engineering research and education continue to attract graduate students in strong numbers. Overall enrolment in our professional (MEng and MHSc) and research-stream (MASc) master's programs increased by 8% from the previous year, bringing our graduate student cohort, including PhD candidates, to 2,365.

We continue to enhance and broaden our MEng offerings, which enable practicing engineers to gain specialized technical knowledge and develop leadership and other professional competencies that will advance their careers. In fall 2016, we launched two new programs — an MEng in Biomedical Engineering and an emphasis in Aerial Robotics — and we will add to our robust curriculum in fall 2017 with new emphases in Forensic Engineering, and Analytics. Demand for our MEng programs was particularly strong in 2016–2017, with applications from international and domestic students each growing by more than 10%.

Multidisciplinary collaboration remains a priority for U of T Engineering. In fall 2017, we will expand our research-stream curriculum with a cross-Faculty Collaborative Master's Specialization in Psychology and Engineering (PsychEng) for Mechanical & Industrial Engineering MASc students and psychology MA students in the Faculty of Arts & Science.

U of T Engineering attracts competitive applicants from across Canada and around the world to our MASc programs. Events, such as Graduate Research Days and a nationwide recruitment tour held in partnership with some of the country's top engineering schools, have enabled us to draw more domestic applicants to our research-stream programs.

Building on the success of the Prospective Professors in Training program, which prepares PhD candidates for the next step in their academic careers, we will launch a parallel program in fall 2017 to support PhD students who will pursue careers in industry and other non-academic settings.

Enrolment

As our programs continue to attract top students from across Canada and around the world, graduate enrolment increased in both size and diversity in 2016–2017. A total of 2,365 students pursued graduate degrees, up 4.7% from the previous year and 67.6% from a decade ago.

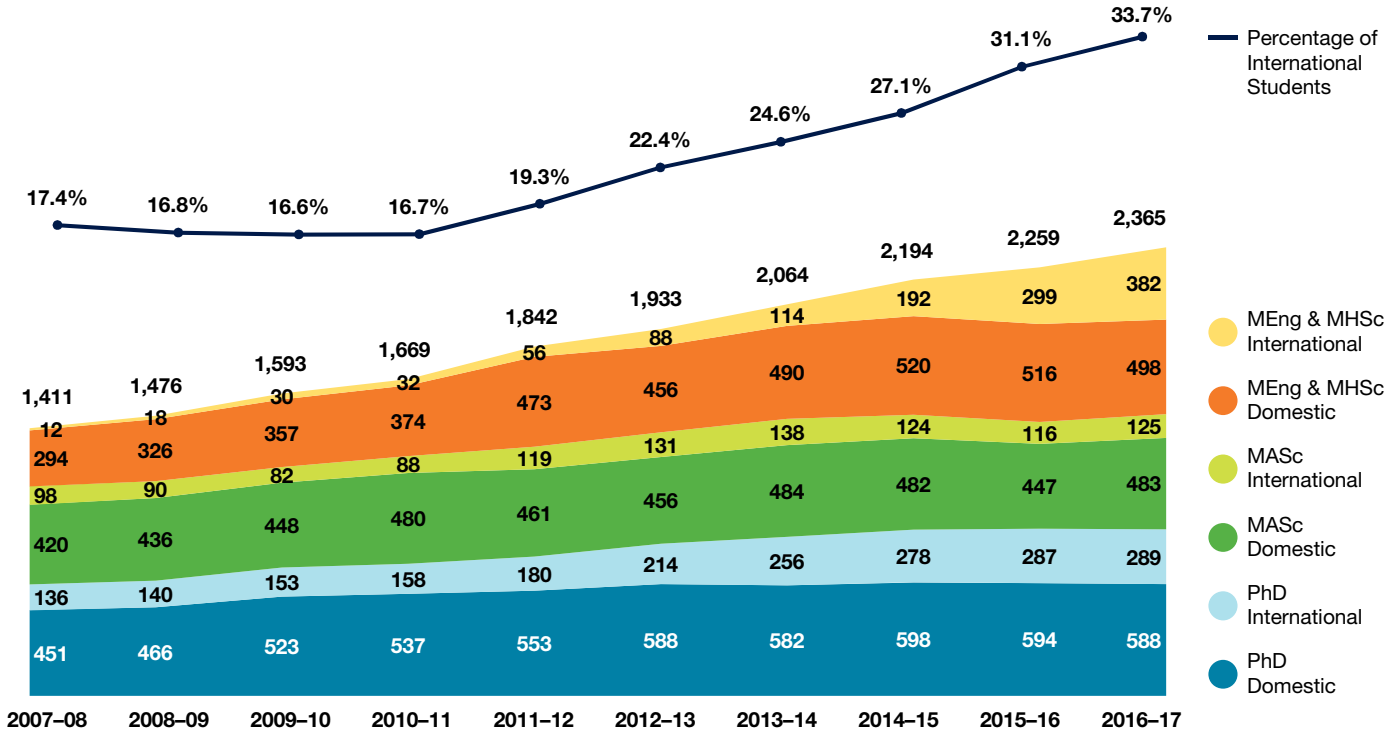
We increased the proportion of graduate students in our overall student body from 23.8% to 32.9% in the past 10 years, bringing us closer to our Academic Plan goal of 40% graduate students and 60% undergraduates, and strengthening our position as a leader in research-based and professional graduate education.

Shown in Figure 2.1b, women accounted for 26.1% of our graduate student population, a proportion that is expected to rise over the next few years as the proportion of women in undergraduate engineering programs continues to grow. In 2016, women comprised 40.1% of our entering undergraduate cohort and 30.0% of our overall undergraduate population, expanding the future pool of women applicants for graduate studies. The proportion of international graduate students rose to 33.7% from 31.1% one year ago.

The total number of students pursuing professional master's degrees increased to 880 in 2016–2017, up 8% from the previous year and more than two-and-a-half times the enrolment of a decade ago. MEng and MHSc students now comprise 59% of all U of T Engineering master's students on a full-time equivalent basis.

As with our professional master's programs, enrolment in our research-stream master's program increased 8% over the previous year, while PhD enrolment remained steady.

Figure 2.1a **International and Domestic Graduate Students by Degree Type, with Percentage of International Students, 2007–2008 to 2016–2017**



Data in this chapter are presented by academic year (September to August) unless otherwise noted. Highlights are from June 2016 to July 2017.

Note 2.1a: Student counts are shown as of November 1.

Figure 2.1b **Graduate Students by Degree Type and Gender with Percentage of Women Students, 2007–2008 to 2016–2017**

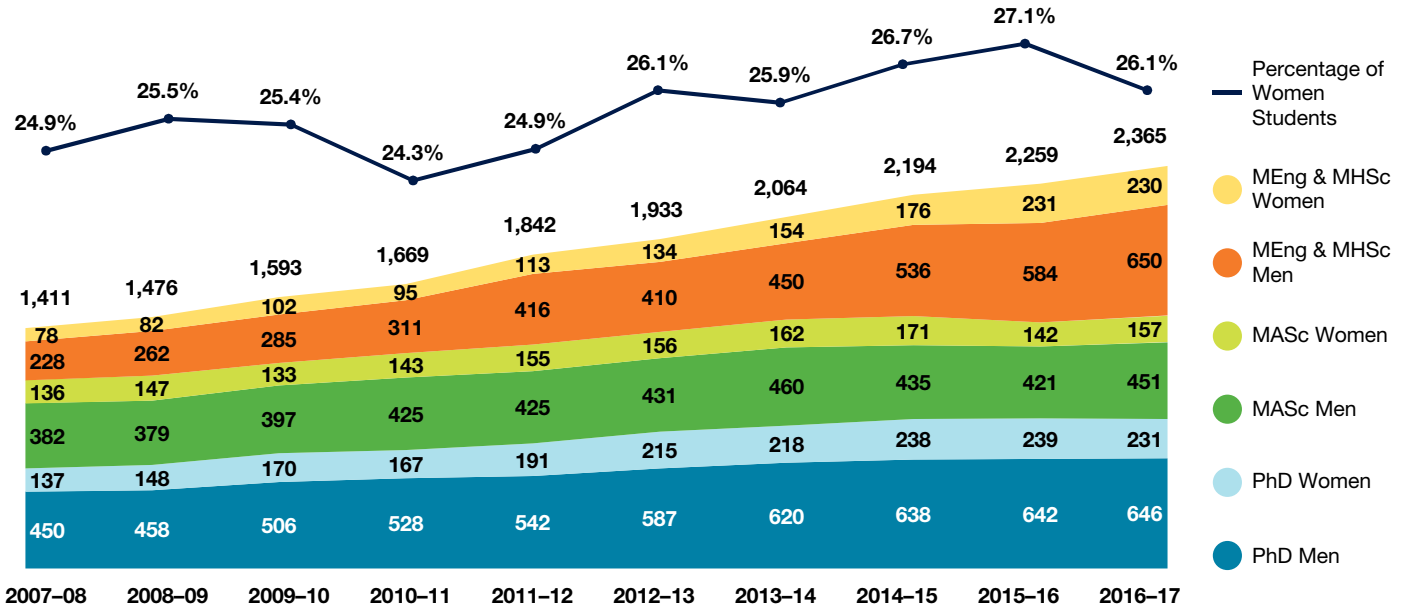


Figure 2.1c **Graduate Student Enrolment by Full-Time Equivalent (FTE) and Headcount (HC) by Academic Area, 2007–2008 to 2016–2017**

		UTIAS	IBBME	ChemE	CivE	ECE	MIE	MSE	Total
2007–08	FTE	105.0	115.0	150.0	183.3	438.1	227.3	71.2	**1,289.9**
	HC	105	115	157	212	478	270	74	**1,411**
2008–09	FTE	122.9	140.0	167.8	184.0	415.4	237.1	82.8	**1,350.0**
	HC	125	140	179	219	442	284	87	**1,476**
2009–10	FTE	130.6	153.0	209.1	200.2	421.5	284.3	70.4	**1,469.1**
	HC	132	153	221	238	453	320	76	**1,593**
2010–11	FTE	140.9	168.0	195.4	212.6	403.0	339.2	68.5	**1,527.6**
	HC	143	168	208	256	431	391	72	**1,669**
2011–12	FTE	143.2	199.0	202.3	229.8	437.7	382.6	68.2	**1,662.8**
	HC	146	199	217	276	479	454	71	**1,842**
2012–13	FTE	146.7	208.3	193.2	243.3	504.8	387.2	68.2	**1,751.7**
	HC	153	209	203	279	565	453	71	**1,933**
2013–14	FTE	162.1	219.0	209.9	290.5	509.8	436.2	90.9	**1,918.4**
	HC	167	219	219	322	556	488	93	**2,064**
2014–15	FTE	182.4	228.0	238.0	293.1	531.5	511.2	80.3	**2,064.5**
	HC	188	228	245	312	577	563	81	**2,194**
2015–16	FTE	143.2	241.0	253.0	299.4	591.5	532.9	79.0	**2,140.0**
	HC	146	241	260	326	637	570	79	**2,259**
2016–17	FTE	178.2	269.0	245.0	306.3	577.0	580.3	92.3	**2,248.1**
	HC	181	269	252	335	619	616	93	**2,365**

Note 2.1b: Student counts are shown as of November 1.
Note 2.1c: A difference between FTE and HC exists only when discussing part-time students. At U of T Engineering, MEng candidates are the only graduate students who can pursue their studies on a part-time basis.

Figure 2.1d **Comparison of MASc and MEng/MHSc Full-Time Equivalent Enrolment Trends, 2007–2008 to 2016–2017**

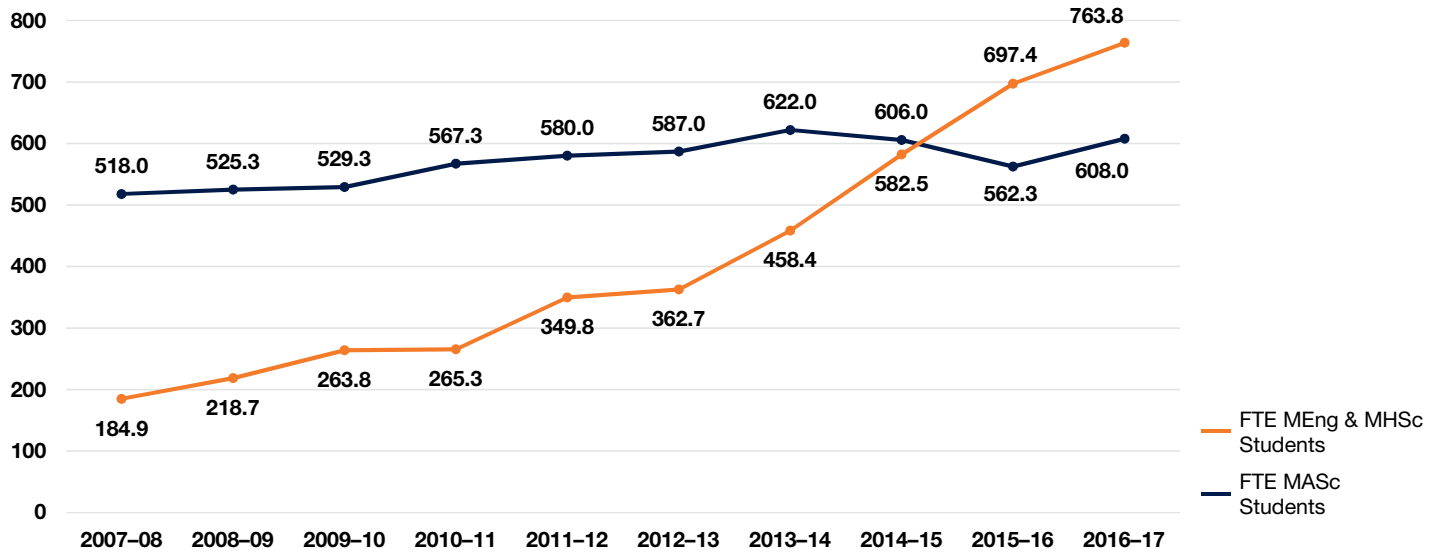
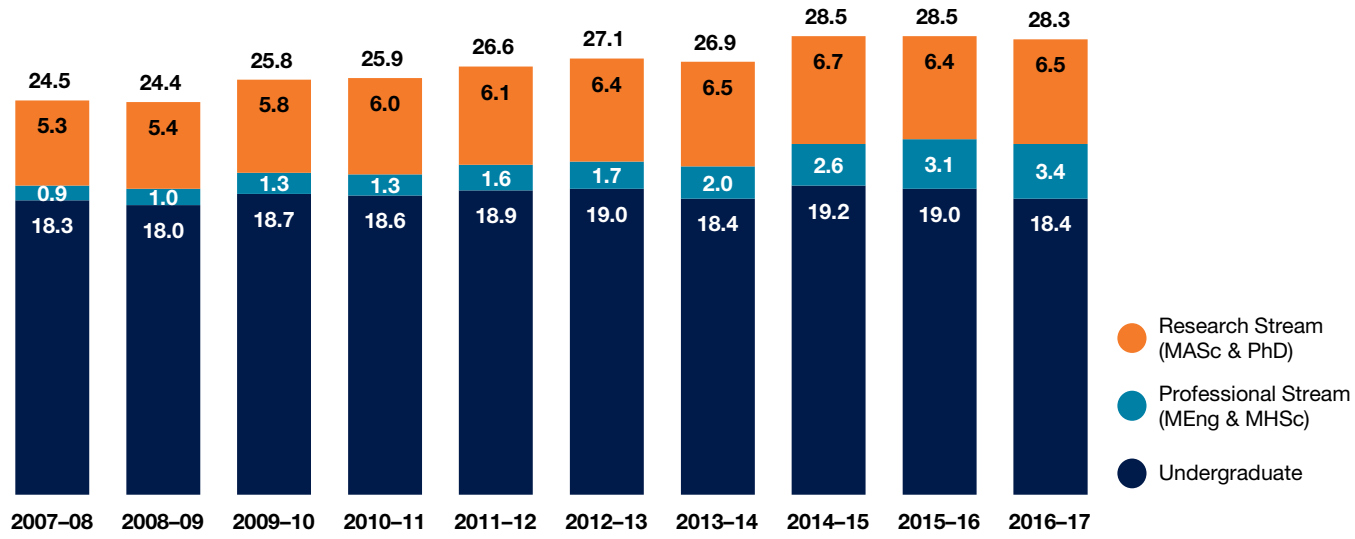


Figure 2.2a **Undergraduate and Graduate Full-Time Equivalent Students per Faculty Member, 2007–2008 to 2016–2017**



Note 2.2a: To allow more accurate comparisons, undergraduate FTEs are determined by counting each part-time student as 0.3 FTE.

Figure 2.2b **Ratio of Undergraduate to Graduate Full-Time Equivalent Students, 2007–2008 to 2016–2017**

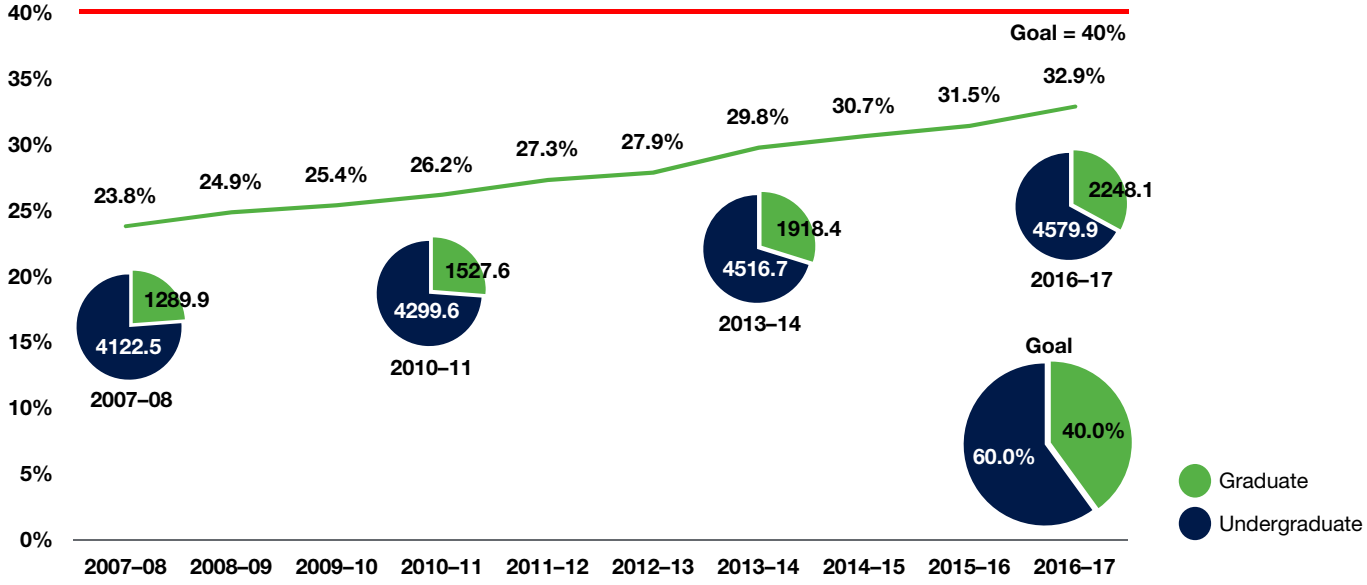
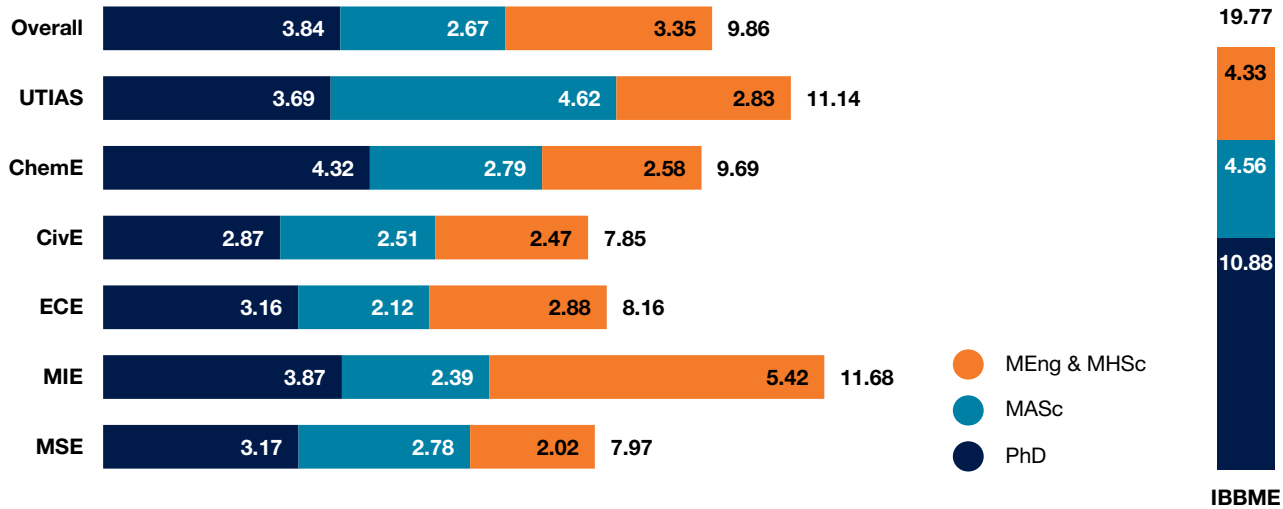


Figure 2.2c **Full-Time Equivalent Graduate Students per Faculty Member by Academic Area and Degree Type, 2016–2017**



Note 2.2b: Students on Professional Experience Year internships are not included in this count.
Note 2.2c: Some students in IBBME are supervised by faculty members from the Faculties of Medicine and Dentistry and affiliated hospitals, as well as from other departments within U of T Engineering. Because the ratio includes only faculty with a budgetary appointment in IBBME, comparisons with other Engineering departments are not possible. For that reason, this figure shows IBBME in a visually distinct way. In cases of inter-departmental supervision within the Faculty, PhD and MASc students are assigned 100% to their primary supervisor's department.

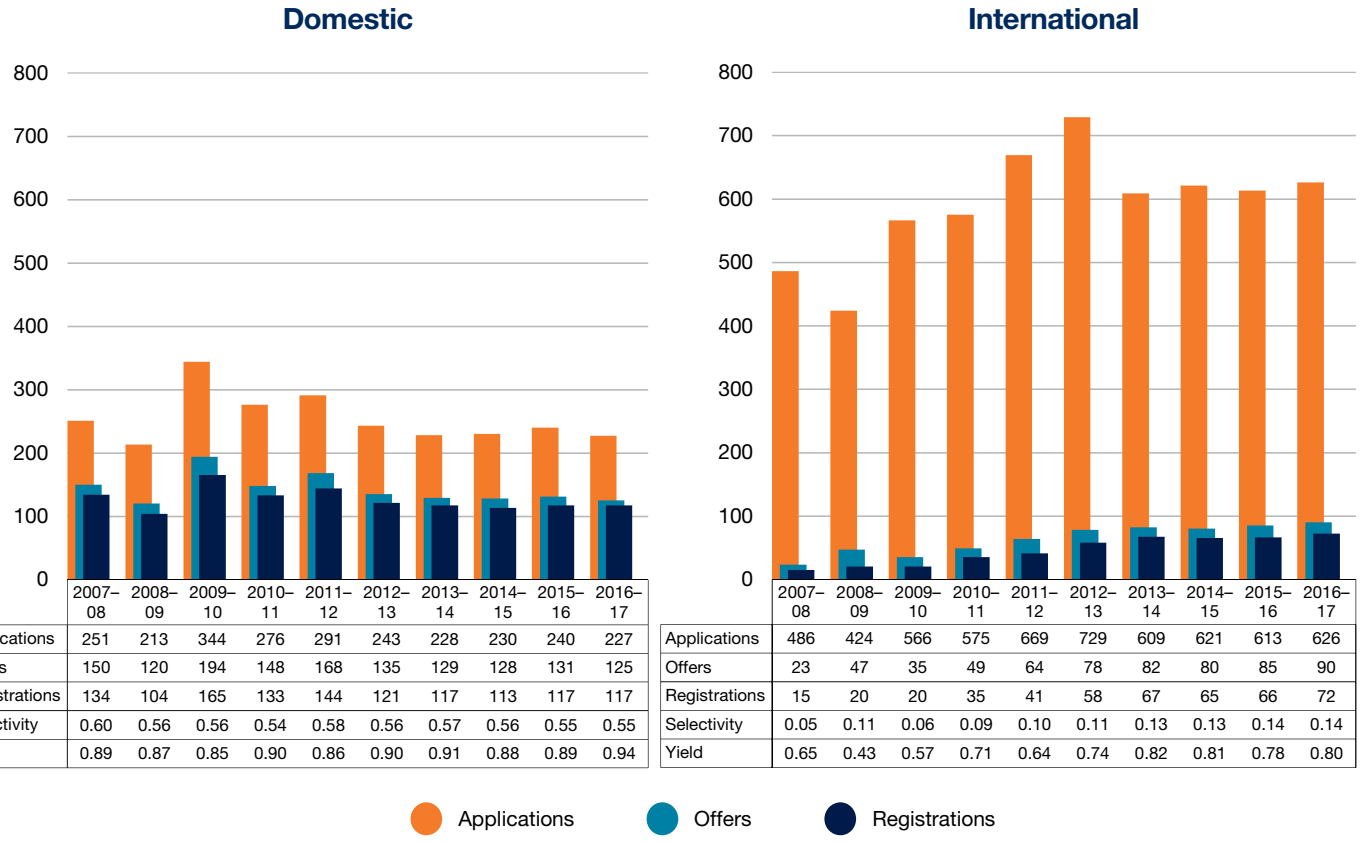
Recruitment and Admissions

The increase in graduate applications in 2016–2017 reflects both the growing demand for MEng programs that offer practicing engineers advanced technical and professional competencies, and rising interest from international students.

Applications to our MEng program from both international and domestic candidates increased by more than 10% compared with 2015–2016. International students made up 44% of new registrations, up from 41% the previous year and just 8% a decade ago. Domestic applications to our MASc programs rose 6%, while overall MASc enrolment increased 8%, a favourable response to our enhanced offerings and national recruitment efforts.

Applications to our PhD programs and registrations remained consistent with 2015–2016. The number of students who have fast-tracked from their MASc programs into PhD programs has remained steady over the past four years, ranging from 36 to 43 students per year. The number of students who entered PhD programs directly after completing their undergraduate degrees has risen for the second consecutive year to 15 in 2016–2017 — three times what it was two years ago — and the number of departments that now offer direct-entry PhD admission rose from three to five.

Figure 2.3 Applications, Offers, Registrations, Selectivity and Yield of PhD Students, 2007–2008 to 2016–2017



Domestic	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Applications	251	213	344	276	291	243	228	230	240	227
Offers	150	120	194	148	168	135	129	128	131	125
Registrations	134	104	165	133	144	121	117	113	117	117
Selectivity	0.60	0.56	0.56	0.54	0.58	0.56	0.57	0.56	0.55	0.55
Yield	0.89	0.87	0.85	0.90	0.86	0.90	0.91	0.88	0.89	0.94

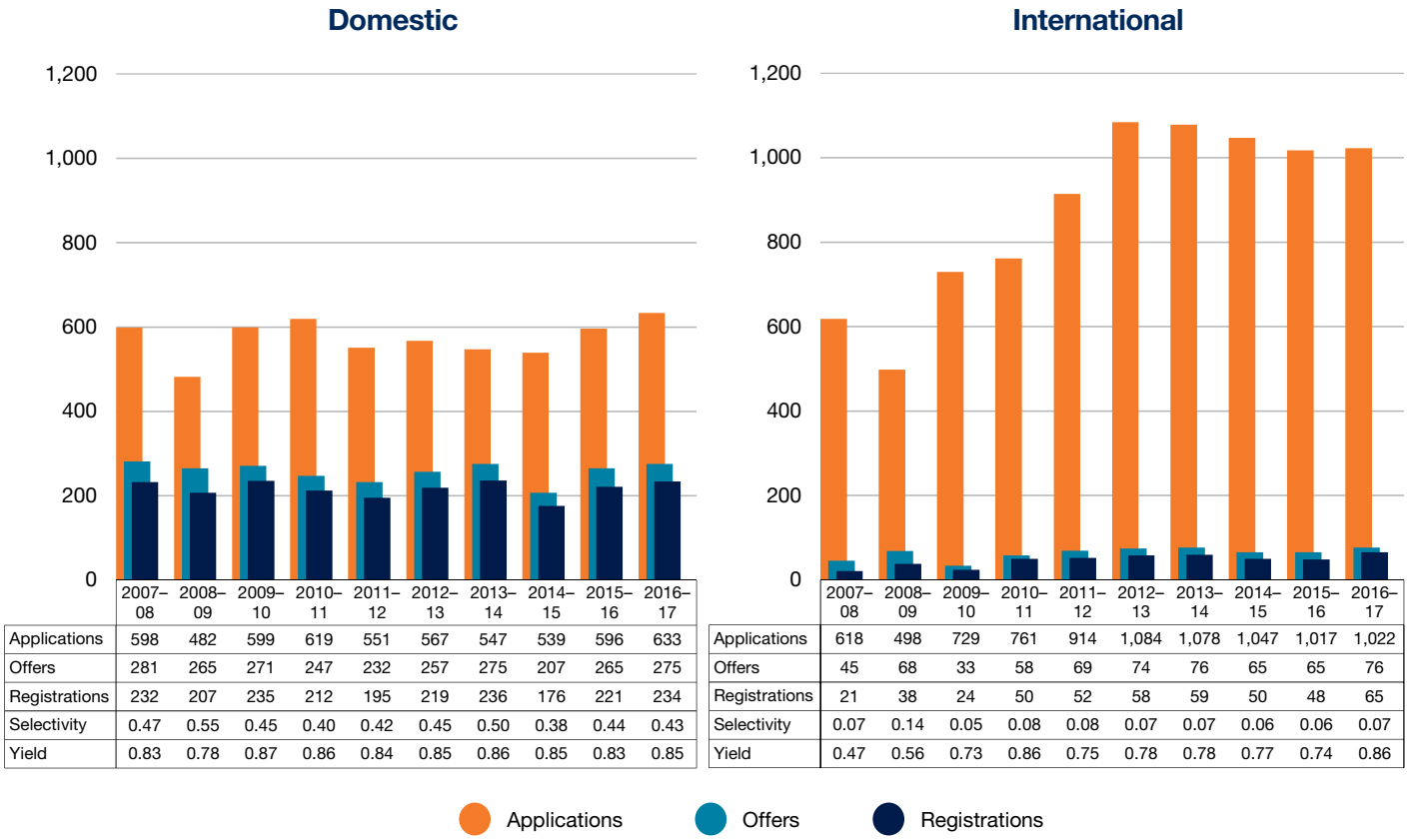
International	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Applications	486	424	566	575	669	729	609	621	613	626
Offers	23	47	35	49	64	78	82	80	85	90
Registrations	15	20	20	35	41	58	67	65	66	72
Selectivity	0.05	0.11	0.06	0.09	0.10	0.11	0.13	0.13	0.14	0.14
Yield	0.65	0.43	0.57	0.71	0.64	0.74	0.82	0.81	0.78	0.80

Note 2.3: Student counts are shown as of November 1. Selectivity = offers ÷ applications and represents the proportion of applicants who were offered admission. Yield = registration ÷ offers. Domestic students are defined as citizens (living in Canada or abroad) or permanent residents of Canada. Students who have fast-tracked from MASc programs into PhD programs are counted in this figure as applications, offers and admissions. This is a change from previous annual reports.

Once again we undertook a number of strategic initiatives to encourage the top students from across Canada to apply to our research-stream programs:

- We held the U of T **Graduate Engineering Fair** and six similar events across the country in partnership with Canada's leading engineering schools: University of Alberta, McMaster University, University of British Columbia, Queen's University, McGill University and University of Waterloo.
- In February 2017, we hosted 139 of the top students from across Canada at our third **Graduate Research Days**. This event enables students to learn more about our programs, discover the innovative research being conducted by our faculty members and graduate students, and meet prospective supervisors.

Figure 2.4 Applications, Offers, Registrations, Selectivity and Yield of MASc Students, 2007–2008 to 2016–2017



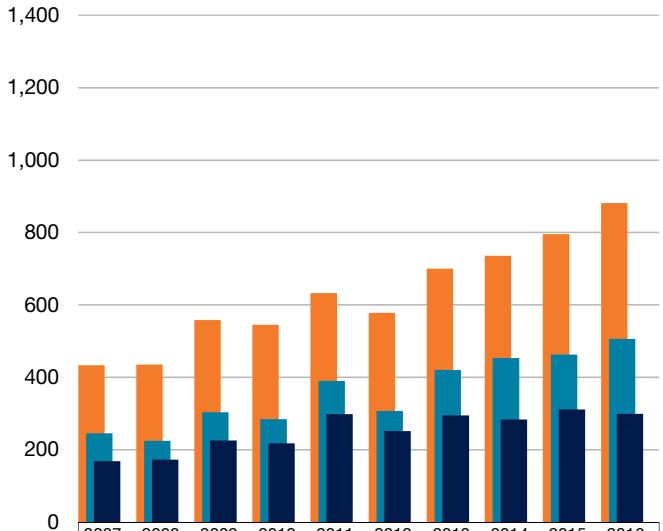
Domestic	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Applications	598	482	599	619	551	567	547	539	596	633
Offers	281	265	271	247	232	257	275	207	265	275
Registrations	232	207	235	212	195	219	236	176	221	234
Selectivity	0.47	0.55	0.45	0.40	0.42	0.45	0.50	0.38	0.44	0.43
Yield	0.83	0.78	0.87	0.86	0.84	0.85	0.86	0.85	0.83	0.85

International	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Applications	618	498	729	761	914	1,084	1,078	1,047	1,017	1,022
Offers	45	68	33	58	69	74	76	65	65	76
Registrations	21	38	24	50	52	58	59	50	48	65
Selectivity	0.07	0.14	0.05	0.08	0.08	0.07	0.07	0.06	0.06	0.07
Yield	0.47	0.56	0.73	0.86	0.75	0.78	0.78	0.77	0.74	0.86

Note 2.4: Student counts are shown as of November 1. Selectivity = offers ÷ applications and represents the proportion of applicants who were offered admission. Yield = registration ÷ offers. Domestic students are defined as citizens (living in Canada or abroad) or permanent residents of Canada.

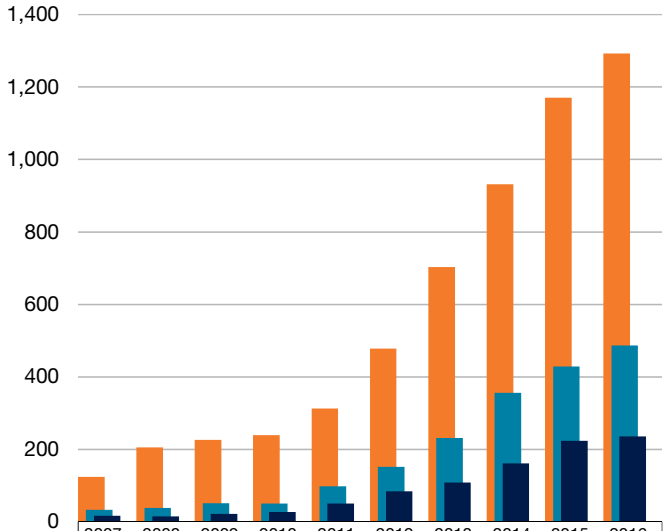
Figure 2.5 **Applications, Offers, Registrations, Selectivity and Yield of MEng and MHSc Students, 2007–2008 to 2016–2017**

Domestic

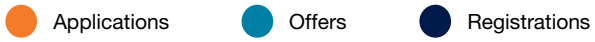


	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Applications	433	435	558	545	632	578	700	735	795	881
Offers	245	224	303	284	390	306	420	453	462	506
Registrations	168	172	225	217	298	251	294	283	311	299
Selectivity	0.57	0.51	0.54	0.52	0.62	0.53	0.60	0.62	0.58	0.57
Yield	0.69	0.77	0.74	0.76	0.76	0.82	0.70	0.62	0.67	0.59

International



	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Applications	124	205	226	239	312	478	703	931	1,170	1,292
Offers	33	38	51	50	98	151	231	356	428	486
Registrations	16	15	22	27	50	84	108	161	223	235
Selectivity	0.27	0.19	0.23	0.21	0.31	0.32	0.33	0.38	0.37	0.38
Yield	0.48	0.39	0.43	0.54	0.51	0.56	0.47	0.45	0.52	0.48



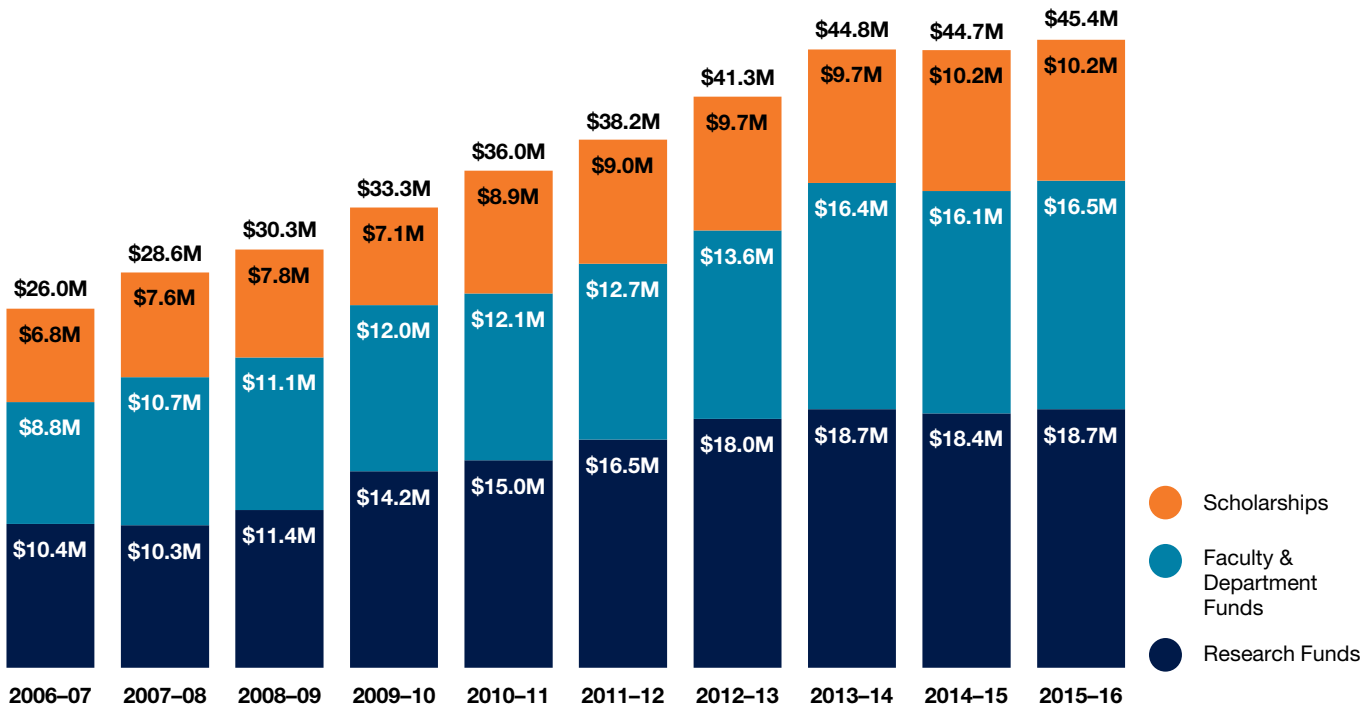
Note 2.5: Student counts are shown as of November 1. Selectivity = offers ÷ applications and represents the proportion of applicants who were offered admission. Yield = registration ÷ offers. Domestic students are defined as citizens (living in Canada or abroad) or permanent residents of Canada.

Funding

Overall graduate student funding for 2015–2016 (the last year for which we have data) increased 1.6% over the previous year. Total scholarship funding, including the Natural Sciences and Engineering Research Council of Canada (NSERC), Ontario Graduate Scholarships (OGS), other external scholarships and a variety of U of T scholarships, remained at $10.2 million. NSERC funding has remained constant since 2006-2007.

In fall 2017, we will increase the minimum stipend for MASc and PhD students. MASc students will receive a minimum of $15,500, an increase of $500 per year, and in fall 2018 they will receive a minimum of $16,000. PhD candidates will receive a minimum of $17,000 per year, up from $15,000. However, most students earn more than the minimum as a result of scholarships and teaching assistantships, so the average engineering graduate student stipend for those in the funded cohort is approximately $25,000 per year.

Figure 2.6a **Graduate Student Funding by Category, 2006–2007 to 2015–2016**



Note 2.6a: Data from 2009–2010 onward were obtained from the new Student Accounts Reporting Cube. Data for prior years (and for all years in previous annual reports) were obtained from the Graduate Student Income Reporting Cube. For more information, see Data Sources.

Figure 2.6b **Graduate Student Funding by Category and Academic Area, 2015–2016**

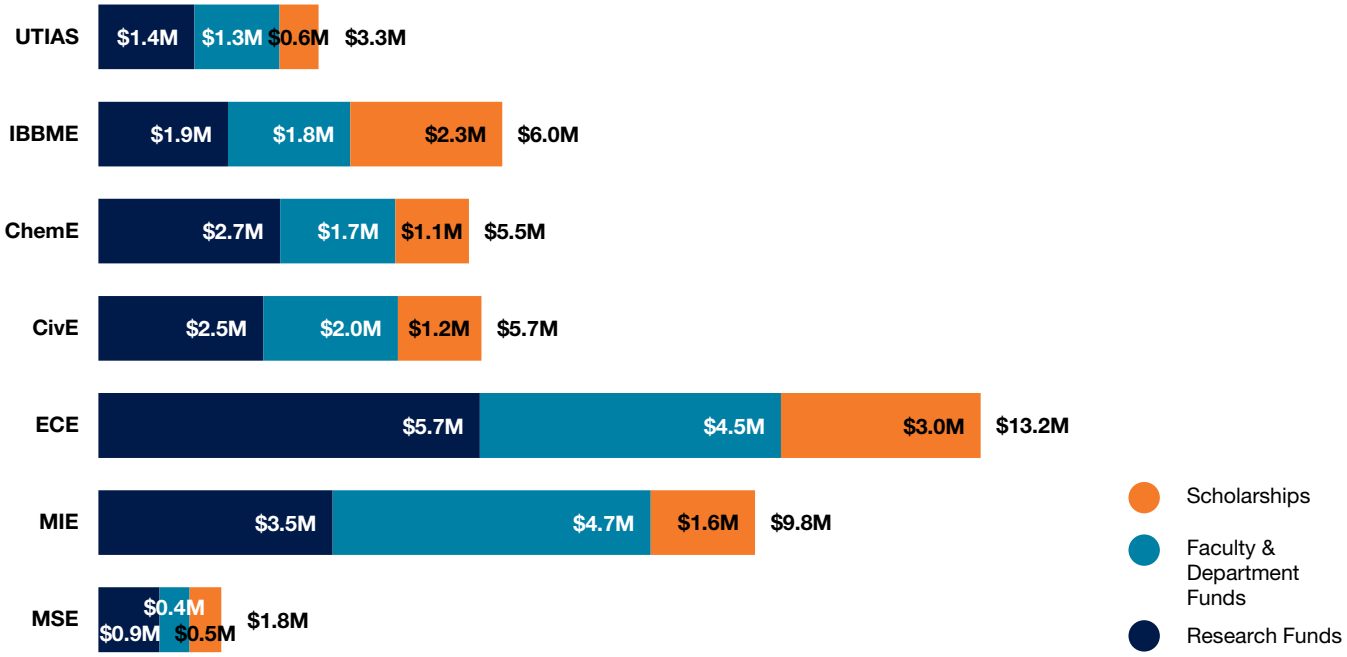
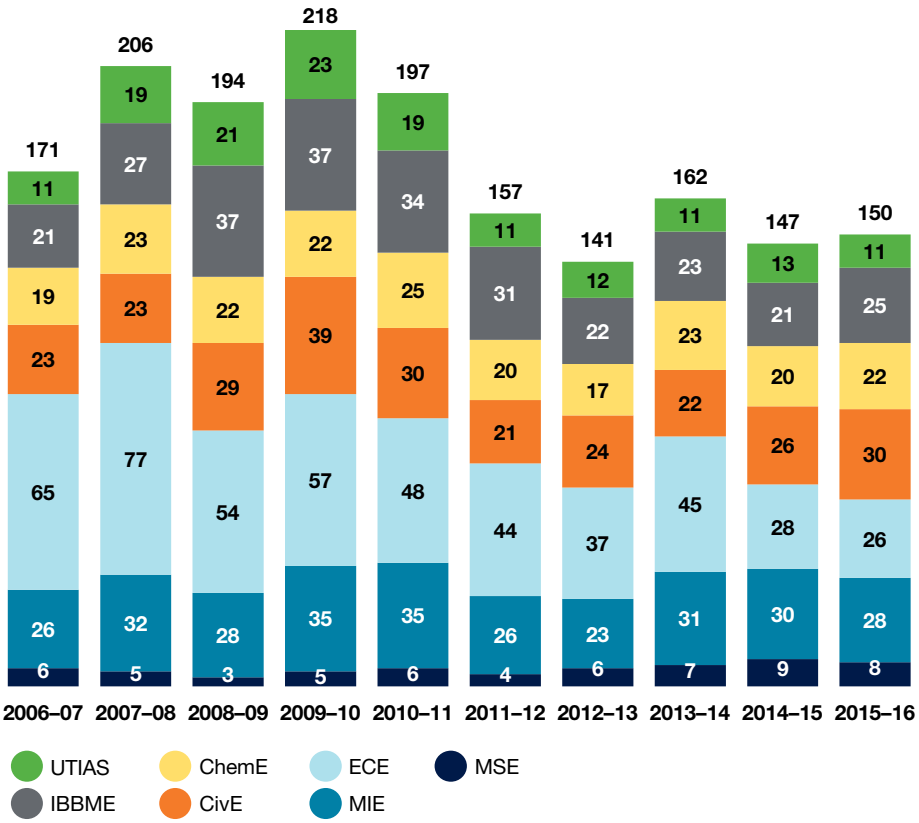


Figure 2.7a **Total External Graduate Student Scholarships by Source, 2006–2007 to 2015–2016**

	NSERC	OGS	External-Other	Total
2006–07	$3,228,150	$1,088,332	$31,100	$4,347,582
2007–08	$3,827,494	$930,000	$68,167	$4,825,661
2008–09	$3,737,157	$868,332	$111,770	$4,717,259
2009–10	$4,393,513	$853,334	$203,167	$5,450,014
2010–11	$4,396,617	$1,036,675	$179,580	$5,612,872
2011–12	$3,765,883	$1,593,328	$256,860	$5,616,071
2012–13	$3,374,183	$1,583,333	$285,501	$5,243,017
2013–14	$3,759,671	$1,236,666	$582,170	$5,578,507
2014–15	$3,488,447	$1,336,670	$877,587	$5,702,704
2015–16	$3,315,223	$1,223,331	$926,787	$5,465,341

Note 2.6b: Data were obtained from the new Student Accounts Reporting Cube. Data for previous annual reports were obtained from the Graduate Student Income Reporting Cube. For more information, see Data Sources.
Note 2.7a: Data from 2009–2010 onward were obtained from the new Student Accounts Reporting Cube. Data for prior years (and for all years in previous annual reports) were obtained from the Graduate Student Income Reporting Cube. For more information, see Data Sources.

Figure 2.7b **Number of NSERC Graduate Student Award Recipients by Academic Area, 2006–2007 to 2015–2016**



Note 2.7b: Data from 2009–2010 onward were obtained from the new Student Accounts Reporting Cube. Data for prior years (and for all years in previous annual reports) were obtained from the Graduate Student Income Reporting Cube. For more information, see Data Sources.

Graduate Studies Completion

Degrees awarded increased 4% over the previous year, while the number of MEng degrees increased by 15%. The number of women who earned degrees increased 18% between 2016 and 2017 and more than 165% in the past decade.

Figure 2.8a **Number of Students Fast-Tracked from MASc to PhD by Academic Area, 2007–2008 to 2016–2017**

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
UTIAS	2	8	6	5	2	5	6	10	1	3
IBBME	8	5	12	8	5	8	8	12	14	8
ChemE	4	7	11	4	8	7	14	8	5	7
CivE	4	5	3	2	5	2	3	1	5	5
ECE	2	0	1	6	4	2	4	5	4	3
MIE	8	7	7	6	6	6	5	2	8	13
MSE	2	3	1	3	7	1	3	4	2	2
Total	**30**	**35**	**41**	**34**	**37**	**31**	**43**	**42**	**39**	**41**

Figure 2.8b **Number of Direct-Entry PhD Students by Academic Area, 2008–2009 to 2016–2017**

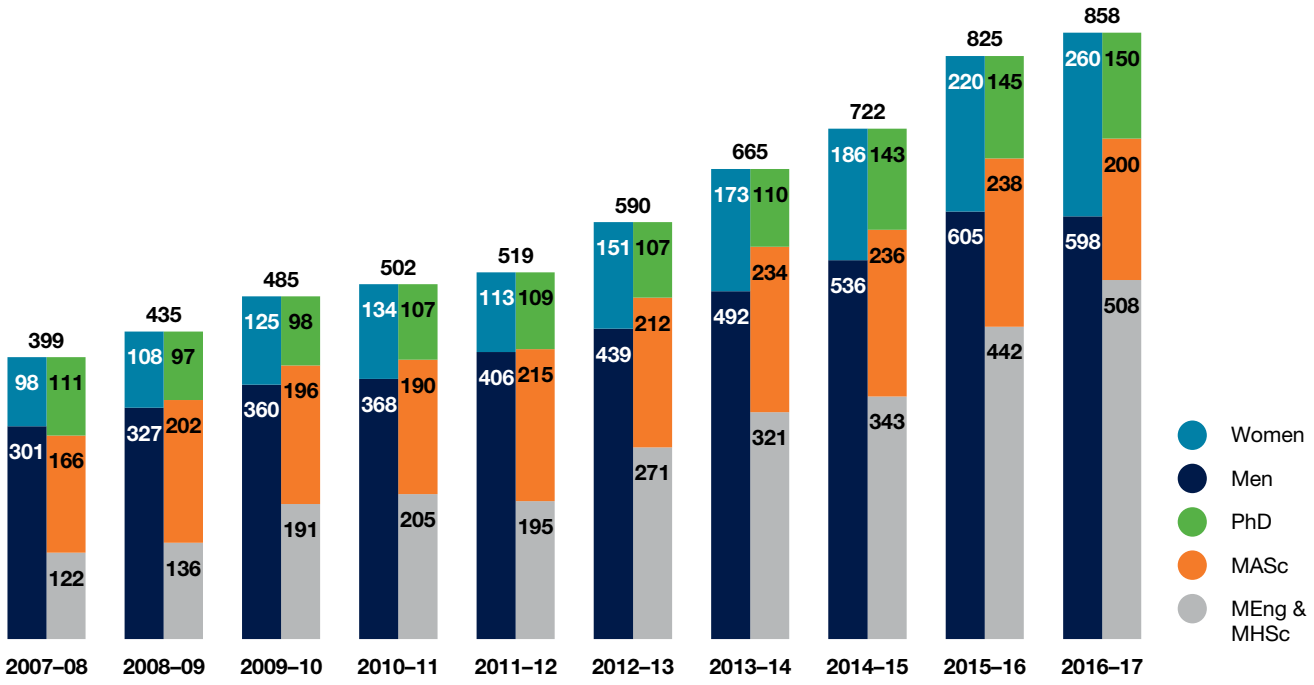
	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
IBBME	1	6	6	5	5	7	3	5	7
ChemE				1				5	1
CivE									1
ECE							2	2	2
MIE				1	1				4
Total	**1**	**6**	**6**	**7**	**6**	**7**	**5**	**12**	**15**

Note 2.8a and b: For counting purposes, the academic year is from May to April.

Figure 2.9 **Time to Completion for PhD, MASc, MEng and MHSc Students, 2007–2008 to 2016–2017**

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
PhD	4.7	4.7	4.7	5.3	5.0	5.3	5.2	5.3	5.3	5.3
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng & MHSc (FT)	1.0	1.0	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.0
MEng (ExtFT)								1.3	1.7	1.7
MEng (PT)	2.0	2.3	2.3	2.3	2.0	2.0	2.0	2.0	2.0	2.3

Figure 2.10 **Graduate Degrees Awarded by Degree Type and Gender, 2007–2008 to 2016–2017**



Enriching the Graduate Student Experience

We continue to strengthen curricular and co-curricular offerings to ensure our graduate students receive the most rigorous and comprehensive preparation possible, whether they aspire to a career in academia, industry or other fields.

Our professional master's programs enable students to gain specialized technical knowledge and develop leadership and other professional competencies to advance their careers. MEng students apply through one of seven departments and institutes and can select from among a growing number of optional emphases, including Aerial Robotics and Forensic Engineering.

The Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE) emphasis continues to be the most popular of these emphases. In 2016–2017, 137 students completed an ELITE emphasis, an increase of 10% over the previous year. We expanded our ELITE curriculum to include two new courses in 2016–2017:

- APS 1038 Strategic Sustainability Management for Business and Products
- APS 1040 Quality Control for Engineering Management

We launched an MEng in Biomedical Engineering in fall 2016 with an initial cohort of seven students. The innovative program focuses on biomedical device design and requires students to undertake applied design challenges as well as a four-month internship. In winter 2017, we piloted an MD-MEng dual-program stream to enable MD students to complete both degrees in parallel. Nine students participated in the initial cohort.

New initiatives for 2017–2018:

- **Cross-Faculty Collaborative Master's Specialization in Psychology and Engineering (PsychEng)** – The collaborative specialization will involve the Department of Mechanical & Industrial Engineering and the Department of Psychology in the Faculty of Arts & Science, and will facilitate and promote applied research at the intersection of engineering and psychology.
- **MEng emphasis in Forensic Engineering** – This emphasis will recognize specialized work by graduate students in areas related to forensic engineering, including assessment of deterioration in infrastructure, product quality and product failure, and procedural practice improvement as a result of investigations. The direct impact of forensic engineering is to improve engineering design practices and the revision of codes and standards to improve public safety.
- **MEng emphasis in Analytics** – This emphasis will provide students with techniques and strategies to translate large data sets into useful insights for sectors, including manufacturing, transportation, banking and health care.
- Part-time option to the **MEng in Biomedical Engineering**, which will be made available to U of T medical students and those who are currently employed full-time. It is expected to attract the interest of current professionals in the biomedical industry and to promote linkages with industry as well as cross-Faculty interactions among classmates.

We are also developing a PhD Career Development Program, a complementary program to our Prospective Professors in Training (PPIT) program that will support PhD candidates with career aspirations outside of academia. The program will be piloted through the Institute for Leadership Education in Engineering (ILead) in fall 2017 and will include workshops and seminars on topics such as transferable skills for the non-academic workplace and professional networking.

(To read more about programs that enrich the graduate student experience, please see Chapter 4: Cross-Faculty Education and Experiential Learning.)

Figure 2.11 **ELITE Emphases Awarded, 2008–2009 to 2016–2017**

	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
AeroE		1	2		7	2	4	11	1
ChemE		2	12	11	17	8	20	20	18
CivE	3	11	13	11	9	12	12	24	22
ECE		3	3	3	22	32	22	14	28
MIE		7	19	20	26	36	39	50	53
MSE			1	1	4	6	11	5	15
Total	**3**	**24**	**50**	**46**	**85**	**96**	**108**	**124**	**137**

Selected Graduate Student Highlights

Stem cell-based gene test predicts patient risk in acute myeloid leukemia

Stanley W.K. Ng (IBBME PhD candidate) led the development of a new, rapid gene expression test that could help clinicians determine the best management for patients with acute myeloid leukemia (AML). The standard treatment for AML is intensive chemotherapy, however it is difficult to predict whether a patient will respond well or might do better with novel therapies offered by clinical trials. The current genetic tests used to estimate patient risk level typically take weeks to arrive. By contrast, Ng's test makes it possible to accurately predict a patient's response to chemotherapy within 24 to 48 hours of diagnosis. The test is the result of a collaboration between U of T's Faculties of Applied Science & Engineering and Medicine, the Princess Margaret Cancer Centre in Toronto, and leukemia clinics in France, Germany and the Netherlands.

HEQCO report shows success of ILead-developed team effectiveness tool

Patricia Sheridan (MechE 0T9, MASc 1T1, ChemE PhD candidate), who will join the Faculty as an Assistant Professor in summer 2017, has designed, built and tested a web-based tool to help students improve their communication, relationship-building and team problem-solving competencies in large classroom environments. The tool, called the Team Effectiveness Learning System (TELS), invites students to assess their own performance and that of their teammates at critical junctures. It then delivers detailed individual and team feedback to students, as well as instructors, to gain a better understanding of how they can support both individual students and teams to ensure their success. A study by the Higher Education Quality Council of Ontario (HEQCO) found that TELS was effective at helping students understand their strengths and weaknesses, as opposed to open, unstructured feedback opportunities, which often only highlight what a student already does well. Sheridan's research, supervised by Professors Doug Reeve and Greg Evans (both ChemE), is part of the Collaborative Program in Engineering Education.

U of T Engineering doctoral students receive $150,000 Vanier Scholarships

Four graduate students working to improve drug delivery to tumours using lasers, customize tissues to repair hearts damaged by disease or injury, optimize the distribution of automated external defibrillators in cities, and increase data download speeds have won Vanier Canada Graduate Scholarships for 2017. Worth $50,000 per year for three years, Vanier Scholarships are awarded by the Government of Canada to doctoral students at Canadian universities who demonstrate excellence in three areas: academics, research impact and leadership.

3

Our community is defined by multidisciplinary collaboration, technical ingenuity and creative trailblazing, as well as leading in engineering innovation and entrepreneurship. The calibre and global impact of our research contributes to our reputation for excellence and as Canada's top-ranked engineering school and one of the world's best.

We continue to enhance pathways for our researchers to collaborate across disciplines, generating new knowledge and advancing innovation. Each year, we engage with more than 300 external partners from a variety of sectors, including information technology, biomedical devices, resource extraction and environmental engineering. Programs such as EMHSeed, created in partnership with the Faculty of Medicine, support collaborative research projects that are at the convergence of engineering and other disciplines.

Our researchers create innovative technologies and processes across a wide range of strategic areas – from sustainability to artificial intelligence to human health – that drive economic development, improve lives and protect the planet. Our commitment to research excellence is reflected in more than 25 leading-edge centres and institutes – nearly half of which were created in the last five years, including the Institute for Water Innovation (IWI). The IWI, which was established to develop novel solutions for domestic, commercial and industrial water management challenges, is one of several research centres that will have a home in the forthcoming Centre for Engineering Innovation & Entrepreneurship (CEIE).

Our research continues to earn strong support from both federal and provincial research funding agencies, as well as endowments from our alumni and funding from external partners. Our Faculty is home to 90 research chairs, a 30% increase over the last five years. Our success in obtaining collaborative grants, such as the prestigious NSERC Collaborative Research and Training Experience (CREATE), enables us to strengthen our industry partnerships while providing our graduate students with experiential learning opportunities relevant to their chosen areas of expertise.

Selected Research Highlights

Printable solar cells just got closer to reality

Postdoctoral researcher and Rubicon Fellow Hairen Tan (ECE) and his team cleared a critical manufacturing hurdle in the development of a new class of solar devices called perovskite solar cells. This alternative solar technology could lead to low-cost, printable solar panels capable of turning nearly any surface into a power generator. Perovskite solar cells depend on a layer of tiny crystals made of low-cost, light-sensitive materials, which can be mixed into a kind of liquid 'solar ink' that can then be printed onto glass, plastic or other materials using a simple inkjet process. To generate electricity, electrons excited by solar energy must be extracted from the crystals so they can flow through a circuit. That extraction happens in the electron-selective layer (ESL). Tan, who works under Professor Ted Sargent (ECE), and his colleagues have developed a new chemical reaction that enables them to grow an ESL made of nanoparticles in solution, directly on top of the electrode. The new nanoparticles are coated with a layer of chlorine atoms, which helps them bind to the perovskite layer on top, allowing for efficient extraction of electrons. In a paper published in *Science*, Tan and his colleagues report the efficiency of solar cells made using the new method at 20.1%, the best ever reported for low-temperature processing techniques. Tan's cells retained more than 90% of their efficiency even after 500 hours of use.

Diesel trains may expose passengers to exhaust

A new study by Professor Greg Evans (ChemE), director of the Southern Ontario Centre for Atmospheric Aerosol Research (SOCAAR), and Dr. Cheol-Heon Jeong, a senior research associate at SOCAAR, finds that diesel trains may expose passengers to elevated levels of pollutants, especially if they are sitting directly behind the locomotive. They measured the concentration of two kinds of airborne particles: black carbon (BC), which is essentially soot, and ultrafine particles (UFP), which are formed when gases in the exhaust condense into microscopic particles. Both measurements also act as proxies for the complex mixture of gases in diesel exhaust, which is an established carcinogen associated with respiratory, cardiovascular and reproductive health effects. In a paper appearing in the journal *Atmospheric Environment,* they report that cars being pulled by diesel trains and located directly behind the locomotive had an average of nine times the levels of BC and UFP compared to air next to a busy city street, and that cars in the middle of the trains had levels three times lower than the front-most cars. The average BC and UFP concentrations across all pulled cars was about five times higher than on city streets. Evans and his team are currently working with Metrolinx to test new filters for the air intake vents, and preliminary results show an 80% reduction in the levels of black carbon.

Skin cells "crawl" together to heal wounds treated with unique hydrogel layer

A team led by Professor Milica Radisic (IBBME, ChemE) has demonstrated for the first time that their peptide-hydrogel biomaterial prompts skin cells to "crawl" toward one another, closing chronic, non-healing wounds often associated with diabetes, such as bed sores and foot ulcers. The team tested their biomaterial on healthy cells from the surface of human skin, called keratinocytes, as well as on keratinocytes derived from elderly diabetic patients. They saw non-healing wounds close 200% faster than with no treatment, and 60% faster than treatment with a leading commercially used collagen-based product. Their work was published in the journal *Proceedings of the National Academy of Sciences*. Until now, most treatments for chronic wounds involved applying topical ointments that promote the growth of blood vessels to the area. But in diabetic patients, blood vessel growth is inhibited, making those treatments ineffective. Radisic and her team knew their special peptide — called QHREDGS, or Q-peptide for short — promoted survival of different cell types, including stem cells, heart cells and fibroblasts, but this was the first time they applied it to wound healing. Radisic and PhD candidates Yun Xiao (ChemE, IBBME) and Lewis Reis (IBBME) worked with Covalon Technologies Ltd., a company dedicated to the research, development and commercialization of novel healthcare technologies, on this project. Covalon's chief scientific officer, Dr. Val DiTizio (IBBME PhD 0T1), has been leading the partnership with Radisic's group for about three years, and contributed its collagen-based wound-healing dressing, ColActive, as one of the controls.

Data in this chapter are presented for the 2015–2016 grant year (April to March). This is the most recent year for which complete data are available. Highlights are from July 2016 to June 2017.

Reducing the risks of cycling

Professor Marianne Hatzopoulou (CivE) has created the Clean Ride Mapper, an online tool that leverages Google Maps to help cyclists find routes that have lower levels of airborne pollutants like ultra-fine particles or nitrogen oxides. In 2016, Hatzopoulou and her team collaborated with Health Canada on a study that aimed to map out how pollution affects human health in different areas of Toronto. Volunteers walked the streets of Toronto equipped with GPS devices and instruments to monitor their heart rates and blood pressure, as well as the level of noise and air pollution they were exposed to. By correlating location with pollution and physiological data, the team is finding the cleanest, safest routes. Employing an online survey, Hatzopoulou and postdoctoral researcher Sabreena Anowar (CivE) have determined that cyclists, on average, are willing to travel an additional 3.6 minutes (approximately one kilometre) to reduce their exposure to pollution.

Target practice on tumours

Professor Warren Chan (IBBME), a pioneer in the field of nanomedicine, is working to reduce the harmful side effects of cancer treatments by determining how to deliver chemotherapy drugs directly into tumours — and nowhere else. He and his group are engineering more effective nanoparticles for drug delivery. The group published a paper in *Nature Reviews Materials* in 2016 revealing that less than 1% of nanomedicines reach their intended tumour targets. Most of the nanoparticles get stuck in the liver, spleen and kidneys — organs responsible for filtering toxins and waste from blood. Chan's group is now examining how the liver takes up nanoparticles, in partnership with Dr. Ian McGilvray at Toronto General Hospital, Professor Anton Zilman in U of T's Department of Physics, and Professor Julie Audet (IBBME).

Ancient microbes offer insight on better mine wastewater strategies

A new research project led by Professor Lesley Warren (CivE) examines how microbes make their living in mine wastewater by studying their genes — an insight that could help further reduce the environmental footprint of the mining industry. All mining wastewater must be cleaned to strict federal guidelines before it can be discharged back into the environment. It is this sulphur-rich wastewater in which the microorganisms thrive. Warren is collaborating with Professor Jill Banfield, from the University of California, Berkeley, Professor Christian Baron, a microbial biochemist from the Université de Montréal, and Dr. Simon Apte, a research scientist in analytical chemistry and geochemical modeling from Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO), to unravel the role played by these sulphur-loving microbes. Informed by genomic and geochemical insights, they plan to develop new tools that can help mine managers make better decisions about how to manage their wastewater, including ensuring conditions that encourage the growth of organisms that break down toxic compounds or prevent the growth of organisms that produce those toxic compounds in the first place. The team is partnering with three Canadian mining companies, as well as two engineering consulting firms, Advisian and Ecological and Regulatory Solutions. The $3.7-million endeavour is funded in part by Genome Canada through the Large Scale Applied Research Projects (LSARP) program, with additional support from the Mining Association of Canada, the Ontario Mining Association and CSIRO. The project also has the endorsement of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM).

New AI algorithm taught by humans learns beyond its training

U of T Engineering researchers Parham Aarabi (ECE) and Wenzhi Guo (ECE MASc 1T5) have designed a machine learning algorithm that learns directly from human instructions, rather than an existing set of examples, and which has outperformed conventional methods of training neural networks by 160%. The algorithm also outperformed its own training by 9%. Humans "teach" neural networks by providing a set of labeled data and asking the neural network to make decisions based on the samples it has seen. This algorithm is different: it learns directly from human trainers who provide instructions that are used to pre-classify training samples rather than a set of fixed examples. Their work is published in the journal *IEEE Transactions on Neural Networks and Learning Systems*. This heuristic training approach holds considerable promise for addressing one of the biggest challenges for neural networks: making correct classifications of previously unknown or unlabeled data. This is crucial for applying machine learning to new situations, such as correctly identifying cancerous tissues for medical diagnostics, or classifying all the objects surrounding and approaching a self-driving car.

Drone-delivered AEDs offer novel approach to saving lives at home

A group of U of T Engineering researchers aims to use drones to deliver life-saving automatic external defibrillators (AEDs) rapidly and directly to homes. Justin Boutilier (IndE PhD candidate) envisions a future in which a bystander or family member who witnesses a cardiac arrest can call 911, and within minutes, an AED is flown to their doorstep or balcony to be administered, even before the paramedics arrive. Boutilier is working under Professor Timothy Chan (MIE), Director of the Centre for Healthcare Engineering at U of T, in collaboration with Professor Angela Schoellig (UTIAS) and researchers from the St. Michael's Hospital Rescu Program, to turn this futuristic idea into a life-saving reality. This project builds on research by Chan's lab on cardiac arrests that occur outside of hospitals, and the lack of accessible AEDs in public locations during non-business hours. Boutilier is now focusing on reducing deaths from cardiac arrests that occur at home. To determine where drones should be stationed and how many are needed to serve a given population, Boutilier obtained historical cardiac arrest data from eight regions in Southern Ontario, including dense urban areas and sparse rural communities. He found that they were able to shave several minutes off the median ambulance response times in both rural and urban regions, and drones could arrive ahead of ambulances more than 90% of the time. Boutilier and Chan presented their research at the American Heart Association Resuscitation Science Symposium in New Orleans, and they plan to pilot the project in Muskoka, a region that has a high rate of bystander cardiopulmonary resuscitation (CPR), and the slowest ambulance response time of all the regions from which they have gathered data.

Can microwaves make mining more sustainable?

Professor Erin Bobicki (MSE, ChemE) is working to reduce the environmental impact of mining and mineral processing, and her secret weapon is a common household appliance – the microwave. Mineral processing is all about separating valuable metals such as nickel, copper and zinc from the low-value minerals — known as gangue — that make up most of the ore. Minerals have different dielectric properties, and in some cases different magnetic properties, and many high-value compounds respond differently to the electromagnetic radiation produced by microwaves than less valuable ones. By playing with those properties, researchers can encourage cracks at the boundaries between the valuable grains and the gangue. Bobicki is experimenting with microwaves to alter the surface chemistry and composition of mineral grains, making it easier to separate the valuables from the gangue in downstream processing.

Researchers reduce climate-warming carbon dioxide into building blocks for fuel

Researchers have long tried to find simple ways to convert greenhouse gases into fuels and other useful chemicals. Now, a group of researchers led by Professor Ted Sargent (ECE) has found a more efficient way to catalyse the reaction powered by renewable energies such as solar or wind. The team's catalyst takes climate-warming carbon-dioxide (CO_2) and converts it to carbon-monoxide (CO), a useful building block for carbon-based chemical fuels, such as methanol, ethanol and diesel. They start by fabricating extremely small gold "nanoneedles" — the tip of each needle is 10,000 times smaller than a human hair — which act like lightning rods for catalyzing the reaction. When they applied a small electrical bias to the array of nanoneedles, they produced a high electric field at the sharp tips of the needles that helps attract CO_2, speeding up the reduction to CO at a rate faster than any catalyst previously reported. This represents a breakthrough in selectivity and efficiency, which brings CO_2 reduction closer to the realm of commercial electrolysers. The team is now working on skipping the CO and producing more conventional fuels directly.

U of T Engineering collaborates with industry and government on drone navigation

A new research partnership between U of T Engineering, Drone Delivery Canada and Defence Research and Development Canada will enable unmanned aerial vehicles — UAVs, also known as drones — to safely find their way back to their launch point if their communication or GPS navigation systems fail. The technology could greatly expand the use of drones in applications from delivery of goods to military reconnaissance. Professor Angela Schoellig (UTIAS) is leading the team, which also includes Professor Tim Barfoot (UTIAS). Current GPS technology allows UAVs to navigate without the help of a ground crew. But if this system gets disrupted by bad weather or malfunctioning equipment, the drone could lose control and crash. Schoellig and her team are proposing to develop a navigation system that relies instead on digital photos taken by drones as they fly.

Research Funding and Partnerships

Our innovative and collaborative research, the strength of our industrial partnerships and our dedicated fundraising efforts enabled U of T Engineering to attract $74.6 million in research funding in 2015–2016, including $63.4 million in operating funds and $11.2 million in infrastructure funds. This funding came from a variety of sources, including federal and provincial granting councils, and corporate partners.

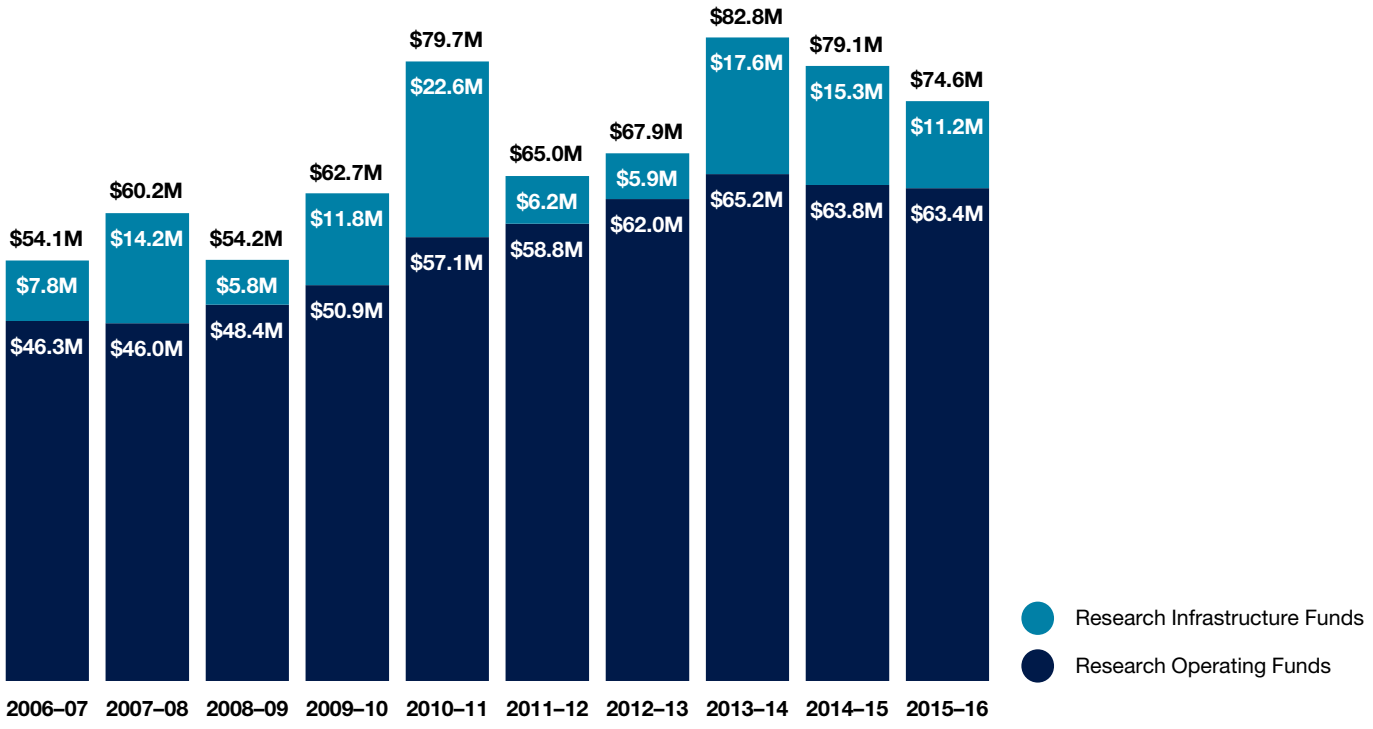
We generated $31.1 million of our research operating funds from the Tri-Agency, which include the Natural Sciences and Engineering Research Council of Canada (NSERC), the Canadian Institutes of Health Research (CIHR) and the Social Sciences and Humanities Research Council (SSHRC), plus the Networks of Centres of Excellence (NCE). The majority of our Tri-Agency funding continues to come from NSERC, from which U of T Engineering researchers received $26.4 million in 2015–2016.

Data for 2016–2017 indicate that we already exceeded our Academic Plan goal of $32 million in Tri-Agency funding by 2016. We had revised this goal after achieving our original target of $25 million three years early.

From 2011–2012 to 2015–2016, U of T's five-year cumulative share of NSERC funding was 9.5%, which is the largest of any Canadian university. The allocation of Canada Research Chairs to U of T and its divisions is updated every two years and is based on its portion of national Tri-Agency funding, including NCE funding.

We also attracted $3.6 million from CIHR for research in biomedical engineering and health systems. The funding represents a 12.5% increase over the previous year.

Figure 3.1a **Breakdown of Research Infrastructure Funding vs. Research Operating Funding, 2006–2007 to 2015–2016**



Note 3.1: The figures in this chapter report research funding the Faculty received in 2015–2016. Because it takes some time after the completion of a fiscal year for research funding data to become final, this is the most recent year for which data are available.

Figure 3.1b **Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC) and Networks of Centres of Excellence (NCE) Funding, 2006–2007 to 2015–2016**

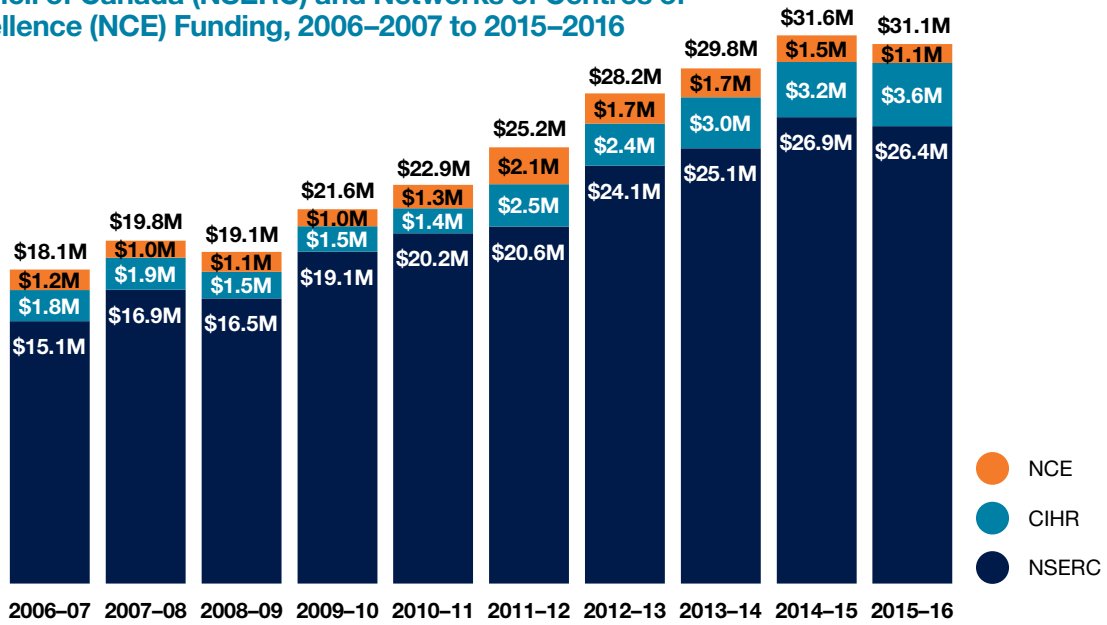
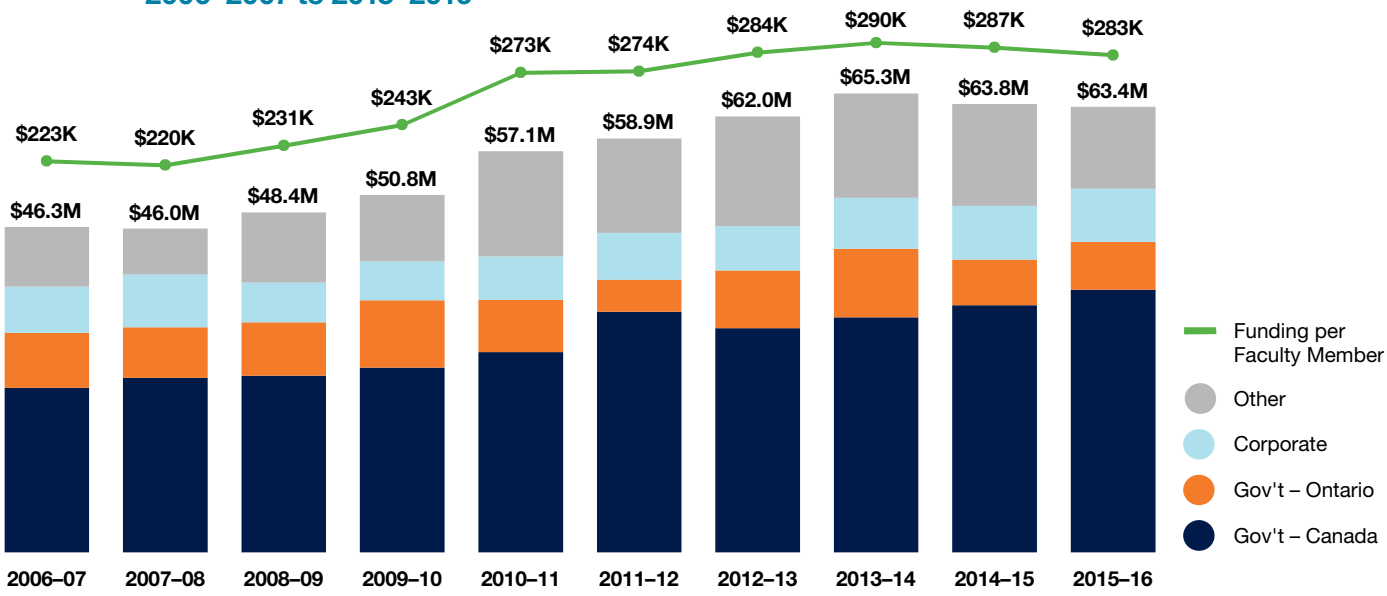


Figure 3.1c **Research Operating Funding by Year, Source and Funding per Faculty Member, 2006–2007 to 2015–2016**



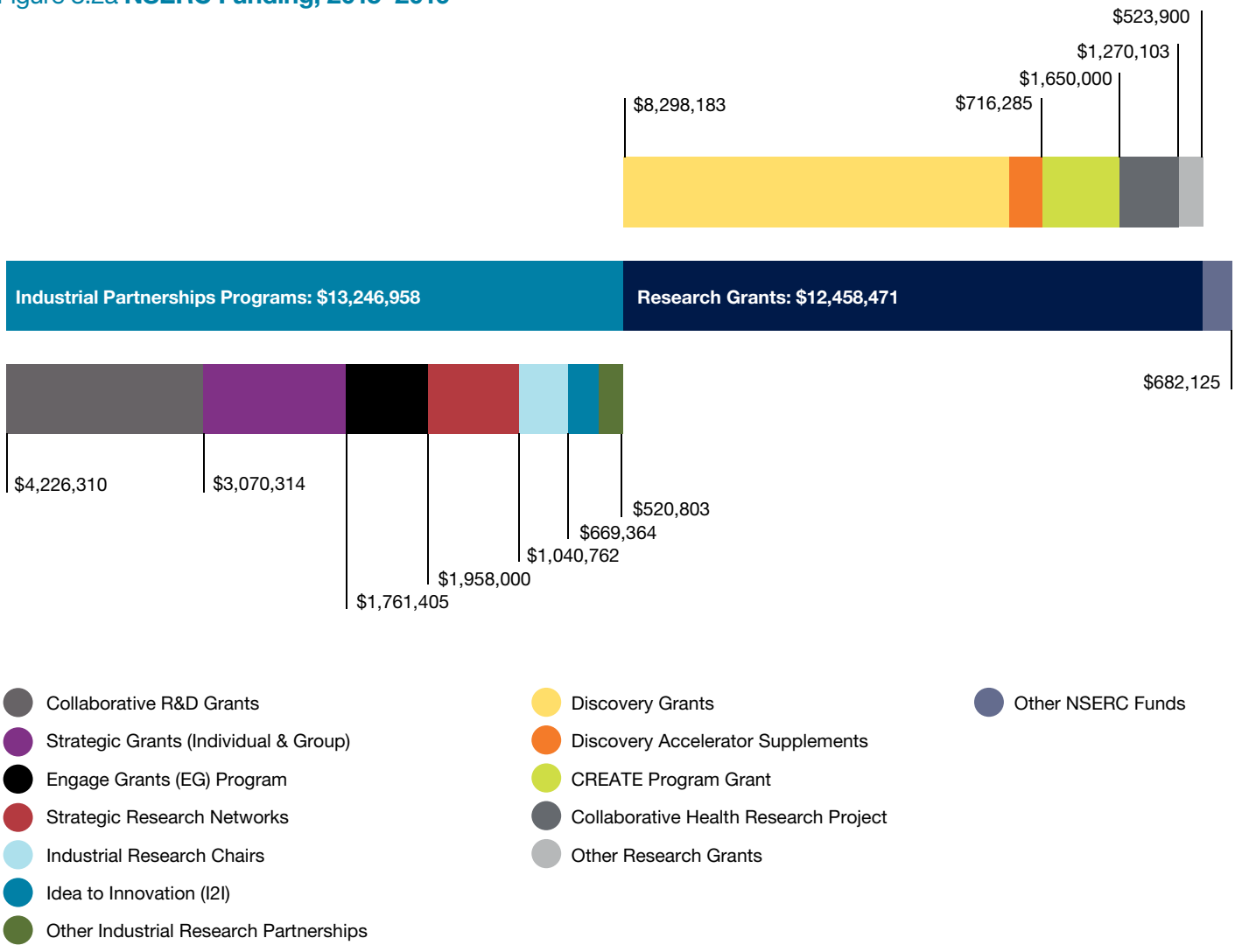
	Funding per Faculty Member	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total
2006–07	$222,608	$23,421,386	$7,817,967	$6,583,699	$8,479,398	**$46,302,450**
2007–08	$220,305	$24,828,188	$7,168,950	$7,520,781	$6,525,854	**$46,043,773**
2008–09	$231,470	$25,122,618	$7,618,346	$5,640,631	$9,995,737	**$48,377,332**
2009–10	$243,266	$26,276,883	$9,562,402	$5,540,382	$9,462,900	**$50,842,567**
2010–11	$272,982	$28,504,020	$7,395,585	$6,180,621	$14,972,995	**$57,053,221**
2011–12	$273,772	$34,218,893	$4,538,965	$6,702,822	$13,400,263	**$58,860,943**
2012–13	$284,491	$31,876,929	$8,240,162	$6,315,707	$15,586,318	**$62,019,116**
2013–14	$290,006	$33,424,711	$9,773,183	$7,256,554	$14,796,883	**$65,251,331**
2014–15	$287,311	$35,146,451	$6,487,530	$7,634,736	$14,514,221	**$63,782,938**
2015–16	$282,920	$37,371,283	$6,787,653	$7,562,726	$11,652,375	**$63,374,037**

Research chairs and major grants generate recognition that enhances our reputation as the top engineering school in Canada. U of T Engineering earned three new Canada Research Chairs in 2016–2017: one in Endogenous Repair, one in Transportation and Air Quality, and one in Quantitative Cell Biology and Morphogenesis. This brings our total of Canada Research Chairs to 31. The Faculty's inaugural NSERC Chair in Multidisciplinary Engineering Design was renewed for five years. This brings our total number of research chairs, including Canada Research Chairs, endowed chairs, NSERC Industrial Research Chairs, U of T Distinguished Professors and University Professors, to 90 held by 84 individual chairholders. *(For the full list, see Appendix D.)*

In addition to research chairs, our faculty members currently hold six prestigious NSERC Collaborative Research and Training Experience (CREATE) grants, aimed at training and mentoring highly qualified students in collaborative and integrative approaches. Each of these NSERC grants provides $1.65 million in support over six years.

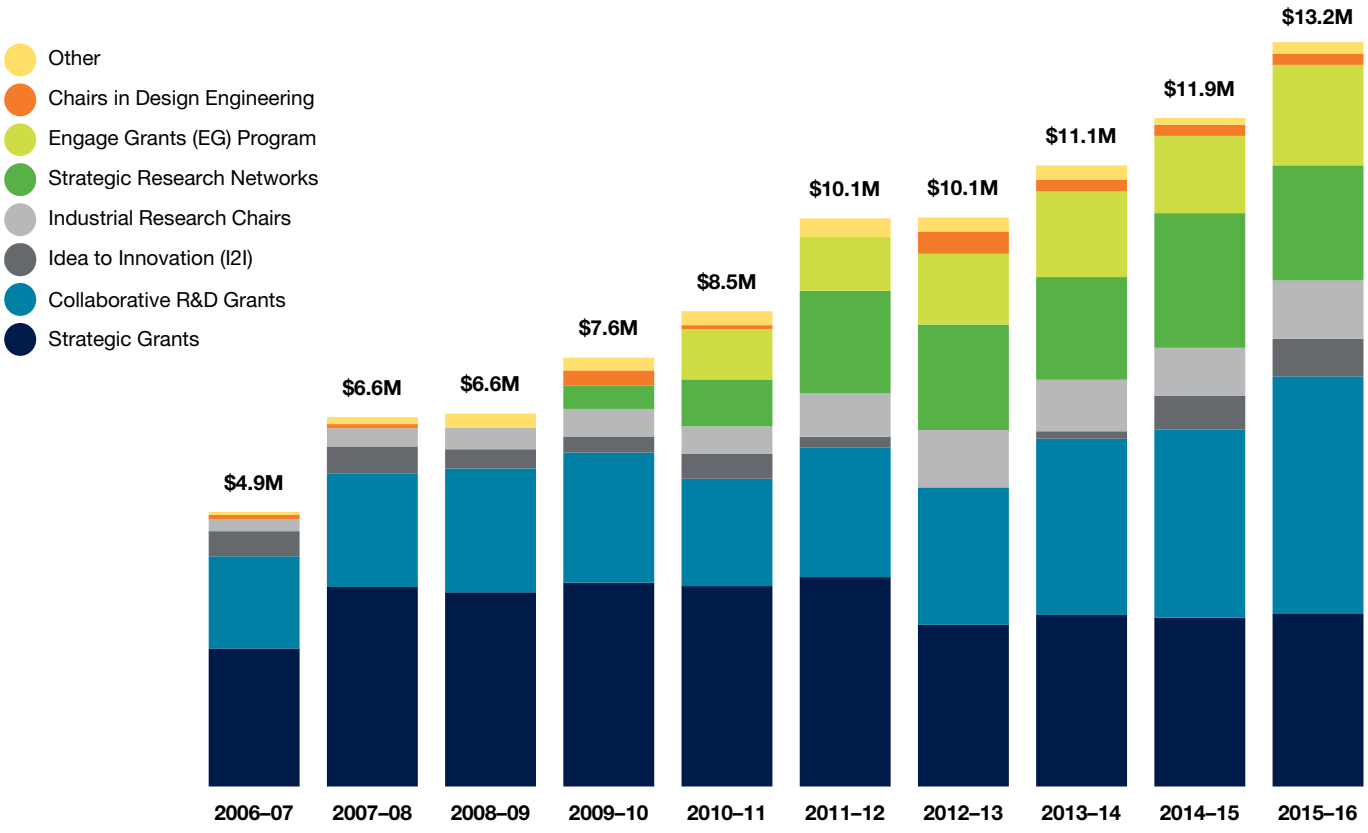
We continue to leverage industrial partnerships, which have played a key role in the growth in our NSERC funding over the past decade. Grants based on industrial partnerships made up 50.3% of our NSERC funding in 2015–2016, a significant increase over the previous year when industrial partnership grants made up 44.3% of NSERC funding. The Faculty attracted three 2016 NSERC Strategic Partnership Grants (SPG) worth a total of $1.05 million. We also launched a workshop series on maximizing success in each stage of the NSERC Discovery Grant program process to strengthen our competitiveness of our NSERC applications.

Figure 3.2a **NSERC Funding, 2015–2016**



Note 3.2a: Data current as of May 2017 and based on grant year (April to March).

Figure 3.2b **NSERC Industrial Partnership Funding by Program, 2006–2007 to 2015–2016**



	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16
Other	$55,267	$130,000	$247,392	$230,000	$251,770	$328,780	$246,790	$258,882	$119,531	$203,803
Chairs in Design Engineering	$69,076	$69,076		$267,173	$69,076		$400,000	$200,000	$200,000	$200,000
Engage Grants (EG) Program					$897,114	$960,531	$1,254,468	$1,533,924	$1,375,371	$1,786,405
Strategic Research Networks				$417,293	$832,697	$1,826,000	$1,879,000	$1,824,940	$2,400,000	$2,050,000
Industrial Research Chairs	$216,000	$329,834	$390,667	$493,197	$485,711	$773,964	$1,025,031	$918,349	$847,278	$1,040,762
Idea to Innovation (I2I)	$449,032	$483,200	$339,200	$287,417	$448,612	$195,000		$133,750	$608,417	$669,364
Collaborative R&D Grants	$1,637,132	$2,015,904	$2,203,103	$2,313,127	$1,909,431	$2,301,643	$2,445,232	$3,137,628	$3,347,888	$4,226,310
Strategic Grants	$2,457,079	$3,549,374	$3,457,330	$3,625,317	$3,567,277	$3,725,049	$2,875,127	$3,050,467	$3,001,610	$3,070,314
Total	**$4,883,586**	**$6,577,388**	**$6,637,692**	**$7,633,524**	**$8,461,688**	**$10,110,967**	**$10,125,648**	**$11,057,940**	**$11,900,095**	**$13,246,958**

U of T Engineering continues to generate and strengthen our research collaborations with more than 300 industry partners, from large multinationals such as Intel, Fujitsu Labs and Huawei to U of T spinoffs such as ModiFace and Deep Genomics. These partnerships provide our Faculty with commercialization expertise and employment opportunities for students, while our partners gain access to our world-class researchers, students and facilities.

In 2016–2017, leading industry partners signed two strategic partnership agreements with U of T Engineering. Global information and communications technology provider Huawei signed a three-year, $3-million agreement to provide collaborative research and outreach funding. Havelaar EV signed a five-year, $10-million partnership agreement with U of T Engineering to establish the U of T Havelaar Electric Vehicle Research Centre. The agreement includes $7.5 million in collaborative research project funding and $2.5 million in seed funding for lab space, equipment and administrative needs.

Figure 3.2c **Industrial Partnerships as a Proportion of Total NSERC Funding, 2006–2007 to 2015–2016**

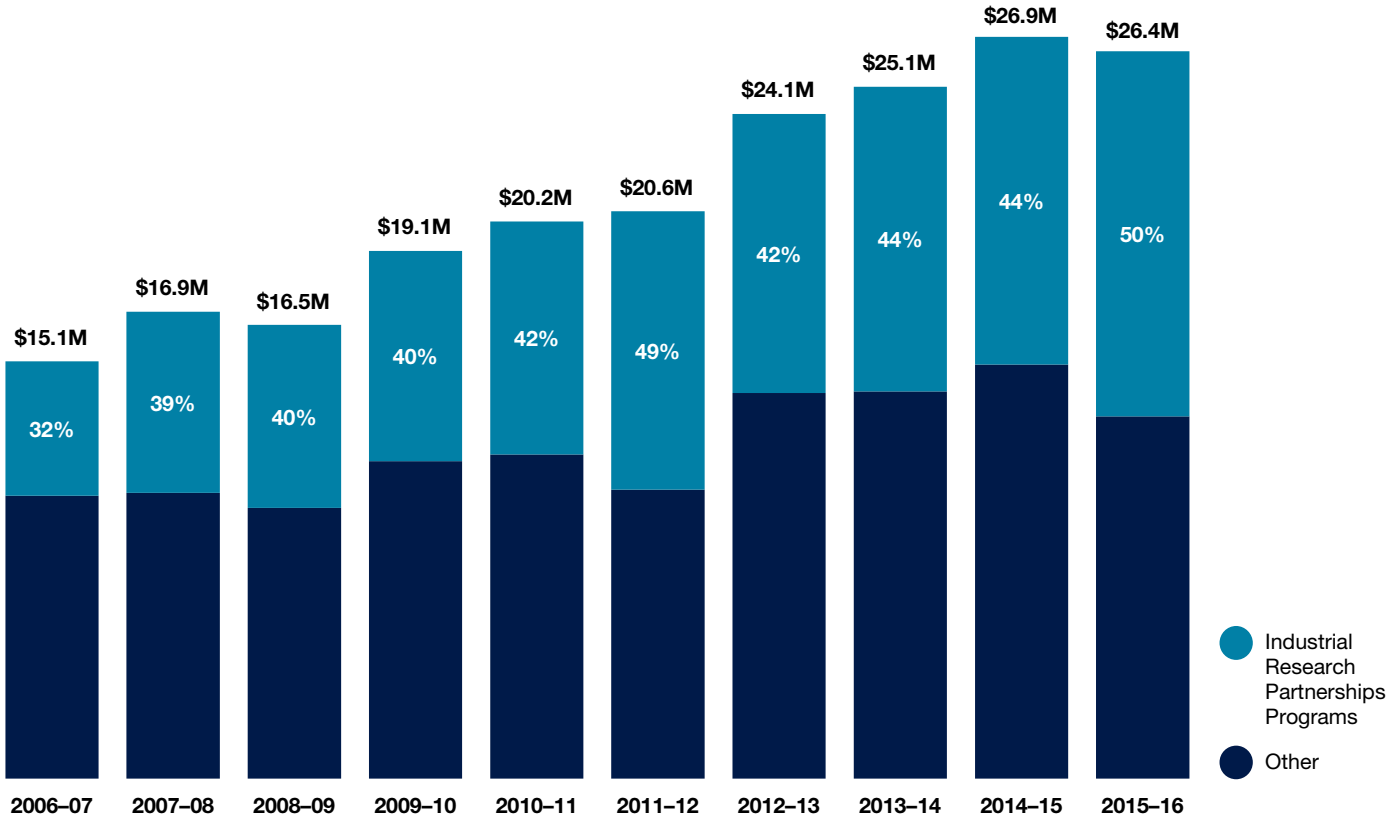


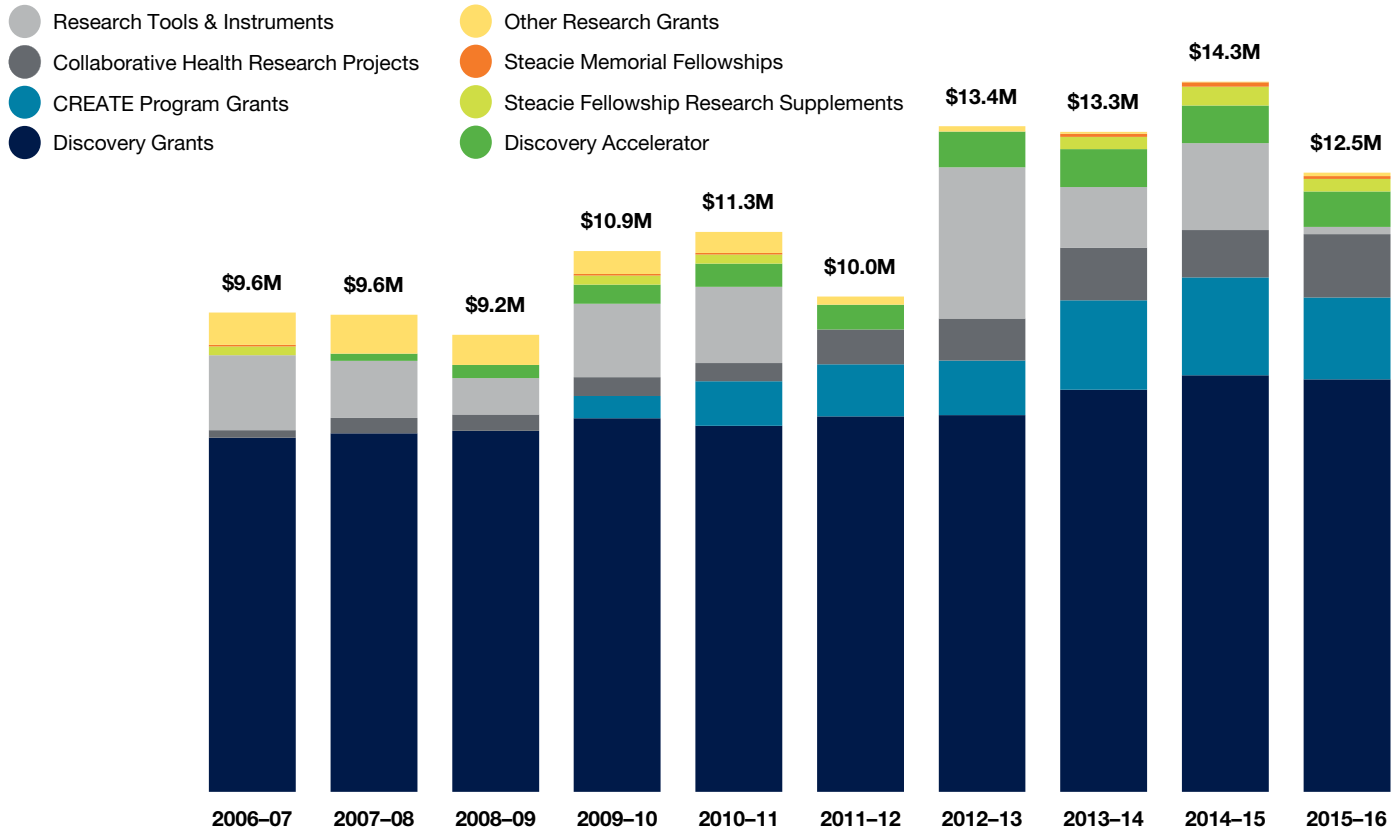
Figure 3.2d **Industry Partners, 2016–2017**

- ABB Group
- Advanced Measurement and Analysis Group Inc.
- Advanced Micro Devices Inc.
- Advanis
- Aerodyne
- Afsan Engineering Co.
- AGFA
- Agnico-Eagle Mines Ltd.
- Agrium Inc.
- Airbus SAS
- AISC
- Alcan Aluminum International
- Alcohol Countermeasure Systems
- Altera Corp.
- AMAG Ltd.
- AMEC Foster Wheeler
- Americas Styrenics LLC
- Analog Devices Inc.
- Andec Manufacturing Ltd.
- Andritz Group
- Anemoi Technologies Inc.
- Angstrom Engineering Inc.
- Antex Western
- Apotex Inc.
- Applanix
- Apple
- Aquafor Beech
- ArcelorMittal Dofasco
- Armacell
- Artium Technologies
- Arup Canada Inc.
- Astronauts4Hire
- Atomic Energy of Canada Ltd.
- AUG Signals Ltd.
- Autodesk
- AV Nackawic Group
- Avalon Rare Metals
- Avertus Epilepsy Technologies Inc.
- Babcock & Wilcox Ltd.
- Barrick Gold Corp.
- Bell Helicopter Textron Inc.
- Bickell Foundation (J. P. Bickell)
- BiomeRenewables
- Bio-Rad Laboratories Canada Ltd.
- Blackberry
- BMW
- Boeing
- Boise Cascade
- Bombardier Aerospace
- Bombardier Inc.
- Braskem
- BresoTec Inc.
- Brican Automated Systems Inc.
- Brigham & Women's Hospital
- Broadcom Corp.
- CAE
- CalEnergy Generation
- Calgon Carbon Corp.
- Cameco
- Canadian Automobile Association
- Canadian Institute of Steel Construction
- Canadian Nuclear Laboratories
- Canadian Nuclear Safety Commission
- Candu Energy Inc.
- Candu Owners Group
- Candura Instruments
- CanSyn Chem Corp.
- Carbon Cure Technologies
- Cardinal Health
- Carter Holt Harvey Ltd.
- Cascades
- CD Nova
- Celestica
- CellScale Biomaterials Testing
- Celulose Nipo-Brasileira
- Cement Association of Canada
- Center for Automotive Materials & Manufacturing
- Centre Line Ltd.
- Christie Digital Systems Canada Inc.
- Chrysler Canada Inc.
- Ciena Canada Inc.
- CIMA Canada Inc.
- Clearpath Robotics
- Clyde-Bergemann Inc.
- CMC Electronics
- Colibri Technologies
- COM DEV International Ltd.
- Commissariat à l'energie atomique
- ConCast Pipe
- Connaught Foundation
- Cook Medical
- Coraltec Inc.
- Crosswing Inc.
- Crowdmark
- Curiousitate
- Cyberworks Robotics
- Cyclone Manufacturing
- Daishowa-Marubeni International (DMI) Ltd. – Peace River Pulp Division
- Dana Canada Corp.
- Daniels Group
- Datatrends Research Corp.
- DCL International
- Defence Science & Techology Lab (UK)
- Dell
- Detour Gold Corp.
- Deveron
- Dionex
- Diros Technology Inc.
- Dongwon Technology Co. Ltd.
- Dr. Robot Inc.
- Drone Delivery Canada
- Droplet Measurement Technologies
- DSO National Laboratories
- DuPont Canada
- E. I. du Pont Canada Company
- Eclipse Scientific Inc.
- Ecosynthetix
- Eco-Tec Inc.
- Eldorado Brasil
- Electrovaya Inc.
- Eli Lilly Research Laboratories
- Enbridge Gas Distribution Inc.
- Energent Inc.
- Engineering Services Inc.
- ENMAX Power Corporation
- Ensyn Technologies Inc.
- ERCO Worldwide
- Ericsson Canada Inc.
- ESG Solutions
- exactEarth Inc.
- Exigence Technologies
- Explora Foundation
- FedEx
- Fibria Celulose
- Finisar Corporation
- Flight Safety International
- Ford Motor Company (USA)
- Ford Motor Company of Canada
- FPInnovations
- Fuji Electric Co. Ltd.
- Fujitsu Laboratories Ltd.
- Fujitsu Labs of America Inc.
- Futurebound Corp.
- G. Cinelli – Esperia Corporation
- G. S. Dunn Dry Mustard Millers
- GE Energy
- GE Global Research
- GE Zenon
- Gedex Inc.
- Gener8 Inc.
- General Dynamics Canada
- General Electric Canada
- General Electric Inc.
- General Motors of Canada Ltd.
- Genpak
- Geosyntec Consultants
- Gerdau Long Steel North America
- GlaxoSmithKline Inc.
- Goodrich Corp.
- Goodrich Landing Gear
- Grafoid Inc.
- Greencore Composites
- Groupe Mequaltech Inc.
- GTAA Toronto Pearson
- GVA Lighting
- Hamilton Professional Fire Fighters Association
- Hanwha Solar Canada
- Hard Rock Innovations Inc.
- Hatch Ltd.
- Havelaar Canada
- Hawker Siddeley Canada
- HDR Corp.
- Hitachi High-Technologies
- Holcim Inc.
- Honeywell
- Huawei Technologies Co. Ltd.
- Hunch Manifest Inc.
- Huron Digital Pathology
- Hydro One Networks
- Hydro-Québec
- Hyundai Motor Company
- IBI Group
- IBM Canada Ltd.
- IBM T. J. Watson Research Center
- iGEN Technologies Inc.
- Imperial Oil Ltd.
- Indian Oil Company
- Industrial Thermo Polymers Ltd.
- Ingenia Polymers Corp.
- Inphi Corporation
- Institute for Energy Technology (Norway)

Note 3.2d: The list above includes companies from U of T's Research Information System, along with collaborators that fund research through a number of industrial research consortia, including those associated with many of our Industrial Research Chairs. It does not include companies that hire our students through the Professional Experience Year, work with them on Multidisciplinary Capstone Projects, or provide philanthropic support.

- Integran Technologies Inc.
- Intel Corp.
- Interface Biologics Inc.
- International Paper Company
- Ionicon
- Ionics Mass Spectrometry Group Inc.
- IRISNDT Corporation
- Irving Pulp & Paper Ltd.
- JDS Uniphase Inc.
- JNE Chemicals
- Johnson Matthey
- Kapik Integration
- Kasai Kogyo Co. Ltd.
- Kevin Quan Studios
- Keysight Technologies Canada Inc.
- Kiln Flame Systems Ltd.
- Kimberly-Clark Corp.
- Kinetica Dynamics
- Kinross Gold Corporation
- Klabin
- KQS Inc.
- Krauss Maffei Corp.
- Kumho Petrochemical R & D Center
- Laboratoire d'essai Mequaltech
- LaFarge Canada
- Lallemand Inc.
- Lattice Semiconductor Ltd.
- LG Chem
- Litens Automotove Group
- Lubrizol
- Lumentra Inc.
- MacDonald, Dettwiler and Associates (MDA) Ltd.
- Magellan Aerospace
- Magna Closures
- Magna Exteriors and Interiors
- Magna International Inc.
- Magna Powertrain
- Manitoba Hydro
- Mantech Inc.
- Manulife Financial
- Marmak Information Technologies
- Materials & Manufacturing Ontario
- Maxim Integrated Products Inc.
- MeadWestvaco (MWV) Corp.
- Mercedes-Benz Canada Inc.
- Messier-Bugatti-Dowty
- Messier-Dowty Inc.
- Metso Pulp, Paper and Power
- Microbonds Inc.
- Micropilot
- Millipore
- Mine Environment Neutral Drainage
- Mitsubishi Rayon Co. Ltd.
- Moldflow Corp.
- Monaghan Biosciences Ltd.
- Mr. Robot Inc.
- Nanowave
- National Aeronautical Establishment (USA)
- NatureWorks LLC
- NCK Engineering
- Nestle Canada
- New World Laboratories
- Newterra
- Nike Inc.
- Northern Yashi Engin, Const Ltd.
- NUCAP Global
- Nuclear Waste Management Organization
- NXP Semiconductors Netherlands BV
- OCMR
- Olympus Canada
- Olympus NDT Canada
- Ontario Clean Water Agency
- Ontario Power Generation Inc.
- Ontario Renal Network
- Ontario Teachers Pension Plan
- Opal-RT Technologies Inc.
- ORNGE Medical Transport
- Ossur Canada Inc.
- OtoSim
- Pall Corporation
- Perkin Elmer Canada
- Pfizer Inc. (New York)
- Philips Electronics North America Corp.
- Plasco Energy Group
- Platinum Unlimited Inc.
- Polaris Industries
- Polumiros Inc.
- Polycon Industries
- Porewater Solutions
- Pratt & Whitney Canada Inc.
- PrecisionHawk
- Process Research Ortech Inc.
- Procter & Gamble
- Prothena Biosciences Inc.
- Purolator
- QD Solar Inc.
- Qualcomm Canada Inc.
- Qualcomm Technologies Inc.
- Quanser Inc.
- Quantum Dental Technologies (QDT) Inc.
- Questor Technologies Inc.
- Quorum Technologies Inc.
- RBC – Royal Bank of Canada
- RBC Capital Markets
- RBC Global Asset Management
- Regeneron Pharmaceuticals
- RESCON
- Resertrac Inc.
- Resonance Ltd.
- Resource Systems Group Inc.
- Robert Bosch Corp.
- Rockwell International
- Rocscience Inc.
- Rolls Royce Canada Ltd.
- Rosellini Scientific LLC
- RWDI
- Safety Power Inc.
- Safran Electronics Canada
- Samsung Advanced Institute of Technology
- Samsung Electronics
- Sanofi Pasteur
- Saudi Basic Industries Corp. (SABIC)
- Sceye Inc.
- Schlumberger Canada Ltd.
- Sealed Air Corp.
- Semiconductor Research Corp.
- Sensor Technology Ltd.
- S-FRAME Software Inc.
- ShawCor
- Shinil Chemical Industry Co. Ltd.
- Side Effects Software
- Siemens ADGT
- Sinclair Interplanetary
- Sinclair Technologies Inc.
- Solantro Semiconductor Corp.
- Solar Ship Inc.
- Solvay Specialty Polymers
- Sony Corporation
- SPP Canada Aircraft Inc.
- St Mary's Cement Group
- Stackpole International
- Stantec Inc.
- Steel Structures Education Foundation
- StemCell Tecnologies Inc.
- StoraEnso
- Sulzer Metco
- Suncor Energy Inc.
- Sunwell Technologies
- Suzano Papel e Celulose
- Synbra
- Syncrude Canada Ltd.
- Teck Resources Ltd.
- Teknion
- Teledyne ISCO
- TELUS
- Telus Mobility
- Tembec Industries Inc.
- Tenova GoodFellow Inc.
- Tessonics Inc.
- Thales Canada Inc.
- The Iron Ore Company of Canada (IOC)
- The Miller Group
- Theralase Inc.
- Thermodyne Engineering
- ThermoFisher Scientific
- TMS Robotics & Academics
- Tolko Industries Ltd.
- Toronto Hydro
- Toshiba Corporation
- Total American Services Inc.
- Tower Automotive
- Tower Solutions
- Toyota Collaborative Safety Research Center (CSRC)
- Toyota Technical Center USA Inc.
- TransCanada
- Trapeze Software ULC
- Tridel
- TSI
- Ultrasonix
- Uncharted Software Inc.
- Unisearch Associates
- US Steel Canada
- UTC Aerospace Systems
- VAC Aero International Inc.
- Vale Canada Ltd.
- Valmet Ltd.
- Van-Rob Kirchhoff Automotove
- Vicicog
- VisImage Systems Inc.
- Volkswagen Canada Inc.
- VTT Technical Research Centre of Finland
- Westport Innovations
- Whitemud Resources
- Wugang Canada Resources Invest. Ltd.
- Wurth Elektronik eiSos GmbH & Co. KG
- Wuzhong Instrument Company
- Xilinx Inc.
- Xiphos Technologies Inc.
- XOR-Labs Toronto
- Xstrata Nickel
- Zotefoams PLC

Figure 3.2e **NSERC Research Grant Funding by Program, 2006–2007 to 2015–2016**



	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16
Other Research Grants	$653,000	$781,400	$607,950	$462,319	$422,583	$162,000	$111,000	$40,000	$15,000	$67,000
Steacie Memorial Fellowships	$30,000			$30,000	$30,000			$60,000	$90,000	$60,000
Steacie Fellowship Research Supplements	$179,250			$187,500	$187,500			$250,000	$375,000	$250,000
Discovery Accelerator Supplements		$144,000	$264,000	$383,999	$464,000	$504,000	$720,000	$760,000	$760,000	$716,285
Research Tools & Instruments	$1,510,468	$1,150,928	$734,572	$1,477,018	$1,533,781		$3,043,030	$1,218,077	$1,750,224	$146,900
Collaborative Health Research Projects	$151,355	$311,245	$326,169	$378,774	$366,899	$696,536	$846,731	$1,064,880	$950,376	$1,270,103
CREATE Program Grants				$450,000	$900,000	$1,050,000	$1,096,000	$1,797,084	$1,969,779	$1,650,000
Discovery Grants	$7,121,674	$7,209,862	$7,262,441	$7,513,403	$7,360,703	$7,552,389	$7,577,942	$8,090,620	$8,381,417	$8,298,183
Total	**$9,645,747**	**$9,597,435**	**$9,195,132**	**$10,883,013**	**$11,265,466**	**$9,964,925**	**$13,394,703**	**$13,280,661**	**$14,291,796**	**$12,458,471**

Figure 3.3a Canadian Peer Universities vs. University of Toronto Share of NSERC Funding for Engineering Cumulative Five-Year Share, 2011–2012 to 2015–2016

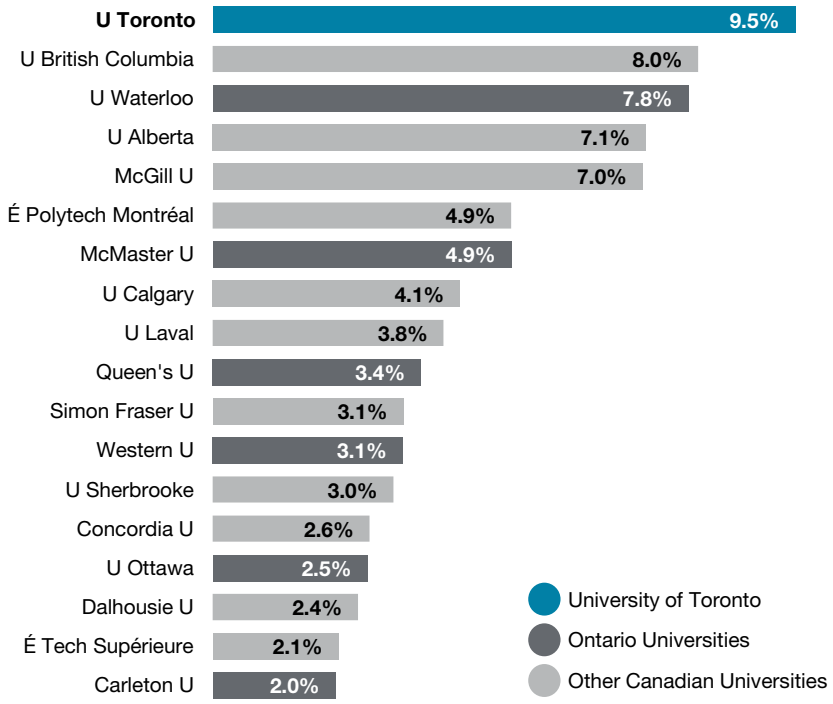


Figure 3.3b U of T Annual Share of NSERC Funding in Engineering, 2006–2007 to 2015–2016

2006–07	9.0%
2007–08	9.2%
2008–09	8.5%
2009–10	9.4%
2010–11	9.0%
2011–12	9.5%
2012–13	9.0%
2013–14	9.6%
2014–15	9.5%
2015–16	10.0%

Figure 3.4a Engineering Invention Disclosures by Academic Area, 2012–2013 to 2016–2017

	2012–13	2013–14	2014–15	2015–16	2016–17	5-Yr Total
UTIAS	1.0	1.0		1.0	0.3	**3.3**
IBBME	8.2	5.9	6.5	7.8	5.9	**34.3**
ChemE	12.4	10.3	9.0	7.0	13.2	**51.9**
CivE	1.8	5.0	5.0	5.0	1.7	**18.5**
ECE	38.1	16.5	41.6	23.5	35.4	**155.1**
EngSci	0.5	1.2		1.1	0.3	**3.1**
MIE	13.1	9.5	18.8	17.0	19.8	**78.2**
MSE	4.0	2.5	1.5	0.3	2.3	**10.6**
Annual Total	**79.1**	**51.9**	**82.4**	**62.7**	**78.9**	**355.0**
University Annual Total	**166.1**	**147.1**	**174.0**	**162.7**	**210.0**	**859.9**
Engineering Percentage	**48%**	**35%**	**47%**	**39%**	**38%**	**41%**

U of T Engineering researchers applied for 39 patents in 2016–2017, representing more than 68% of all patent applications across the entire University. Our Faculty also led the way in invention disclosures, accounting for 38% of those made at U of T in 2016–2017 and 43% of those made in the last five years. Within our Faculty, ECE accounted for more than 40% of invention disclosures in the last five years, and MIE accounted for 22%.

Note 3.3a and 3.3b: Data are from the NSERC advanced search website and are shown by NSERC's fiscal year (April to March).

Figure 3.4b **U of T Invention Disclosures by Faculty, 2016–2017**

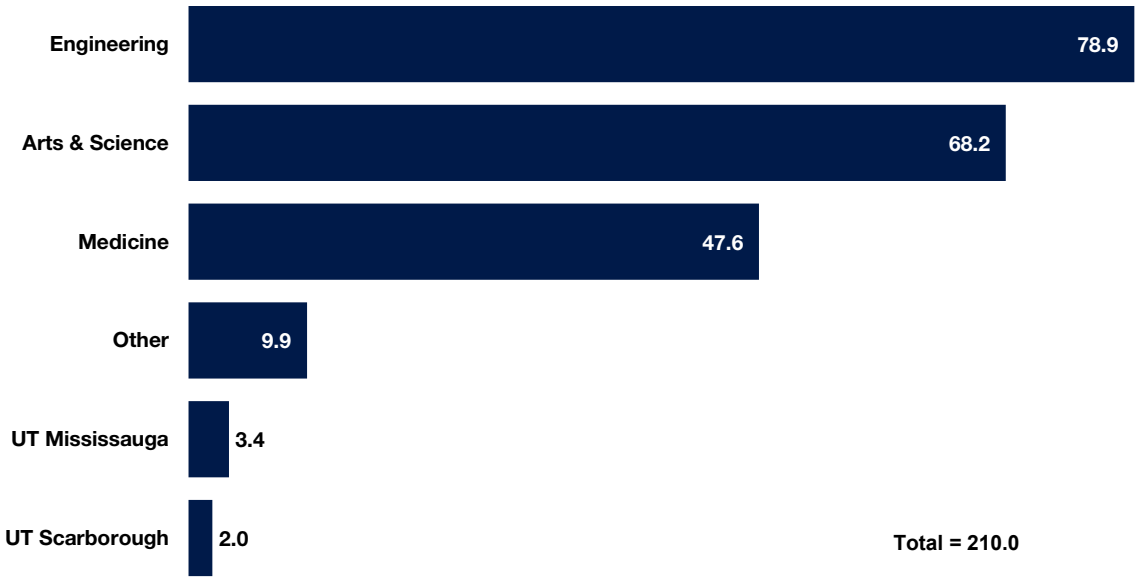


Figure 3.4c **U of T Patent Applications by Faculty, 2016–2017**

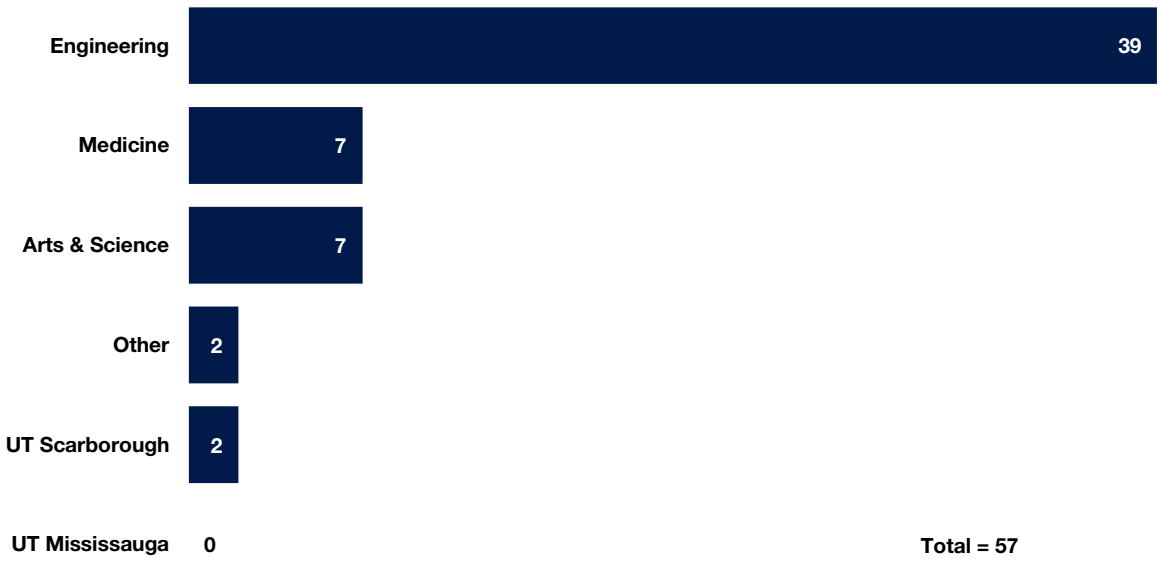
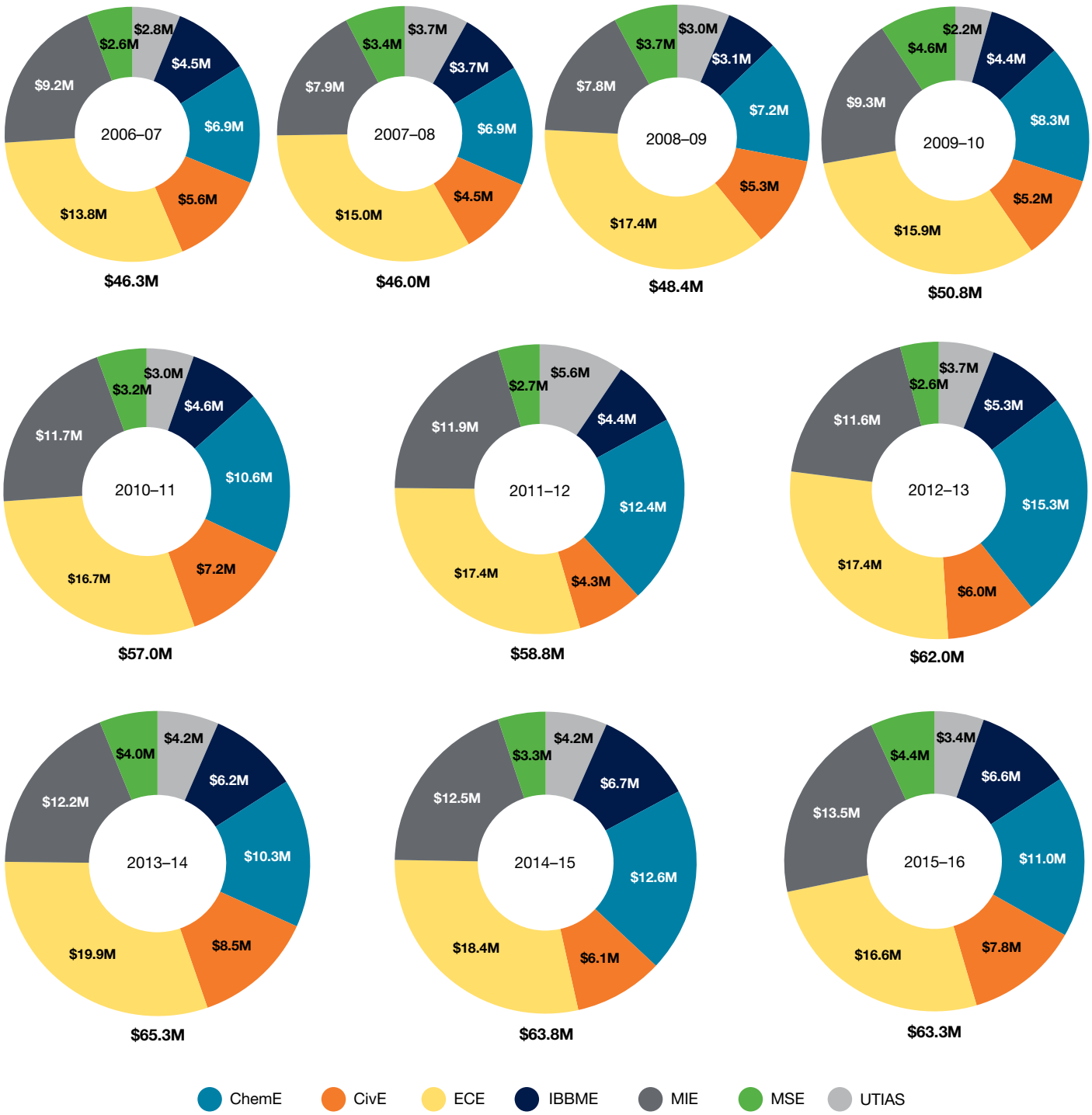


Figure 3.5 **Distribution of Research Operating Funding by Academic Area, 2006–2007 to 2015–2016**



Note 3.5: Totals include a small amount of additional funding not shown in the breakdown by academic areas. The research funding attributed to IBBME for 2015–16 represents 71% of the total funding received by core professors in the Institute. Because of IBBME's cross-disciplinary structure, many of its faculty have their research funding processed through the Medicine or Dentistry Faculties. The figure above shows only the funding that comes through U of T Engineering and is presented by grant year (April to March).

4

Cross-Faculty Education and Experiential Learning

U of T Engineering provides students with unparalleled opportunities to collaborate across disciplines, customize their degrees to suit their interests, and enrich their education through experiential learning. Our robust curricular and co-curricular programming — from certificates and minors to internship and entrepreneurship opportunities — enable students in all years to complement their technical knowledge with crucial competencies in engineering design, teamwork, leadership, entrepreneurship and communication. As a result, our graduates are versatile, creative and prepared to innovate and lead in the increasingly complex and challenging global economy.

Building meaningful professional experience is a key element of our students' engineering education and development. Our Professional Experience Year (PEY) internship program, the largest of its kind in Canada, enables undergraduates to apply their knowledge in the workplace, strengthening their professional networks while earning a competitive salary. In 2016–2017, a total of 734 students participated in PEY, 65 of them in placements outside of Canada.

Engineering students are at the heart of the University's thriving entrepreneurial ecosystem. The Entrepreneurship Hatchery, which will have a new home in the forthcoming Centre for Engineering Innovation & Entrepreneurship (CEIE), is a startup accelerator that pairs intensive mentorship opportunities with resources to help students and faculty take their ideas from concept to marketable product. It includes the Hatchery Nest summer program and the new Hatchery LaunchLab, which supports research-based startups led by graduate students and faculty.

As the world demands more dynamic and thoughtful creators, innovators and problem solvers capable of addressing the most complex global challenges, an education in leadership has never been more important. The Institute for Leadership Education in Engineering (ILead), which draws on expertise from several disciplines, including engineering, education, social science and business, enables our students to build confidence and key leadership competencies. In 2016–2017, ILead engaged more than 2,300 students through its suite of courses and co-curricular activities.

These cross-disciplinary, team-building and experiential-learning initiatives are woven throughout our academic programs, research and co-curricular activities. Together, these opportunities nurture the whole engineer, enabling our students to become the engineering leaders and innovators of tomorrow.

Undergraduate Engineering Minors and Certificates, Complementary Courses and Inter-Divisional Collaboration

Our minors and certificates — from Robotics & Mechatronics to Engineering Leadership — enable undergraduate students from any discipline to collaborate with each other based on shared goals and interests, and to hone their technical and professional competencies in their chosen areas of focus. Students must complete six half-courses to earn a minor, and three half-courses for a certificate. Engineering students may also complete minors through the Faculty of Arts & Science in areas such as economics, math, sociology, philosophy, history and music. For the second year in a row, more than half of the 2017 undergraduate graduating class completed at least one minor or certificate, and 34% completed an Engineering Business minor or certificate.

In 2016–2017, we offered the following minors and certificates:

Minors

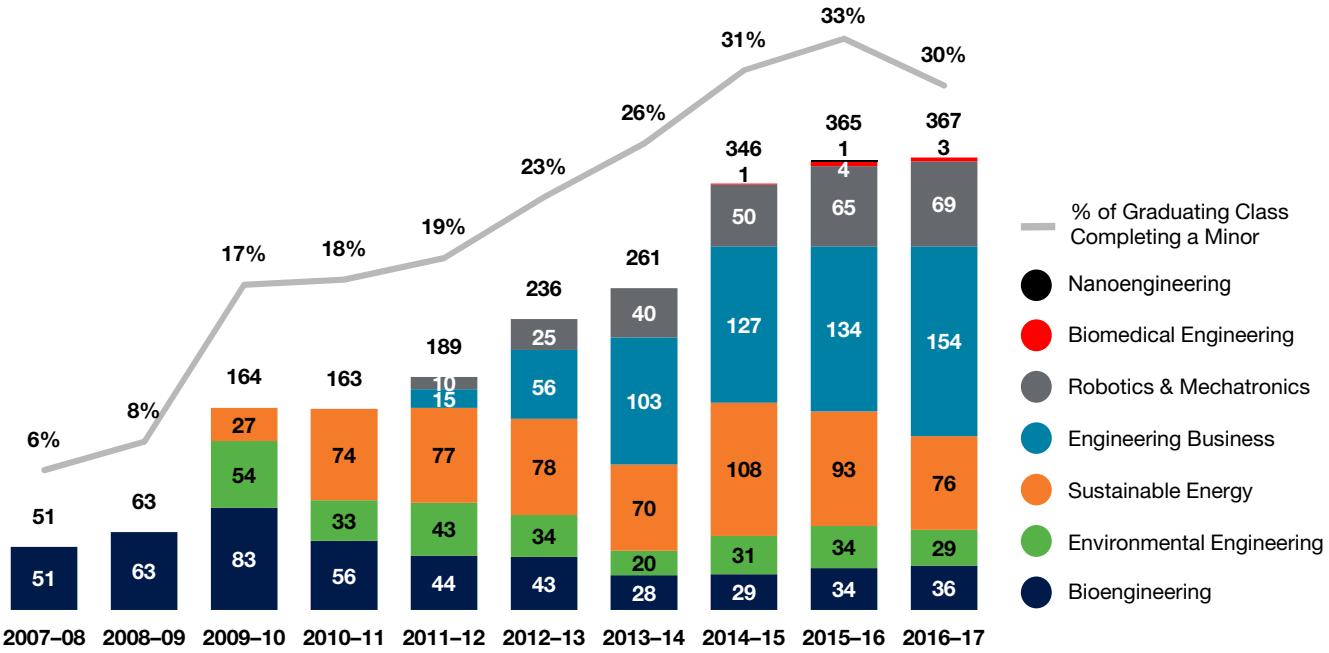
- Bioengineering
- Biomedical Engineering
- Engineering Business
- Environmental Engineering
- Nanoengineering
- Robotics & Mechatronics
- Sustainable Energy

Certificates

- Communication
- Engineering Business
- Engineering Leadership
- Entrepreneurship, Innovation & Small Business
- Global Engineering
- Mineral Resources
- Nuclear Engineering
- Renewable Resources Engineering

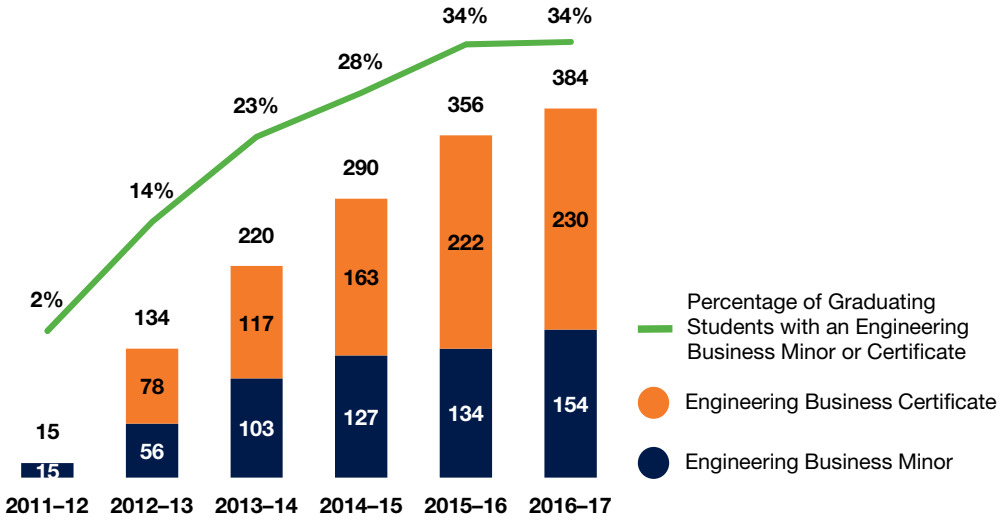
In 2017–2018, we will broaden our offerings by launching a new minor in Advanced Manufacturing and a new certificate in Forensic Engineering.

Figure 4.1a **Number of Students and Percentage of Graduating Class Completing an Engineering Minor, 2007–2008 to 2016–2017**



Data and highlights in this chapter are presented for the period from August 2016 to July 2017.

Figure 4.1b **Students Graduating with an Engineering Business Minor or Certificate, 2011–2012 to 2016–2017**



Undergraduate Design and Research

We embed engineering design throughout our undergraduate curriculum, enabling students in all years to work with external partners on developing solutions for practical challenges, as well as building and testing prototypes and developing competencies in teamwork, leadership and effective communication.

All first-year students take engineering design courses: Praxis I and II are for students in Engineering Science, while Engineering Strategies and Practice I and II are for students in our TrackOne and core programs.

In 2016–2017, Praxis students were challenged to improve daily life in communities around the Greater Toronto Area. Designs presented at the Praxis showcase in April 2017 included:

- an adaptive seat for sailboats (in conjunction with the Disabled Sailing Association of Ontario);
- an innovative wheelchair to reduce pressure sores (in conjunction with Kensington Gardens Residential Home); and
- diagnostic methods for a rare form of infant epilepsy (in conjunction with U of T's Faculty of Medicine).

In their final year, all engineering undergraduate students undertake design challenges as part of their capstone courses. Students may take discipline-specific capstone courses, or enrol in APS490 Multidisciplinary Capstone Design Project (MCP) through the University of Toronto Institute for Multidisciplinary Design & Innovation (UT-IMDI). In just four years since MCP's inception, more than 350 students from across the Faculty have collaborated on 78 projects for 38 industry clients.

In 2016–2017, 24 student teams worked with industry clients such as Bombardier Aerospace, Defence Research & Development Canada, Drone Delivery Canada, Guycan Ltd., NASA Ames Research Center, Pratt & Whitney Canada, the Royal Bank of Canada and United Steelworkers. Projects presented at the annual MCP Showcase in March 2017 included:

- a UAV compartment for automated payload deployment;
- a web-based physiological monitoring system for soldiers in the field;
- a modular solar-powered water filtration system;
- ergonomic seating for sub-orbital microgravity flight;
- a carbon dioxide-based self-sustaining chemical production process for a Mars space mission;
- a mobile wave farm for enhanced power generation.

The Innovation, Hammers & Nails program connects students at the Institute of Biomaterials & Biomedical Engineering (IBBME) with clinicians, nurses, staff and fellows to design engineering solutions to challenges identified by experts at the Hospital for Sick Children. This initiative is available to undergraduate and graduate students through a range of courses and degree programs, including the BME498 Biomedical Systems Engineering Design course and the MHSc clinical internship. In 2016–2017, a total of 26 students and six IBBME faculty and SickKids researchers were involved in six BME498 projects, including developing wireless electrodes to enable intraoperative neuromonitoring, and designing an expandable trocar device to enable instruments to be more easily inserted during keyhole surgeries.

Undergraduates across all years have rich opportunities to engage in research that advances the frontiers of engineering, both within the Faculty and around the world. Through the Engineering Science Research Opportunities Program (ESROP), first- and second-year Engineering Science students work with faculty members each summer on research-based collaborations. In August 2016, undergraduates across all programs presented their summer research findings at the Undergraduate Engineering Research Day (UnERD). This annual event featured 116 poster and podium presentations on topics such as biocompatible polymers that can be used to 3D-print scaffolds for lab-grown human tissues, improving chemical constructs that act as contrast agents for magnetic resonance imaging (MRI) scans, and new systems to efficiently grow large quantities of microalgae that could be used as food supplements or converted into fuel.

U of T Engineering students also have opportunities to conduct research abroad through programs administered by the Division of Engineering Science and U of T's Centre for International Experience. Partner institutions include the National University of Singapore, Hong Kong University of Science & Technology and University of Stuttgart.

Figure 4.2a **Undergraduate Participation in Summer Research Opportunities, 2010 to 2017**

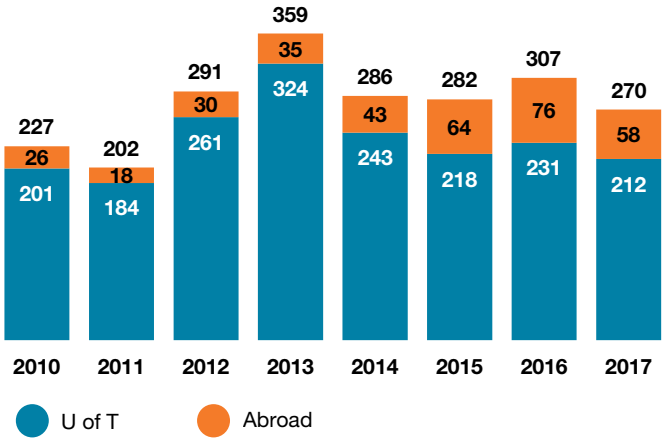


Figure 4.2b **Undergraduate Participation in Summer Research Opportunities, by Academic Area, 2017**

Research Participation:	U of T	Abroad	Total
ChemE	17	9	26
CivE & MinE	24	2	26
ECE	32	1	33
EngSci	90	32	122
MIE	30	13	43
MSE	15	1	16
Other	4	0	4
Total	212	58	270

Engineering Leadership

ILead prepares students to maximize their impact as engineers, innovators and leaders by providing transformative curricular and co-curricular learning opportunities that develop competencies for success. ILead also conducts academic and industry-focused research and outreach to engineering leadership educators and engineering-intensive enterprises.

In fall 2016, ILead hosted the inaugural meeting of the National Initiative on Capacity Building and Knowledge Creation for Engineering Leaders (NICKEL). The first-of-its-kind conference on engineering leadership education was attended by close to 40 professors and instructors from engineering schools across Canada, as well as representatives from industry and Engineers Canada.

ILead offered five undergraduate and seven graduate courses in 2016–2017, in areas ranging from leadership in project management to positive psychology for engineers to the science of emotional intelligence. New graduate courses in 2016–2017 included APS1029 The Science of Emotional Intelligence and its Applications, and APS1030 Engineering Careers: Theories and Strategies to Manage Your Career for the Future. As part of the Faculty's strategy to broaden students' competencies and prepare them for leadership, ILead will launch a complementary studies course, APS447 The Art of Ethical and Equitable Decision-Making, in winter 2018.

MEng students can count these courses toward the Entrepreneurship, Leadership, Innovation & Technology (ELITE) certificate, while undergraduate students can earn credits toward the Minor in Engineering Business or the Certificate in Engineering Leadership. Demand for these courses was strong: overall enrolment reached 477 students and many courses had significant waiting lists.

ILead also actively partners with faculty to offer team-based learning and leadership curriculum in numerous courses. In 2016–2017, ILead integrated 21 lectures and workshops into courses across the Faculty, including:

- APS490 Multidisciplinary Capstone Design Project;
- MIE350 Design and Analysis of Information;
- APS111 Engineering Strategies and Practice 1;
- ASP100 Orientation to Engineering;
- CHE230 Environmental Chemistry;
- MIE191 Mechanical and Industrial Engineering Seminar;
- MIE315 Design for the Environment.

Engineering students also have opportunities to hone their leadership competencies through ILead's innovative co-curricular programs:

- **Leadership Labs** are highly experiential workshops ranging from evening sessions on project management, team conflict, public speaking, team culture, emotional intelligence and feedback to full-day labs on teamwork development and workplace readiness. In 2016–2017, ILead offered 24 co-curricular labs that reached 734 students, and also delivered 17 labs as part of core courses that reached 2,369 students. Students who attend four Leadership Labs are eligible for recognition on their Co-Curricular Records. These labs also provided work experience for five students who were trained as co-facilitators.
- **The Game** is a year-long cohort program that challenges student teams to hone their leadership competencies by developing solutions to large-scale social problems. The program, which begins in September and culminates in a project showcase in March, attracted seven teams in 2016–2017. The areas of focus this year included reducing residential electricity usage, improving recycling behaviours at U of T, navigating mental health services on campus for ESL students, reimagining educational supports for underrepresented communities in Toronto, and improving bicycle safety.
- The **ILead Summer Fellowship** is a 16-week program for highly engaged engineering students who want to increase the impact of their student organization and their leadership competencies. The program includes strategies for organizational development, peer learning and individual coaching. ILead had 11 summer fellows in 2016.
- In summer 2016, ILead launched the Faculty-wide **Summer Leadership Program**. The eight-week course provided the initial cohort of 53 summer research students with opportunities to better understand their strengths and values, gain new perspectives on engineering and its impact on society, and be part of a vibrant and diverse community.
- In spring 2017, ILead offered a series of **PhD Career Development Workshops** to support engineering PhD candidates and post-docs with career aspirations outside of academia. A full pilot program will launch in fall 2017.

Student Entrepreneurship

U of T Engineering is committed to providing rich curricular and co-curricular opportunities for students to develop the technical and entrepreneurial competencies they need to bring their ideas to the marketplace.

Curricular Programs

Undergraduate students can complement their technical studies with our popular Engineering Business Minor or Certificate, or a Certificate in Entrepreneurship, Innovation & Small Business. Courses in the ELITE emphasis prepare MEng students to lead in business and entrepreneurial activities.

The Entrepreneurship Hatchery

One of two in-house accelerators, The Entrepreneurship Hatchery, which will have a new home in the CEIE, provides mentoring, networking, and financial and other resources to enable our students to develop and launch businesses. Established in 2012, the Hatchery nurtures a culture of entrepreneurship within the U of T community through a comprehensive suite of programs and services, including weekly Idea Markets, the Hatchery Speaker Series, Accelerator Weekend and the Hatchery Hackathon.

Hatchery Nest

Student teams inspired to launch their own startups can apply to the Hatchery Nest, a rigorous summer program that offers access to funds, 3D printers and fabrication facilities, lab space and the opportunity to engage with an experienced mentor. In 2016, the Hatchery Nest received 137 applications and accepted 52 teams, 14 of which competed at the Hatchery Demo Day in September, where they pitched their startups to investors and the U of T community. The Hatchery Nest has launched 55 startups since it began five years ago.

Hatchery LaunchLab

Established in fall 2016, the Hatchery LaunchLab provides support for graduate student and faculty-led research-based startups. Teams benefit from enriched support, including legal counsel, accounting and marketing services, an advisory board comprised of experts in technical and business development, as well as mentors with experience in the industries in which the startups hope to compete and funding for an extended incubation period of one to two years. The goal is to enable these teams to sustain themselves while they complete the steps necessary to provide proof-of-concept for their technology and attract investment from venture capitalists. Ten teams applied to Hatchery LaunchLab's initial cohort and three were accepted:

- **Aurorem** — Provides lighting solutions that mimic the spectrum of natural sunlight, with the goal of improving the physical and mental health of people who work indoors.
- **Trexo Robotics** — Builds robotic exoskeletons that could be used to ease physiotherapy treatment for children with cerebral palsy or other physical disabilities.
- **SensOR** — Aims to help surgeons gain greater control over tools that are remotely or robotically operated. The company has created a thin film that easily wraps around any surgical instrument and translates physical force into data that can be easily visualized.

Start@UTIAS

Start@UTIAS, the second Faculty accelerator, was established in 2014 with a $1-million donation from entrepreneur Francis Shen (EngSci 8T1, UTIAS MASc 8T3). It provides UTIAS graduate students with mentoring, networking, seed funding and other resources to translate the knowledge and competencies they have gained through their education into successful startups.

Professional Experience

U of T Engineering's internship programs enable undergraduate students to enhance their technical and professional competencies and gain valuable work experience before they graduate.

The Professional Experience Year (PEY) program is the largest optional paid internship of its kind in Canada and a key part of our Faculty's commitment to experiential learning. It enables undergraduates who have completed their second or third year of study to enhance their technical competencies, build meaningful work experience and strengthen their professional networks. PEY students immerse themselves in engineering practice with companies ranging from startups to major multinational corporations. During this period, which lasts 12 to 16 months, they are full-time employees, with a competitive salary. PEY internships allow students to gain greater insights into workplace operations and make larger contributions than in the shorter co-op placements that many engineering schools offer.

In 2016–2017, 734 undergraduates — including 66% of students from the previous year's third-year class — participated in the PEY program. Sixty-five students secured international placements, and more than 325 employers hired PEY students, ranging from startups such as EventMobi to large multinational corporations such as Apple, Deloitte, IBM and Tesla Motors. The average annual salary for engineering PEY students in 2016-17 was $47,000, with individual salaries ranging as high as $88,000.

Students may also choose to participate in the Engineering Summer Internship Program (eSIP), a paid, four-month summer internship that is open to second- and third-year U of T Engineering undergraduates. Similar to a traditional co-op placement, the program provides students with work experience and prepares them to be competitive for future opportunities, including the PEY internship program.

To enhance student success in the recruitment process, eSIP offers intensive and interactive development through a series of large- and small-group workshops and individual career counselling appointments. In summer 2016, 30 students secured eSIP opportunities with employers such as the Toronto Transit Commission, Geomechanica Inc., Amphenol Canada Corp., BlueCat and Temporal Power Ltd.

The Engineering Career Centre (ECC) provides services to all students throughout the academic year to help them prepare applications, succeed in job interviews and make a positive impact in the workplace. The ECC is currently reinvigorating and strengthening its programming through initiatives, partnerships and stakeholder engagement. In 2016, we appointed a new Academic Director to oversee this transformation. A new Executive Director is expected to join the ECC in the coming year.

Figure 4.3a **PEY Internship Placements for Engineering Undergraduates with Percentage Participation from Previous Third-Year Class, 2007–2008 to 2016–2017**

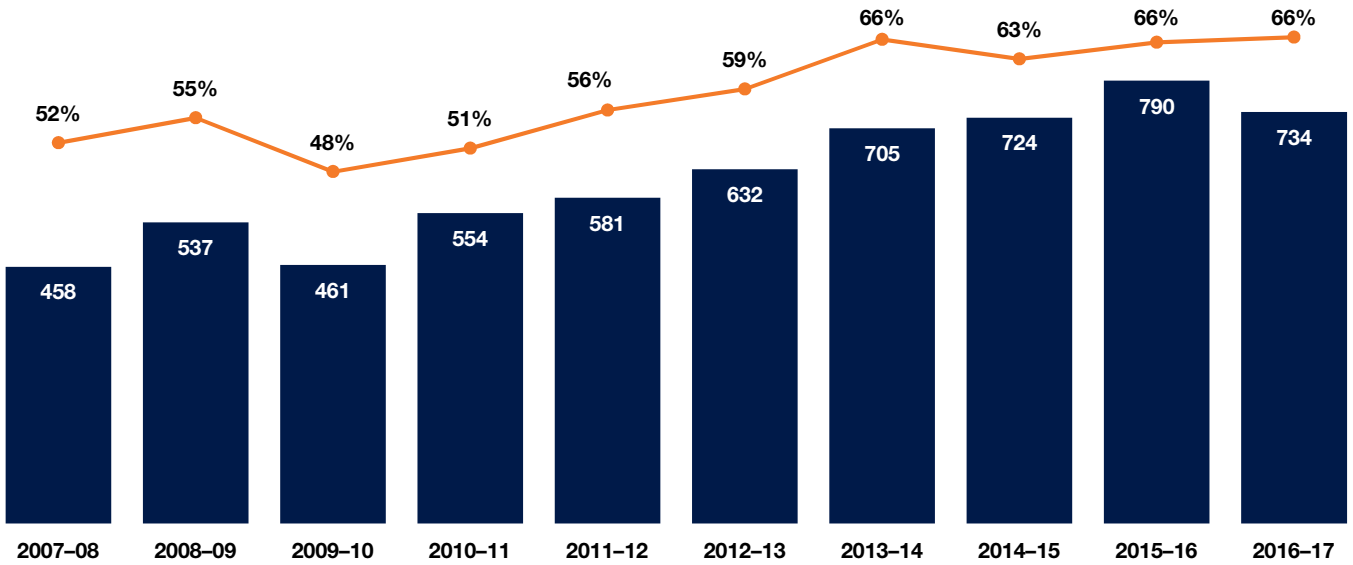


Figure 4.3b **Canadian and International PEY Internship Placements for Engineering Undergraduates, 2007–2008 to 2016–2017**

	Canadian Placements	U.S. Placements	Other International Placements	Total PEY Placements
2007–08	427	23	8	**458**
2008–09	490	31	16	**537**
2009–10	426	24	11	**461**
2010–11	530	11	13	**554**
2011–12	547	26	8	**581**
2012–13	592	24	16	**632**
2013–14	644	36	25	**705**
2014–15	663	42	19	**724**
2015–16	711	50	29	**790**
2016–17	669	49	16	**734**

Figure 4.3c **PEY Employers, 2008–2009 to 2016–2017**

	PEY Employers who Hired Engineering Students
2008–09	193
2009–10	158
2010–11	185
2011–12	221
2012–13	241
2013–14	304
2014–15	317
2015–16	310
2016–17	337

Engineering Communication

The Engineering Communication Program (ECP) is a hub for teaching, research and professional communication in engineering best practices. It provides support to all students, enabling them to develop professional communication competencies. ECP programming is integrated into courses across the curriculum from first to fourth year, and also includes writing and communication workshops and one-to-one tutoring. In 2016–2017, 868 students received communication support through the tutoring service, an increase of 4% from the previous year. The ECP also coordinates the undergraduate Certificate in Communication, which launched in 2015–2016. The certificate leverages the suite of humanities and social sciences electives that have been offered by ECP faculty since 2008.

The ECP engages five teaching-stream faculty members, 21 sessional lecturers and writing instructors, and 11 teaching assistants in its programming. It also supports two internship programs that are specifically designed to enable undergraduate students to develop the competencies and experience they need for the workplace: PEY and eSIP.

The ECP continues to develop our Professional Language Support for multilingual students. In 2016–17, we piloted the Diagnostic English Language Needs Assessment for all incoming first-year students to enable us to better understand their language challenges and provide additional workshops and tutoring.

Student Clubs and Teams

Our students nurture their passions and interests through close to 100 U of T Engineering student clubs and teams, ranging from the Skule™ Arts Festival to the Blue Sky Solar Racing team, as well as hundreds of student activities across U of T. Students can document these activities in the U of T Co-Curricular Record (CCR), an official document that recognizes competencies gained through athletic teams, student government, cultural clubs, design teams and other campus organizations. In 2016–2017, 70 new positions were recognized by the CCR.

In 2016–2017, 100 undergraduate and graduate engineering student initiatives received $360,174 through the Engineering Centralized Process for Student Initiative Funding, an increase of $110,908 over the previous year. *(Please see Appendix B for a full list of student clubs and teams.)*

5

U of T Engineering faculty members, staff and alumni continue to earn widespread recognition for their outstanding achievements in research, teaching, professional endeavours and community service.

Our professors have been recognized for the excellence of their research and their teaching, and once again, we outperformed all other Canadian engineering schools in 2016–2017. While U of T Engineering is home to less than 6% of the engineering faculty in Canada, we received more than 24% of major national and international awards won by engineering professors nationwide — more than three times as many as any other engineering school in the country.

Our reputation for attracting the most talented engineering scholars is reflected in the many major international and national awards earned by our early-career researchers and educators. Professor Angela Schoellig (UTIAS) received a prestigious Sloan Research Fellowship, the second year in a row a faculty member has received this award, while Professor Amy Bilton (MIE) garnered the Engineers Canada Young Engineer Achievement Award.

Other U of T Engineering faculty members continue to distinguish themselves by receiving top national and international honours. Dean Cristina Amon received the Sir John Kennedy Medal, the highest honour bestowed by the Engineering Institute of Canada. Professor Molly Shoichet (ChemE, IBBME) received the Killam Prize in Engineering, the second consecutive year a U of T engineer received this award.

Our faculty members were widely recognized for their contributions to education. Professor Greg Evans (ChemE) was the recipient of the 3M Teaching Fellowship, Canada's most prestigious award for teaching. Professor Dawn Kilkenny (IBBME) received the U of T Early Career Teaching Award and the Wighton Fellowship, a national award for excellence in laboratory teaching, and Professor Jonathan Rose (ECE) garnered the President's Teaching Award from U of T and the OCUFA Teaching Award from the Ontario Confederation of University Faculty Associations.

Staff members in several departments garnered University recognitions such as the Excellence Through Innovation Award and the True Blue Award, and were honoured at the national and international level for outstanding achievements in communication and outreach.

Measuring Excellence

In 2016, U of T Engineering faculty members were recognized with 22 major awards and honours for excellence in research and teaching, and contributions to the engineering profession. Nineteen of those awards were from prestigious national and international engineering bodies, more than three times as many as any other Canadian engineering school and more than the next three schools combined. That figure represented 24.4% of all national and international awards received by engineering professors across Canada, even though our faculty members comprise only 5.7% of engineering faculty members nationally.

Figure 5.1 Summary of Major International, National and Provincial Awards and Honours, 2007 to 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
International										
AAAS Fellowships (Engineering Section)	2	4	4	6	5	3			1	4
MIT Top 35 Under 35		1				1				
U.S. National Academies*				1	1			1		1
National										
Brockhouse Prize										1
Canadian Academy of Engineering Fellowship	1	3	9	8	1	7	6	3	5	5
Engineering Institute of Canada Fellowship	2	3	4	3	3	3	3	3	2	3
Engineering Institute of Canada Awards				1	2	1	2		1	1
Engineers Canada Awards			1	3		1	1	1	1	
Killam Research Fellowship*		2		2						
Killam Prize*		1						1		1
Manning Innovation Award								1		
Royal Society of Canada Fellowship*	1	1	1	2	4	3		2	2	1
Royal Society of Canada College of New Scholars, Artists and Scientists								1	1	1
Steacie Fellowship*			1			2	1	1	1	1
Steacie Prize*						1				
Synergy Award for Innovation			1			1				
Provincial										
Ontario Professional Engineers Awards		3	4	4	5	3	2	2	1	2
OCUFA Teaching Award				1					1	1
Total	**6**	**18**	**25**	**31**	**21**	**26**	**15**	**16**	**16**	**22**

Data in this chapter are presented for the 2016 calendar year (January to December). Selected faculty, alumni and staff awards were received between summer 2016 and summer 2017.

Note 5.1: (*) denotes U of T performance indicator. Data shown are by calendar year (January to December) and include faculty award recipients only. Please see Appendix G to read descriptions of the listed awards and honours.

Figure 5.2a **Number of Major National and International Awards Received by U of T Engineering Compared to Other Canadian Engineering Faculties, 2016**

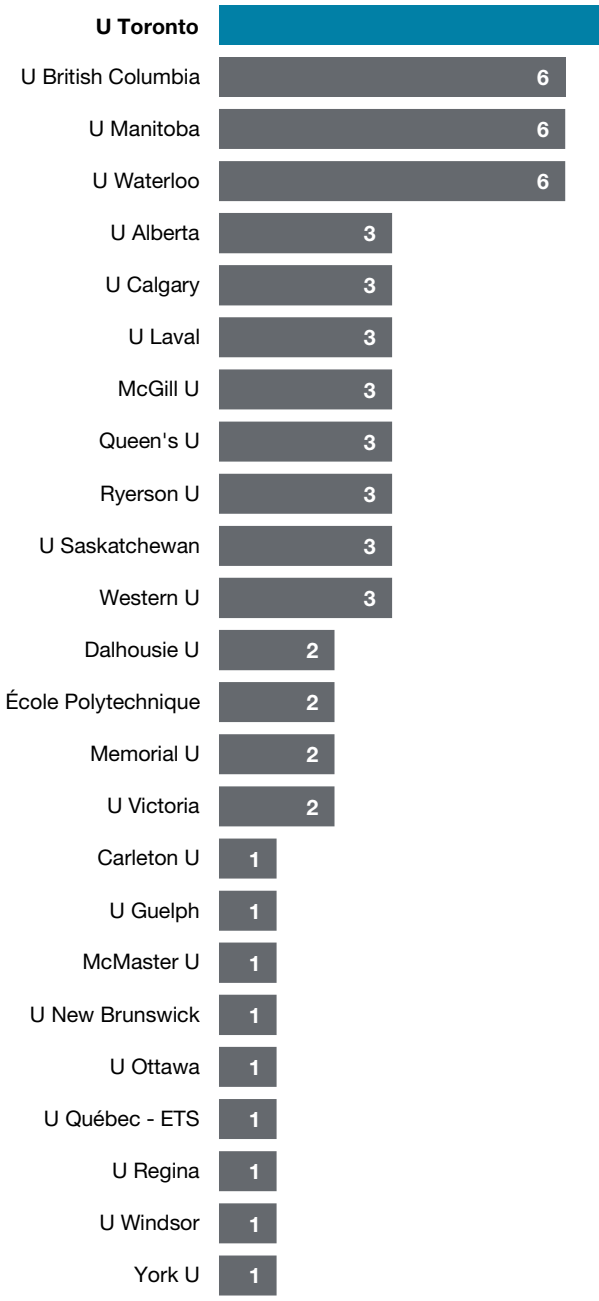
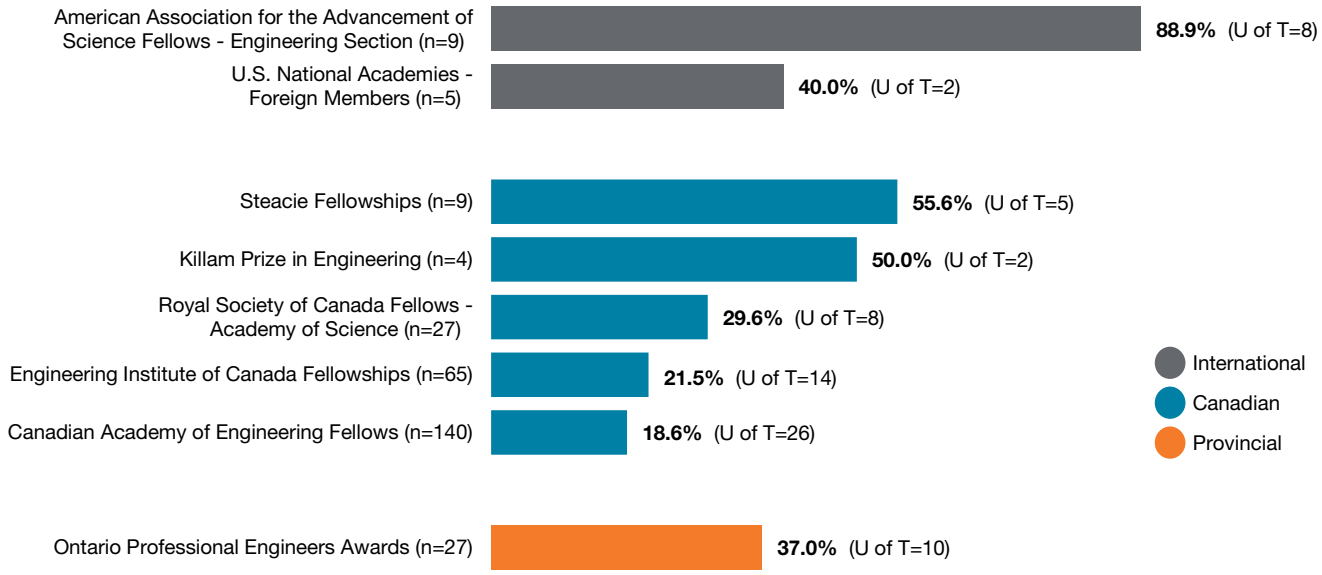


Figure 5.2b **Percentage of Total Canadian Engineering Faculty Members and Percentage of Major Awards Received by Canadian Engineering Faculties, 2016**

	Percent of Total FTE Engineering Faculty in Canada	Percent of Total Major Awards Received by Engineering Faculties
U Toronto	5.7%	24.4%
U British Columbia	4.3%	7.7%
U Manitoba	1.9%	7.7%
U Waterloo	6.7%	7.7%
U Alberta	4.5%	3.8%
U Calgary	3.6%	3.8%
U Laval	3.8%	3.8%
McGill U	3.3%	3.8%
Queen's U	3.0%	3.8%
Ryerson U	3.7%	3.8%
U Saskatchewan	2.0%	3.8%
Western U	2.2%	3.8%
Dalhousie U	2.2%	2.6%
École Polytechnique	5.9%	2.6%
Memorial U	1.8%	2.6%
U Victoria	1.4%	2.6%
Carleton U	3.7%	1.3%
U Guelph	1.2%	1.3%
McMaster U	3.5%	1.3%
U New Brunswick	1.5%	1.3%
U Ottawa	2.9%	1.3%
U Québec – ETS	8.7%	1.3%
U Regina	1.1%	1.3%
U Windsor	1.6%	1.3%
York U	1.3%	1.3%

Note 5.2a, b: Data shown are by calendar year (January to December) and include faculty award recipients only. The following major awards are included: International — American Association for the Advancement of Science Fellowship (Engineering Section), MIT Top 35 under 35, U.S. National Academies; National — Alan Blizzard Award, Brookhouse Prize, Canadian Academy of Engineering Fellowship, Engineering Institute of Canada Awards, Engineering Institute of Canada Fellowship, Engineers Canada Awards, Killam Prize (Engineering), Killam Research Fellowship, Manning Innovation Award, Royal Society of Canada Fellowship (Engineering/Physical Sciences), Royal Society of Canada College of New Scholars, Artists and Scientists, Steacie Fellowship, Steacie Prize and Synergy Awards for Innovation.

Figure 5.3 **Number of Awards Received by U of T Engineering Faculty Compared to Other Canadian Engineering Faculties, 2012 to 2016**



Selected Awards Received by Faculty Members and Alumni

The following is a selected list of awards U of T Engineering professors and alumni received between summer 2016 and summer 2017.

INTERNATIONAL

American Association for the Advancement of Science: *Fellow*
Kamran Behdinan (MIE)
Zheng-Hong Lu (MSE)
Jeffrey Packer (CivE)
Yu Sun (MIE)

American Concrete Institute: *Joe W. Kelly Award*
Frank Vecchio (CivE)

American Society of Mechanical Engineers: *Honorary Member*
Cristina Amon (MIE)

Engineering Conferences International: *Scale-Up and Manufacturing of Cell-Based Therapies Award*
Peter Zandstra (IBBME)

Institute of Electrical and Electronics Engineers: *Fellow*
Ravi Adve (ECE)
Sorin Voinigescu (ECE)

Institute of Electrical and Electronics Engineers Information Theory Society: *Aaron D. Wyner Distinguished Service Award*
Frank Kschischang (ECE)

Institute of Materials, Minerals and Mining (U.K.): *Fellow*
Paul Young (CivE)

Sloan Foundation: *Sloan Research Fellowship*
Angela Schoellig (UTIAS)

SPIE (The International Society for Optical Engineering): *Fellow*
Peter Herman (ECE)
Hani Naguib (MIE, MSE)

Technical Association of the Pulp and Paper Industry: *Gunnar Nicholson Gold Medal Award*
Honghi Tran (ChemE)

Technical University of Munich: *TUM Ambassador*
Frank Kschischang (ECE)

Tissue Engineering & Regenerative Medicine International Society: *Lifetime Achievement Award*
Michael Sefton (ChemE, IBBME)

Note 5.3: Data shown are by calendar year (January to December) and include faculty award recipients only.

NATIONAL

Canada Council for the Arts: *Killam Prize in Engineering*
Molly Shoichet (ChemE, IBBME)

Canadian Academy of Engineering: *Fellow*
Nazir Kherani (MSE, ECE)
Deepa Kundur (ECE)
Milica Radisic (IBBME, ChemE)
Murray Thomson (MIE)
Honghi Tran (ChemE)

Canadian Society for Civil Engineering: *Albert E. Berry Medal*
Heather MacLean (CivE)

Canadian Society for Civil Engineering: *Camille A. Dagenais Award*
Bryan Karney (CivE)

Canadian Society for Civil Engineering: *Fellow*
Brent Sleep (CivE)

Canadian Society for Mechanical Engineering: *Fellow*
Nasser Ashgriz (MIE)

Canadian Society for Mechanical Engineering: *Robert W. Angus Medal*
Kamran Behdinan (MIE)

Chemical Institute of Canada/Society for Chemical Industry: *Kalev Pugi Award*
Molly Shoichet (ChemE, IBBME)

Engineering Institute of Canada: *John B. Stirling Medal*
Jean Zu (MIE)

Engineering Institute of Canada: *Sir John Kennedy Medal*
Cristina Amon (MIE)

Engineers Canada: *Fellow*
Levente Diosady (ChemE)

Engineers Canada: *Young Engineer Achievement Award*
Amy Bilton (MIE)

Metallurgy and Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum: *Brimacombe Award*
Kinnor Chattopadhyay (MSE)

Metallurgy and Materials Society of the Canadian Institute of Mining, Metallurgy and Petroleum: *Environmental Award*
Charles Jia (ChemE)

March of Dimes Canada: *Jonas Salk Pioneer Award*
Tom Chau (IBBME)

Office of the Governor General: *Governor General's Innovation Award*
Paul Santerre (IBBME)

Royal Society of Canada: *Fellow*
Javad Mostaghimi (MIE)

Royal Society of Canada College of New Scholars, Artists & Scientists: *Member*
Hani Naguib (MIE, MSE)

Sandford Fleming Foundation: *Wighton Fellowship*
Dawn Kilkenny (IBBME)

Society for Teaching and Learning in Higher Education: *3M National Teaching Fellow*
Greg Evans (ChemE)

Stem Cell Network: *Till & McCulloch Award*
Molly Shoichet (ChemE, IBBME)

PROVINCIAL

Ontario Confederation of University Faculty Associations: *OCUFA Teaching Award*
Jonathan Rose (ECE)

Ontario Professional Engineers Awards: *Engineering Excellence Medal*
Vaughn Betz (ECE)

Ontario Professional Engineers Awards: *Research and Development Medal*
Stewart Aitchison (ECE)

University of Toronto

Distinguished Professor of Nanobioengineering
Warren Chan (IBBME)

Early Career Teaching Award
Dawn Kilkenny (IBBME)

Faculty Award
Elizabeth Edwards (ChemE)

Northrop Frye Award
Craig Simmons (MIE, IBBME)

Selected Awards Received by Staff, April 2016 to April 2017

INTERNATIONAL

Graduway Award for Most Creative Marketing Campaign
U of T Engineering CONNECT

International Association of Business Communicators (IABC) Gold Quill Award of Merit, *#DisplayYourPride Campaign*
Engineering Strategic Communications

NATIONAL

Actua Make Friends with Science Award
Engineering Outreach Office

Canadian Council for the Advancement of Education (CCAE) Prix d'Excellence, *CElExSKAM Graffiti Mural*
Engineering Strategic Communications

CCAE Prix d'Excellence, *Innovate U*
Engineering Strategic Communications, Engineering Outreach

Council for Advancement and Support of Education (CASE) District II Gold Award, *CElExSKAM Graffiti Mural*
Engineering Strategic Communications

CASE District II Gold Award, *Welcome to Skule Microsite*
Engineering Strategic Communications,
Engineering Recruitment

RGD In-house Award, *CElExSKAM Graffiti Mural*
Engineering Strategic Communications

TORONTO

International Association of Business Communicators (IABC) Ovation Award, *Skulematters*
Engineering Strategic Communications,
Engineering Advancement

IABC Ovation Award, *Welcome to Skule Microsite*
Engineering Strategic Communications,
Engineering Recruitment

U OF T

Excellence Through Innovation Award
Annie Simpson (ILead)

True Blue Award
Sharon Brown (Cross-Disciplinary Programs Office)
Pierina Filippone (Office of the Registrar)
Phuong Huynh (First Year Office)
David F. James (MIE)

University of Toronto Engineering Faculty Awards

Each year, U of T Engineering recognizes the excellence of our staff and faculty through a number of awards for research, teaching, leadership and dedication to improving the student experience.

Agnes Kaneko Citizenship Award

Presented to a staff member who has served with distinction and made contributions to the Faculty's mission above and beyond their job description over a long period of time. This award was established in memory of a dedicated Civil Engineering staff member.

2016–17: Joan DaCosta (UTIAS)
2015–16: Matthew Chow (ECE)
2014–15: Belinda Li (ECE)
2013–14: Oscar del Rio (MIE)

Harpreet Dhariwal Emerging Leader Award

Presented to a staff member who leads by example in their dedication to the Faculty's mission. Recipients are held in high regard by colleagues and demonstrate potential to assume more senior leadership roles within the Faculty. This award was renamed in memory of an esteemed staff member who received this honour in 2011–2012.

2016–17: Andrey Shukalyuk (IBBME)
2015–16: Bruno Korst (ECE)
2014–15: Kelly Hayward (ECE)
2013–14: Luke Ng (MSE)

Innovation Award

Presented to staff who, individually or as a team, address a problem creatively by developing a new technology or making significant improvements to an existing system or method.

2016–17: Pauline Martini (ChemE)
2015–16: Roberta Baker, Raymond Cheah, Shilpa Gantotti and Catherine Riddell (Engineering Strategic Communications)
2014–15: Darlene Gorzo, Jaro Pristupa and Joe Wong (ECE)
2013–14: Tomas Bernreiter (MIE)

Quality of Student Experience Award

Presented to a staff member who has made significant improvements to the quality of student experience.

2016–17: Cori Hanson (Office of the Registrar)
Endang (Susie) Susilawati (ChemE)
2015–16: Carla Baptista (MIE)
2014–15: Mike Mehramiz (ECE)
2013–14: Susan Grant (ECE)

Research Leader Award

Presented to a faculty member or team who has shown leadership in innovative, interdisciplinary and/or collaborative research initiatives that has enhanced the Faculty's research profile within the broader community.

2016–17: Greg Evans (ChemE)
2015–16: Alberto Leon-Garcia (ECE)
2014–15: Honghi Tran (ChemE)
2013–14: Javad Mostaghimi (MIE)

Sustained Excellence in Teaching Award

Recognizes a faculty member who has demonstrated excellence in teaching over the course of at least 15 years.

2016–17: Will Cluett (ChemE)
2014–15: Jonathan Rose (ECE)
2013–14: Glenn Gulak (ECE)
2012–13: Tarek Abdelrahman (ECE)

Early Career Teaching Award

Presented in recognition of exceptional teaching by a faculty member who has taught at U of T for less than six years.

2016–17: Matthew Mackay (MIE)
2014–15: Scott Ramsay (MSE)
2012–13: Jason Anderson (ECE) and Timothy Chan (MIE)
2011–12: Micah Stickel (ECE)

Faculty Teaching Award

Recognizes a faculty member who demonstrates outstanding classroom instruction and develops innovative teaching methods.

2016–17: Craig Simmons (MIE, IBBME)
2014–15: Jason Foster (EngSci)
2013–14: Greg Evans (ChemE)
2012–13: Evan Bentz (CivE)

Engineering Alumni Association Awards, 2016–2017

The Engineering Alumni Association's annual awards honour graduates for outstanding contributions to U of T Engineering and to the profession.

L.E. (Ted) Jones Award of Distinction

Inspired by the contributions of Professor Emeritus L.E. (Ted) Jones, this award honours an alumnus/alumna for his or her support and dedication to U of T Engineering and its arts community.

2016–17: Allan Kuan (EngSci 1T4 + PEY, CivE MASc 1T7); Alex Perelgut (EngSci 1T6 + PEY)
2015–16: Xiao Fionna Gan (EngSci 1T6)
2014–15: Luca Casciato (MechE 1T5); Haruna Monri (CivE 1T5)
2013–14: Christopher Sun (EngSci 1T3 + PEY)

7T6 Early Career Award

Presented to an alumnus/alumna 10 years after graduation who is distinguished in the profession and community.

2016–17: Andrew Gillies (MechE 0T7); Christopher Wilmer (EngSci 0T7)
2015–16: Gimmy Chu (ElecE 0T6)
2014–15: Stefanie Blain-Moraes (EngSci 0T5); Todd Reichert (EngSci 0T5, UTIAS PhD 1T1)
2013–14: Mathew Szeto (CompE 0T4)

2T5 Mid-Career Achievement Award

Presented to an alumnus/alumna 25 years after graduation who has earned respect within the profession and broader community, attained significant achievement and exhibits promise of further contributions.

2016–17: Tom Chau (EngSci 9T2)
2015–16: Raffaello D'Andrea (EngSci 9T1)
2014–15: Janet Elliot (EngSci 9T0); Suneet Tuli (CivE 9T0)
2013–14: Ted Maulucci (MechE 8T9)

Malcolm F. McGrath Alumni Achievement Award

Named in honour of Malcolm McGrath on his retirement as assistant dean, alumni liaison, this award recognizes contributions of personal service to the Faculty, University or to the greater community.

2016–17: Don Andrew (CivE 5T4)
2015–16: Ross Pitman (GeoE 7T4)
2014–15: R. Christopher Hinde (CivE 5T0)
2013–14: Caprice Boisvert (MechE 9T3)

Engineering Alumni Hall of Distinction Award

The Hall of Distinction is an assembly of extraordinary alumni, selected by their peers for their lifelong accomplishments. These are graduates who have ultimately defined what is most exemplary in the engineering profession.

2016–17:
Rocco Martino (Physics 5T1, Astrophysics MASc 5T2, UTIAS PhD 5T6)
Kathy Milsom (CivE 8T3)
Jonathan Rose (EngSci 8T0, ECE MASc 8T2, ECE PhD 8T6)
The Honourable Tom Siddon (UTIAS MASc 6T6, UTIAS PhD 6T9)

2015–16:
Paul Henderson (EngBus 5T7)
Ali Khademhosseini (ChemE 9T9, IBBME MASc 0T1)
Ronald Sidon (IndE 6T6)
John Weber (MechE 7T9)

2014–15:
William Breukelman (ChemE 5T5)
Jan Carr (ElecE 6T8)
Jay Cross (EngSci 7T5)
Emil Frind (CivE 6T6)

2013–14:
Prabha Kundur (ElecE MASc 6T5, ECE PhD 6T7)
Gerald Smith (MechE 8T7)
Som Seif (IndE 9T9)
William Troost (ChemE 6T7)

6

World Recognition by Rankings

While rankings are only one of many measures of our Faculty's excellence, they illustrate our pre-eminence across diverse engineering fields, and they are widely cited as a key factor students and faculty consider when selecting U of T Engineering.

It has been 10 years since the three main ranking organizations, Shanghai Jiao Tong Academic Ranking of World Universities (ARWU), Times Higher Education (THE) and QS World University Rankings (QS), began publishing global rankings specific to engineering, with National Taiwan University Performance Ranking of Engineering Papers (NTU; formerly HEEACT) joining them in 2008. The dramatic displacement of U.S. schools by Asian institutions at the top level of the most recent ARWU is another reminder that engineering schools of global stature operate in an environment that is increasingly international and competitive.

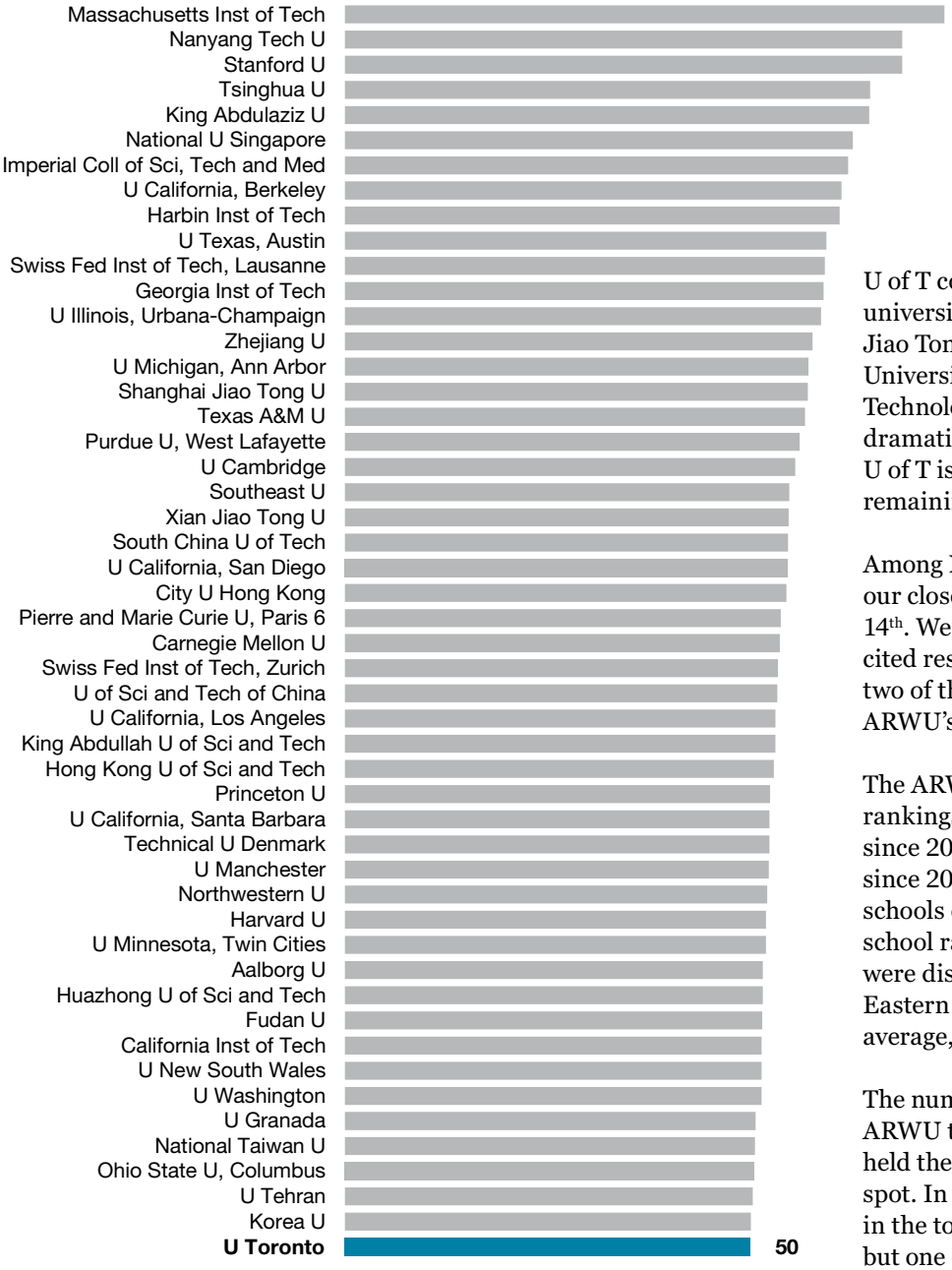
Within that context, it is particularly significant that this year, for the first time, U of T is the only Canadian university to appear within the top 50 across all four of the major global rankings for Engineering. Our outstanding rankings facilitate international visibility that enhances our ability to attract students, faculty and industry collaborators, and strengthens our position as a leader in engineering education and research.

This year, the ARWU has added subject-level ranking in engineering fields, joining those that have been provided by both QS and NTU for the past seven years. While each organization's assessments are unique, and often distinct from the others, overall U of T continues to rank number one in Canada across all international engineering rankings and among the top 10 North American public institutions across most subjects.

Comprehensive University Rankings

Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) for Engineering/Technology and Computer Sciences

Figure 6.1a **ARWU Top 50 World Universities, 2016**



U of T continues to rank among the premier universities worldwide in the 2016 Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) for Engineering/ Technology and Computer Science. After dramatic changes at the top of the rankings, U of T is now the only Canadian school remaining in the top 50.

Among North American public universities, our closest peer institutions, U of T ranked 14th. We lead all Canadian schools in highly cited research and articles in top journals, two of the three indicators that constitute the ARWU's evaluation methodology.

The ARWU is the longest running of the global rankings. It has provided overall rankings since 2003 and engineering field rankings since 2007. For much of the past decade, U.S. schools dominated the top 10 engineering school rankings. In 2016, five of those schools were displaced by four Asian and one Middle Eastern university that had each climbed, on average, 16 places to get there.

The number of North American schools in the ARWU top 50 fell from 27 to 21. Two of them held their positions, including MIT in the top spot. In contrast, the number of Asian schools in the top 50 increased from 12 to 16, and all but one of them rose by an average of 18 places. Middle Eastern schools in the top 50 increased from one to three, collectively climbing by an average of 63 places. Though U of T was clearly impacted by this overall trend, our rank variation was close to the average for other Canadian schools in the top 200 of the ARWU.

Data in this chapter include rankings published between August 2016 and July 2017.

Figure 6.1b **ARWU Top North American Public Universities, 2016**

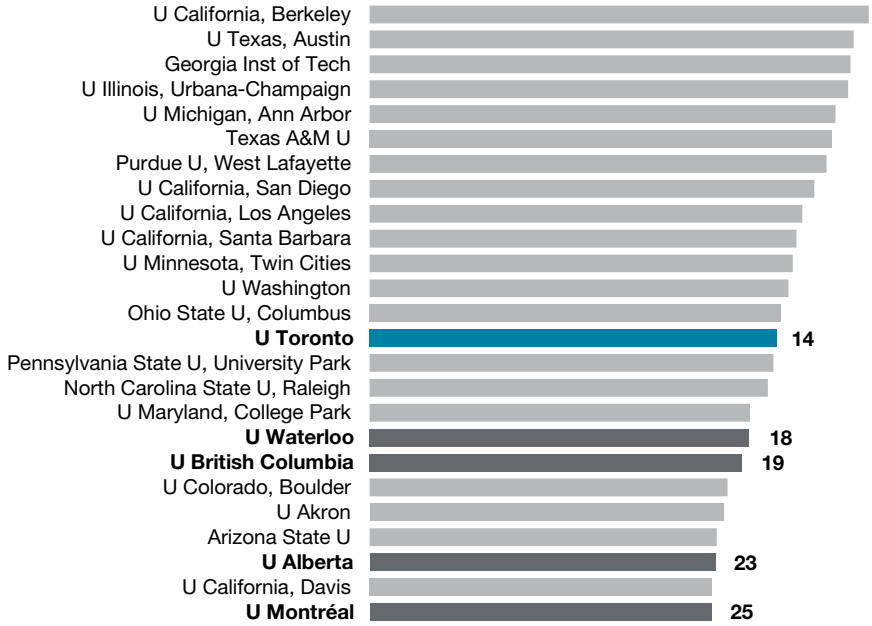


Figure 6.1c **Canadian U15 Universities in ARWU Top 200, 2016**

Figure 6.1d **Scoring Analysis of Canadian U15 Universities in ARWU Top 200, 2016**

Scoring on Highly Cited Research: (HiCi) Indicator

Scoring on Published Articles: (PUB) Indicator

Scoring on Articles in Top Journals: (TOP) Indicator

Note 6.1d: In addition to HiCi, Pub and TOP, the ARWU uses a fourth indicator called Research Expenditures (FUND), which is used only for U.S. schools. Research funding mechanisms differ so significantly from country to country that all other international universities, including Canadian universities, are ranked using only the first three indicators.

Canadian Universities in ARWU by Subject, 2016

The Shanghai Ranking Consultancy, which produces the ARWU, published Global Subject Rankings for engineering disciplines for the first time in 2016. These replaced the more limited range of mainly science-focused subjects that have been featured since 2009.

The new subject rankings continue the ARWU's emphasis on publications and citations, much like the NTU ranking, and in contrast to the British rankings (THE and QS), which rely heavily on reputational indicators. Scoring is based on various measures, including 50% on citations, 30% on newly introduced measures of the extent of co-authorship with international and corporate or industrial partners, and 20% on the number of papers authored and international awards won by each institution.

U of T dominated the new engineering subject rankings across all Canadian institutions, taking the top spot in three of the subjects. The new subject rankings are based on a wider range of measures. Figure 6.1d shows a scoring analysis of the three indicators that have historically determined our standing in the ARWU Engineering ranking: Highly Cited Research (HiCi), Published Articles (PUB) and Articles in Top Journals (TOP). The Research Funding (Fund) indicator is only used for U.S. schools.

The new rankings, by contrast, use up to seven indicators to evaluate an institution in each subject:

- **PUB** – the number of papers indexed in Scopus
- **TOP25** – the number of world top 25% most cited papers
- **TOP1** – the number of world top 1% most cited papers
- **FWCI** (Field Weighted Citation Index) – the number of citations received by an institution's publications compared with the average number of citations received by all other similar publications
- **IC** – the extent of international co-authorship
- **CC** – the percentage of publications with academic and corporate or industrial co-authors
- **MCR** – Most Cited Researchers
- **AWARD** – several subjects also assess the number of staff winning a significant award

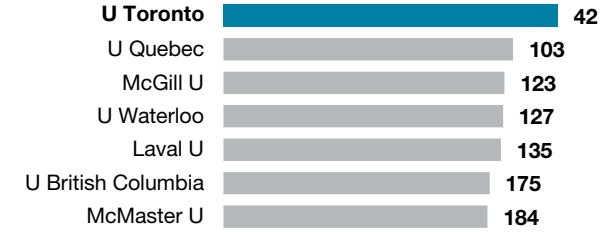
Figure 6.1e **Canadian Universities in ARWU Subject Ranking**

Chemical Engineering

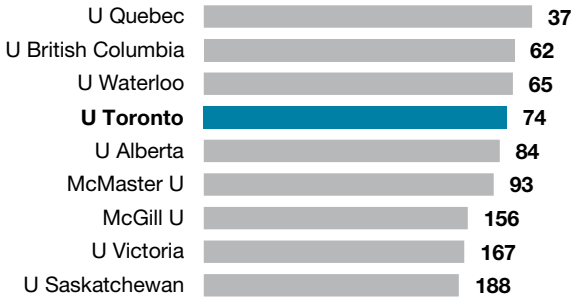
Civil Engineering

Electrical Engineering

Materials Engineering

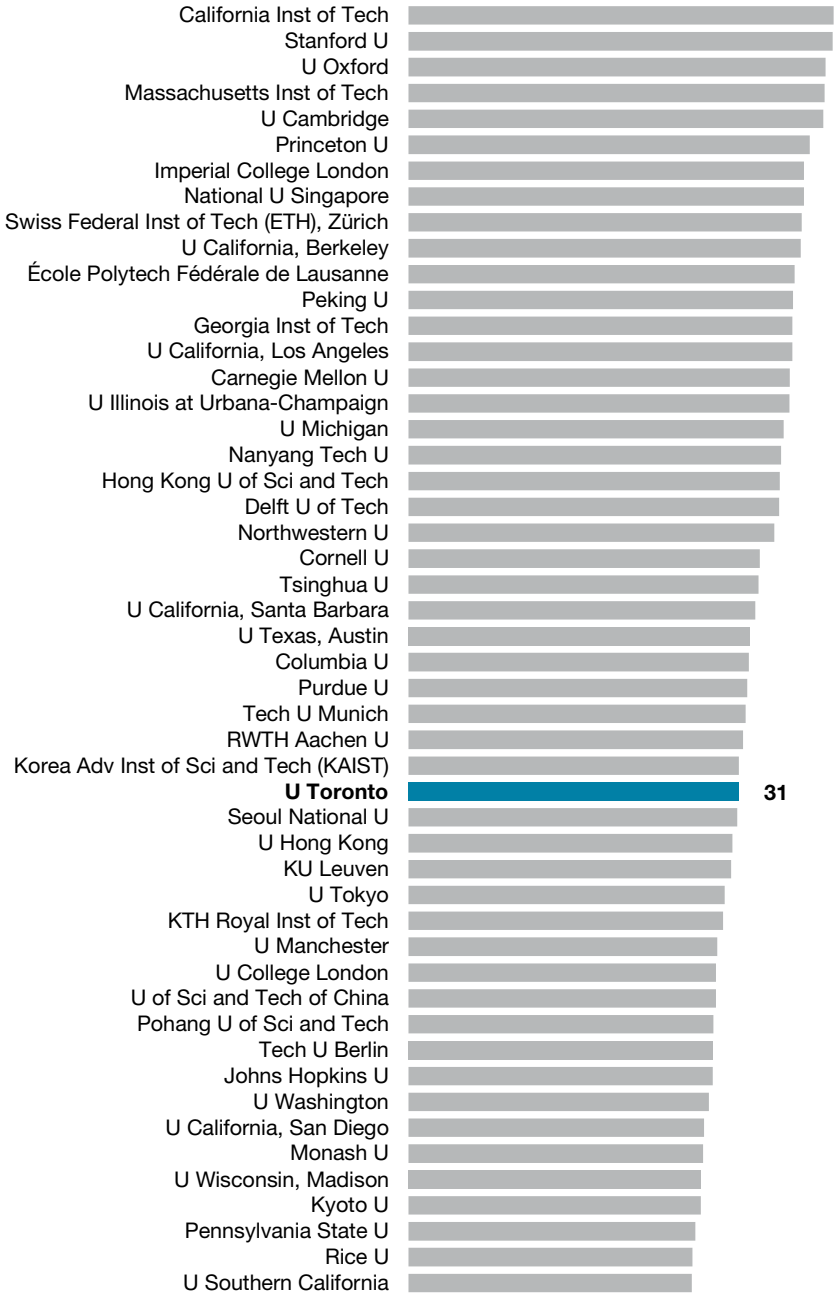


Mechanical Engineering



Times Higher Education (THE)–Elsevier World University Ranking for Engineering and Information Technology

Figure 6.2a **THE Top 50 World Universities, 2016**



In 2016, the Times Higher Education (THE) marked its 10th year of publishing an Engineering and Information Technology field ranking with a succession of partners: first QS, then Thomson-Reuters, and most recently Elsevier. Throughout that time, U of T has remained both the top Canadian university for engineering and among the top 10 North American public universities, this year placing ninth.

THE is the second-longest-running survey of its kind after the ARWU. What sets it apart as an influential assessment of global, research-intensive universities is the breadth of its evaluation, which aims to measure institutions across all their core missions: teaching, research, knowledge transfer and international outlook. The THE ranking uses 13 performance indicators in five weighted categories:

- Teaching: the learning environment (30%)
- Research: volume, income and reputation (30%)
- Citations: research influence (30%)
- International outlook: staff, students and research (7.5%)
- Industry income and innovation (2.5%)

Figure 6.2b **THE Top North American Public Universities, 2016**

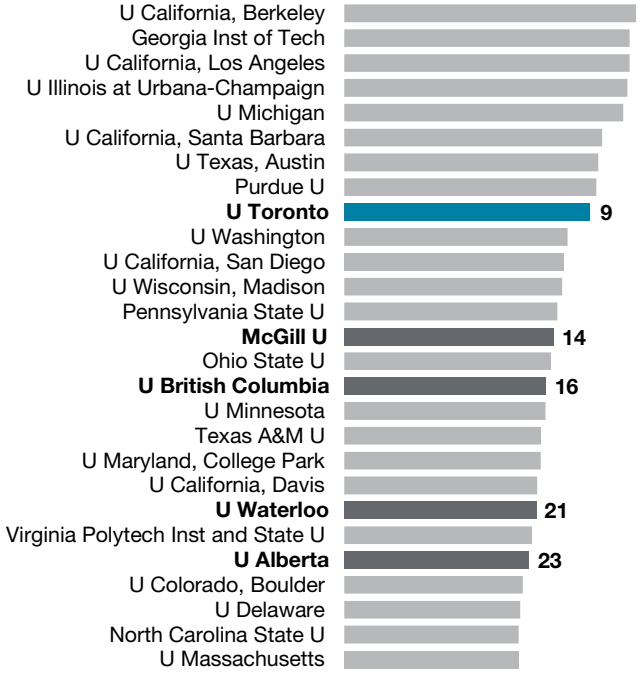


Figure 6.2c **Canadian U15 Universities in THE Top 100, 2016**

QS World University Rankings for Engineering and Technology

Figure 6.3a **QS Top 50 World Universities, 2017**

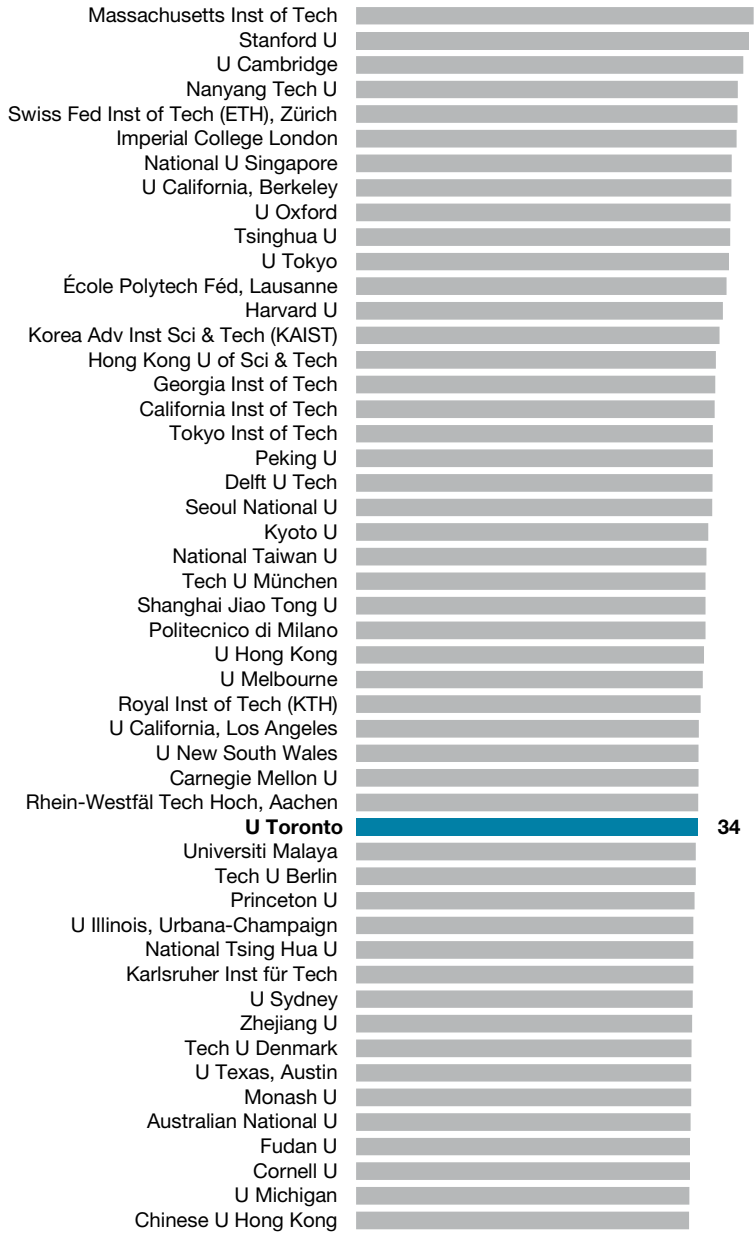


Figure 6.3b **QS Top North American Public Universities, 2017**

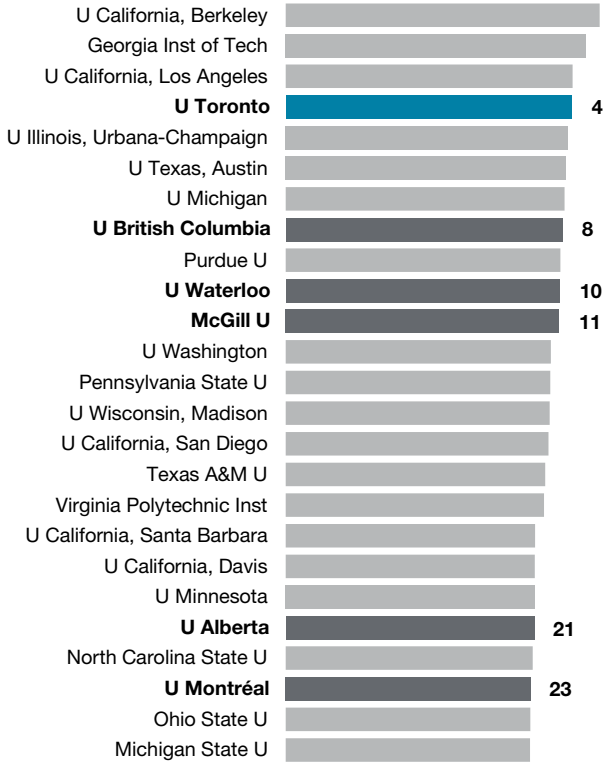
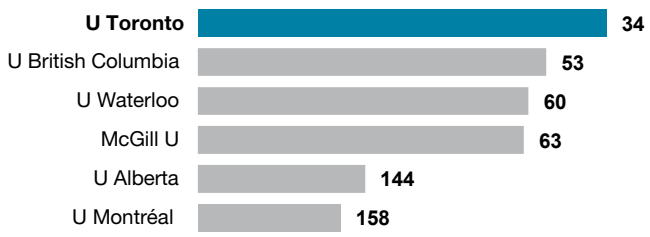


Figure 6.3c **Canadian U15 Universities in QS Top 200, 2017**



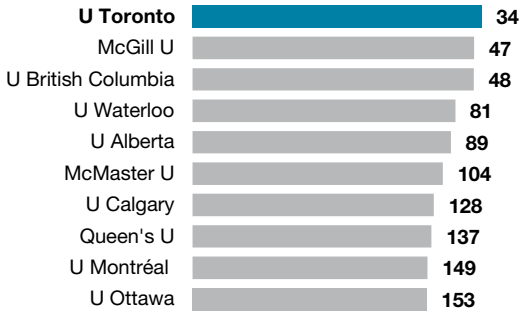
U of T Engineering rose 15 places in the most recent QS World University Rankings for Engineering and Information Technology, bringing us back into the range of our typical ranking since 2010.

Our standing among North American public universities also rose to fourth place, the highest we have been among these peer institutions.

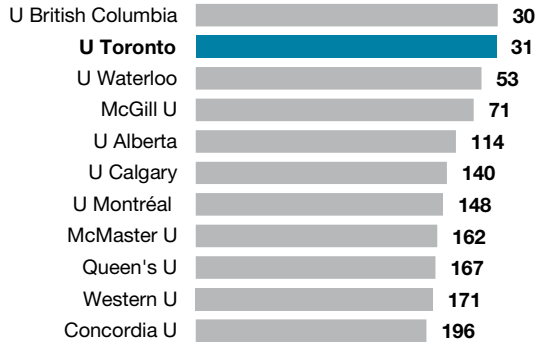
Nationally, it was encouraging to see all our U15 peers improve their rankings significantly over the previous rankings period. Even so, U of T was the only Canadian university to make the QS top 50 for the third year in a row.

Figure 6.3d **Canadian Universities in QS by Subject, 2017**

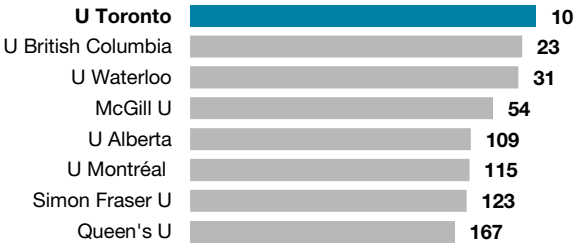
Chemical Engineering



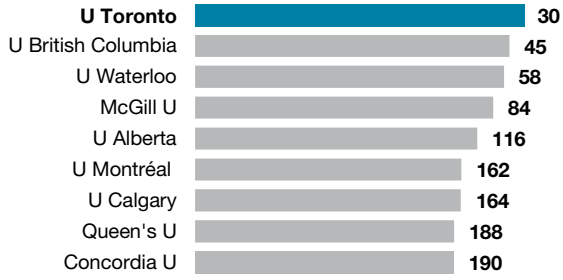
Civil & Structural Engineering



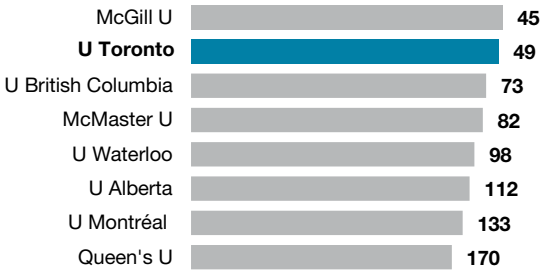
Computer Science & Information Systems



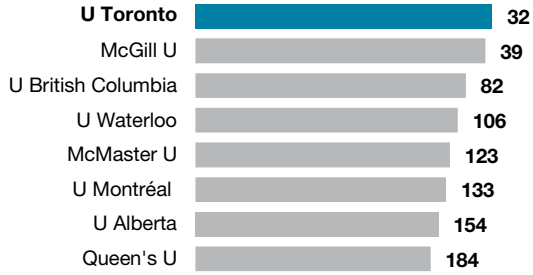
Electrical & Electronic Engineering



Materials Sciences



Mechanical, Aeronautical & Manufacturing Engineering



Mineral & Mining Engineering

With the inclusion of the Mineral & Mining Engineering field for the first time, we are now recognized as the top Canadian engineering school in four out of seven engineering and information technology subjects (Chemical Engineering, Computer Science & Information Systems, Electrical & Electronic Engineering, Mechanical, Aeronautical & Manufacturing Engineering) and second in two other subjects (Civil & Structural Engineering, Materials Science), demonstrating our strength across a range of disciplines.

National Taiwan University (NTU) Performance Ranking of Engineering Papers

U of T Engineering ranked 43rd globally and first in Canada in the National Taiwan University Performance Ranking of Engineering Papers. We also placed ninth among the top tier of North American public universities. NTU uses the publication of engineering papers to identify and compare the top 200 universities in the world by subject.

NTU's ranking is based on eight weighted criteria grouped into three broad categories:

Research Productivity

- Total number of articles published in the past 11 years (2005–2015) [10%]
- Total number of articles published in the most recent year reported (2015) [15%]

Research Impact

- Total number of citations in the past 11 years (2005–2015) [15%]
- Total number of citations in the past two years (2014–2015) [10%]
- Average annual number of citations over the past 11 years (2005–2015) [10%]

Research Excellence

- H-index (measures productivity and impact of published work) of the past two years (2014–2015) [10%]
- Number of highly cited papers in the past 11 years (2005–2015) [15%]
- Number of papers published in high-impact journals in the current year (2015) [15%]

Figure 6.4a **NTU Top 50 World Universities, 2016**

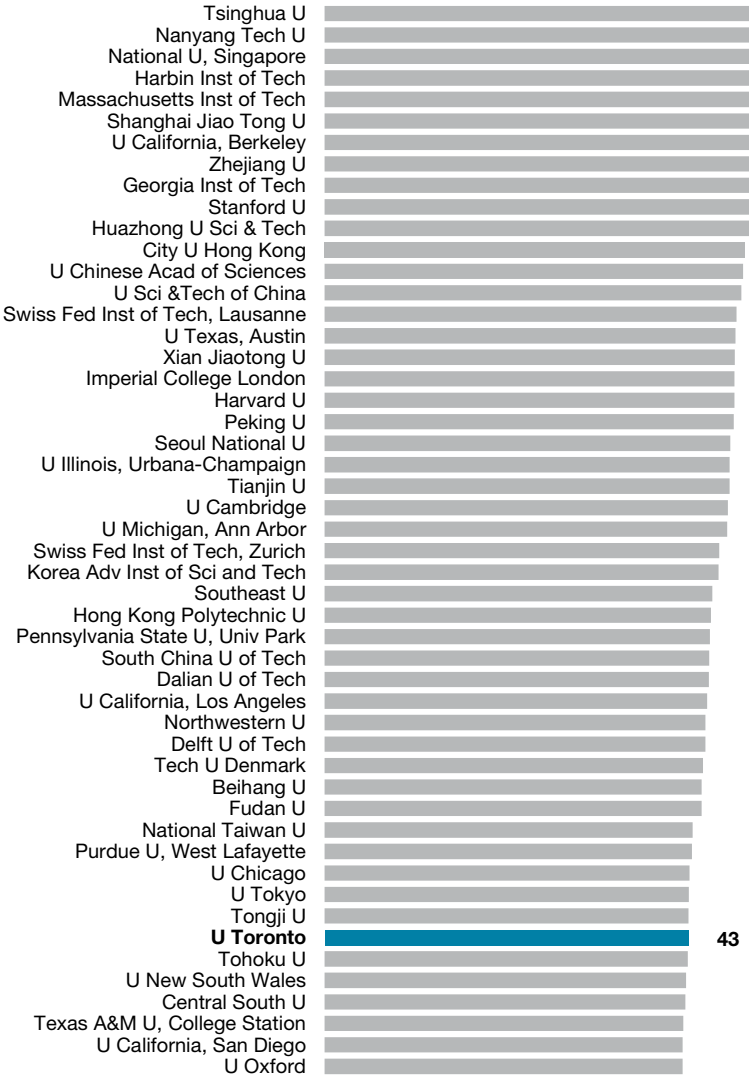
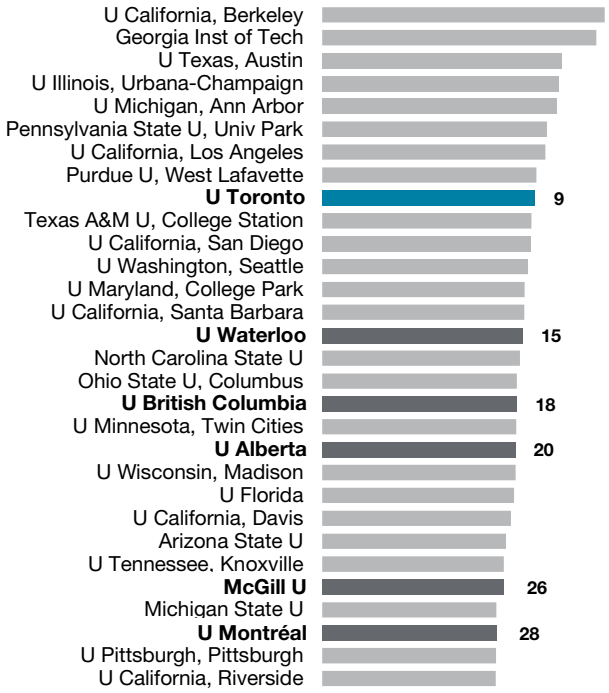


Figure 6.4b **NTU Top North American Public Universities, 2016**



In NTU's rankings of engineering and information technology subject areas (Figure 6.4d), U of T Engineering placed first among Canadian institutions in four out of six subject rankings. We are among the top 50 globally in Computer Science and in Civil, Electrical and Mechanical Engineering.

Figure 6.4c **Canadian U15 Universities in NTU Top 200, 2016**

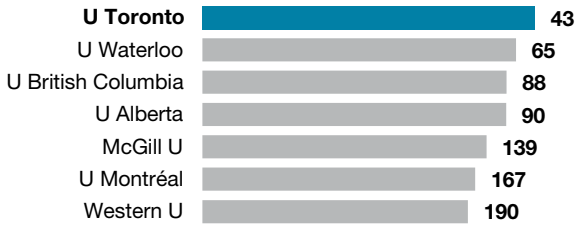
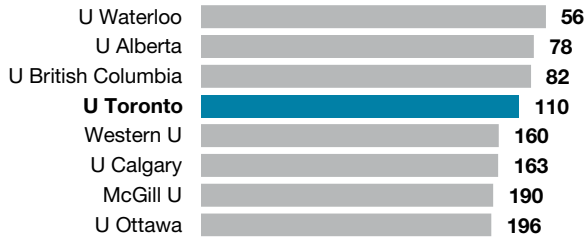
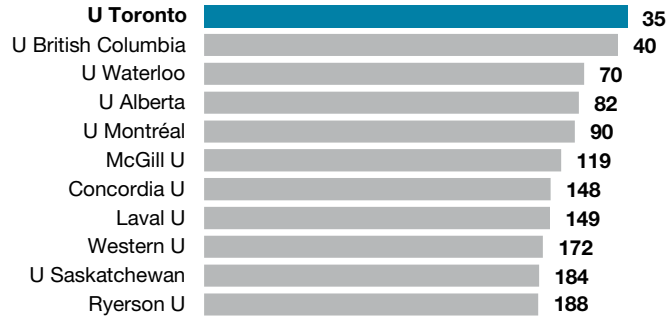


Figure 6.4d **Canadian Universities in NTU by Subject, 2016**

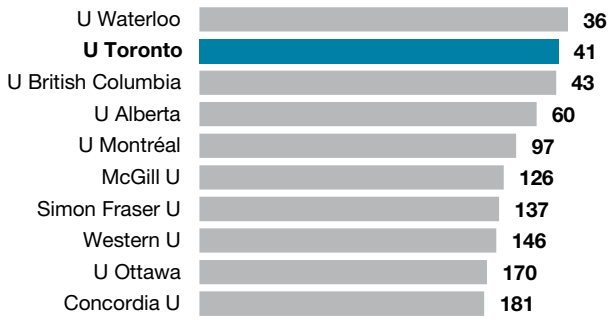
Chemical Engineering



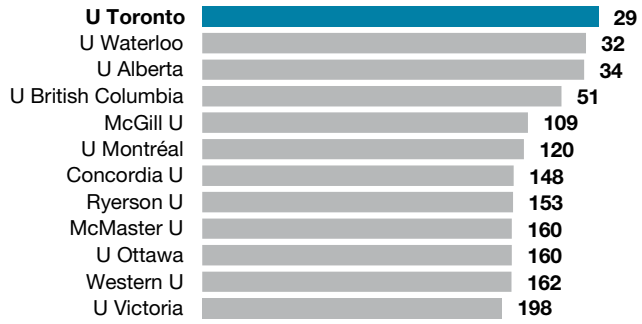
Civil Engineering



Computer Science

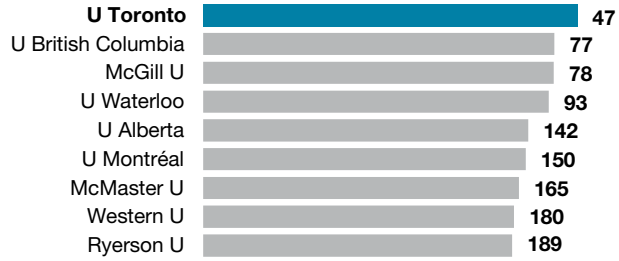


Electrical Engineering



Materials Science

Mechanical Engineering



Rankings Based on Publications and Citations

Figure 6.5a **Number of Engineering Publications Indexed by Thomson Reuters for Association of American Universities (AAU) Public and Canadian Peer Institutions, 2011 to 2015**

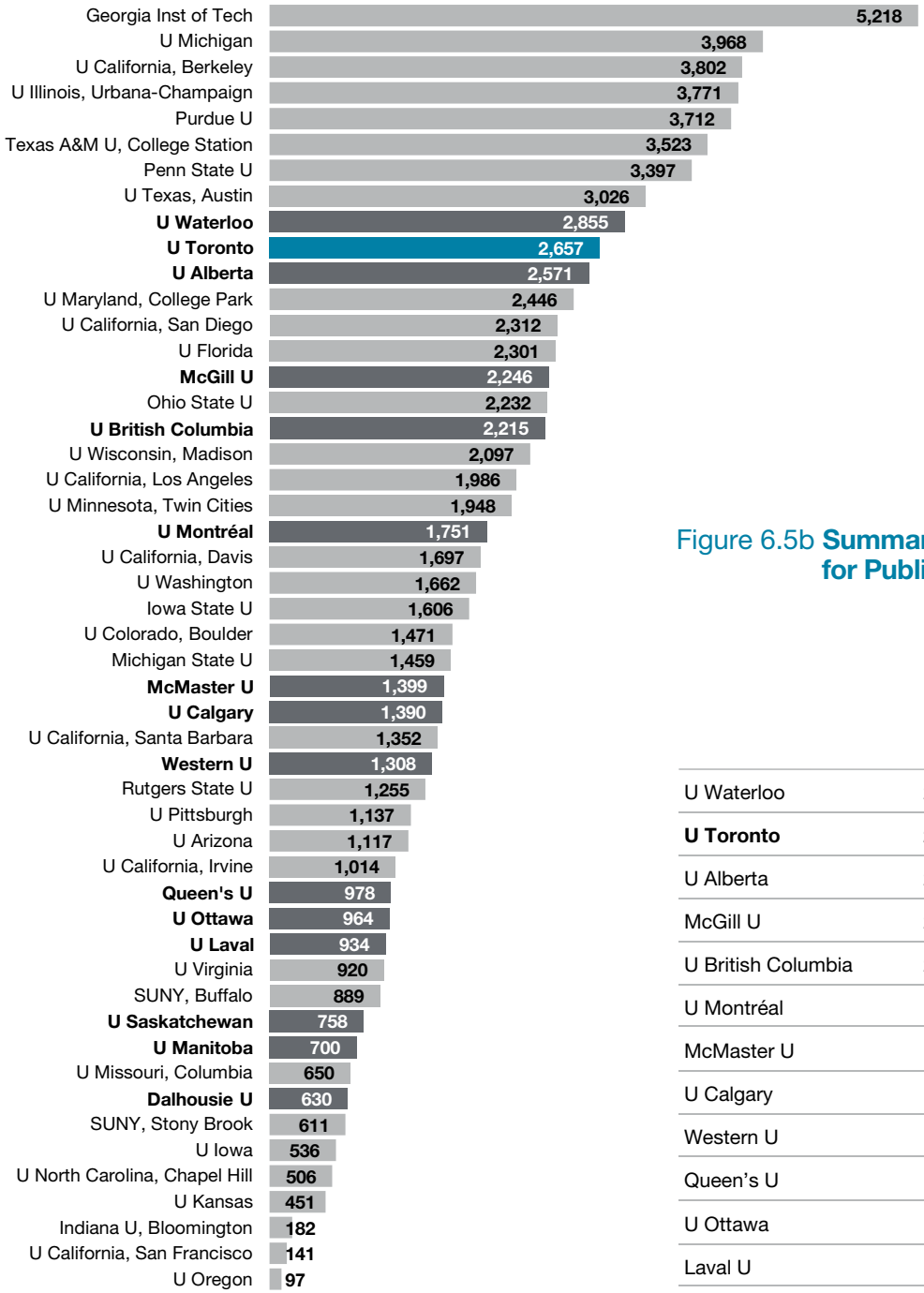


Figure 6.5b **Summary of U15 Bibliometrics for Publications**

	Publications	Faculty Count	Publications per Faculty	Rank on Pub per Faculty
U Waterloo	2,855	288	9.9	6
U Toronto	**2,657**	**246**	**10.8**	**5**
U Alberta	2,571	195	13.2	3
McGill U	2,246	143	15.7	1
U British Columbia	2,215	186	11.9	4
U Montréal	1,751	255	6.9	13
McMaster U	1,399	150	9.4	7
U Calgary	1,390	157	8.9	8
Western U	1,308	96	13.6	2
Queen's U	978	129	7.6	12
U Ottawa	964	124	7.8	11
Laval U	934	162	5.8	15
U Saskatchewan	758	88	8.7	9
U Manitoba	700	83	8.4	10
Dalhousie U	630	97	6.5	14

Note 6.5 and 6.6: Faculty counts are based on data from the Engineers Canada Resources Report (2015) Publication and citation data from Thomson Reuters InCites™, updated March 11, 2017.

The Association of American Universities (AAU) index measures research output, productivity and intensity based on publication counts. Once again, U of T Engineering ranked 10th in North America and second in Canada, based on a total publication count of 2,657 papers between 2011 and 2015.

The AAU index citation counts are based on the total number of papers cited over a five-year period, as well as the frequency of citations per faculty member and articles. U of T Engineering placed first in Canada and 10th among North American public institutions in the total number of citations. As in the past two years we ranked third in Canada for citations per faculty after McGill University and Western University and retained the lead among Canadian universities in the number of citations per publication, which is the metric representing the relevance of our publications as cited by other researchers.

Figure 6.6a **Number of Engineering Citations Indexed by Thomson Reuters for Association of American Universities (AAU) Public and Canadian Peer Institutions, 2011 to 2015**

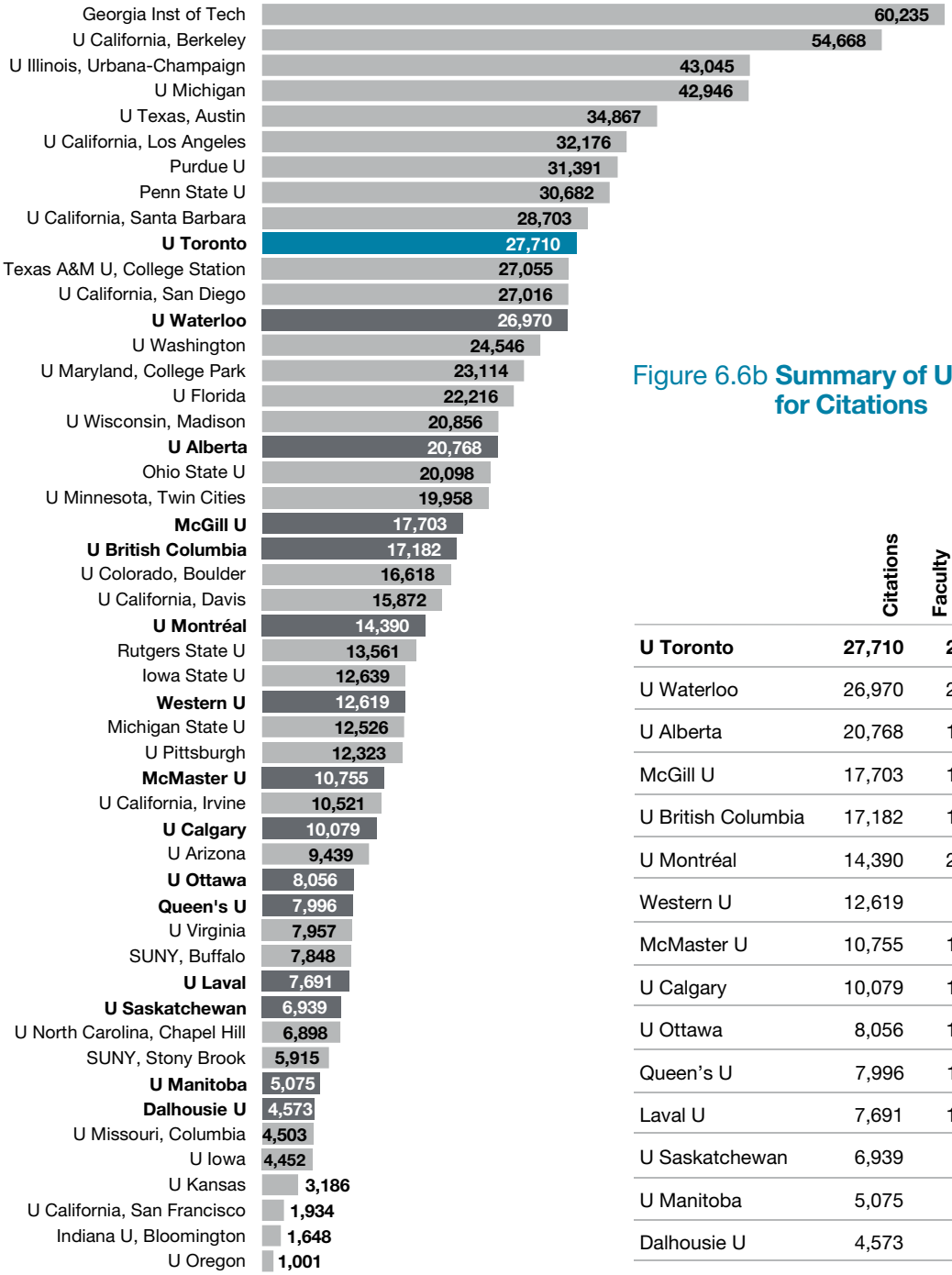


Figure 6.6b **Summary of U15 Bibliometrics for Citations**

	Citations	Faculty Count	Citations per Faculty	Rank on Citations per Faculty	Citations per Publication	Rank on Citations per Publication
U Toronto	**27,710**	**246**	**112.7**	**3**	**10.4**	**1**
U Waterloo	26,970	288	93.5	5	9.4	3
U Alberta	20,768	195	106.5	4	8.1	9
McGill U	17,703	143	123.8	2	7.9	10
U British Columbia	17,182	186	92.5	6	7.8	11
U Montréal	14,390	255	56.4	13	8.2	7
Western U	12,619	96	131.4	1	9.6	2
McMaster U	10,755	150	71.9	8	7.7	12
U Calgary	10,079	157	64.2	10	7.3	14
U Ottawa	8,056	124	65.0	9	8.4	5
Queen's U	7,996	129	62.1	11	8.2	8
Laval U	7,691	162	47.5	14	8.2	6
U Saskatchewan	6,939	88	79.2	7	9.2	4
U Manitoba	5,075	83	61.1	12	7.3	15
Dalhousie U	4,573	97	47.1	15	7.3	13

Summary of Ranking Results

In 2016, U of T Engineering remained the top Canadian university, and the only Canadian institution within the global top 50, across all the rankings. Among North American public universities, we ranked in the top 10 in three of the four ranking systems. Although no ranking can decisively illustrate a school's performance, our high rankings enhance our ability to attract top faculty, researchers and students from around the world.

Figure 6.7 **Summary of University of Toronto Engineering Performance in World Rankings**

Ranking Organization	Release Date	Canada	North American Public	World
Academic Ranking of World Universities for Engineering (ARWU) for Engineering / Technology and Computer Sciences	August 2016	1	14	50
ARWU Scoring Detail by Category	August 2016			
• Highly Cited (HiCi)		1	15	46
• Publications (PUB)		2	9	67
• Publications in Top Journals (TOP)		1	17	57
ARWU Subject Ranking ***[New for 2016]***	June 2016			
• Chemical Engineering		1	10	39
• Civil Engineering		3	16	81
• Electrical & Electronic Engineering		1	10	27
• Energy Science & Engineering		9	33	162
• Environmental Science & Engineering		2	10	25
• Materials Science & Engineering		1	10	42
• Mechanical Engineering		4	22	74
Times Higher Education (THE) – Elsevier World University Ranking for Engineering & Technology	September 2016	1	9	31
QS World University Rankings for Engineering and Technology	March 2017	1	4	34
QS World University Rankings by Subject	March 2017			
• Chemical Engineering		1	8	34
• Civil & Structural Engineering		2	8	31
• Electrical & Electronic Engineering		1	7	30
• Materials Science		2	11	49
• Mechanical, Aeronautical & Manufacturing Engineering		1	8	32
• Mineral & Mining Engineering		4	7	17
• Computer Science & Information Systems		1	2	10
National Taiwan University (NTU) Performance Ranking of Scientific Papers for World Universities by Subject	October 2016	1	9	43
NTU Performance Ranking by Subject	October 2016			
• Chemical Engineering		4	19	110
• Civil Engineering		1	10	35
• Electrical Engineering		1	7	29
• Materials Science		1	10	62
• Mechanical Engineering		1	11	47
• Computer Science		2	10	41

7

Our Faculty has a dynamic and engaged global engineering community — alumni, friends, faculty, staff, students and industry partners — that plays an important role in our position as the top-ranked engineering school in Canada and one of the world's best.

Our alumni are more engaged than ever before. Many volunteer as mentors, contribute to advisory boards or deliver guest lectures, sharing their knowledge and experience with current students. Others support research, student activities or new infrastructure through philanthropic giving. Their generosity enables us to advance our research enterprise, strengthen our program offerings, enhance the student experience, improve facilities, and prepare the next generation of engineering innovators, leaders and entrepreneurs — technically deep, globally adept and business savvy — to address the most pressing global challenges.

More than 3,500 alumni around the world joined us in 2016–2017 for events and activities, such as the BizSkule speaker series and the Alumni Mentorship Program, which drew a record number of alumni mentors and student mentees. We also expanded our CONNECT social media platform across all departments in spring 2017, facilitating more enriched alumni engagement.

This year, gifts from generous alumni enabled us to create new scholarships for our undergraduate and graduate students, and to enhance our entrepreneurship initiatives. The Centre for Engineering Innovation & Entrepreneurship (CEIE) continues to be a cornerstone of our Boundless campaign and we are working with prospects to fundraise for key elements of the building, including the fabrication facility, the Robotics & Mechatronics Lab and several of the multidisciplinary research hubs located on the upper floors.

With continued support we will enable our community — today's scholars and tomorrow's engineering leaders — to build a global society of boundless innovation, creativity and economic prosperity.

Philanthropic Support

Our Faculty's fundraising efforts play a significant role in U of T's historic $2.4-billion Boundless fundraising campaign. In 2016–2017, we raised a total of $22-million, including $14.7-million in philanthropic gifts and $7.3-million in research support. This enabled us to surpass our $200-million Boundless fundraising goal in March 2017 — six months ahead of schedule. We have expanded our Boundless fundraising goal to $230-million, with the resounding support of our dedicated alumni community and senior academic leadership.

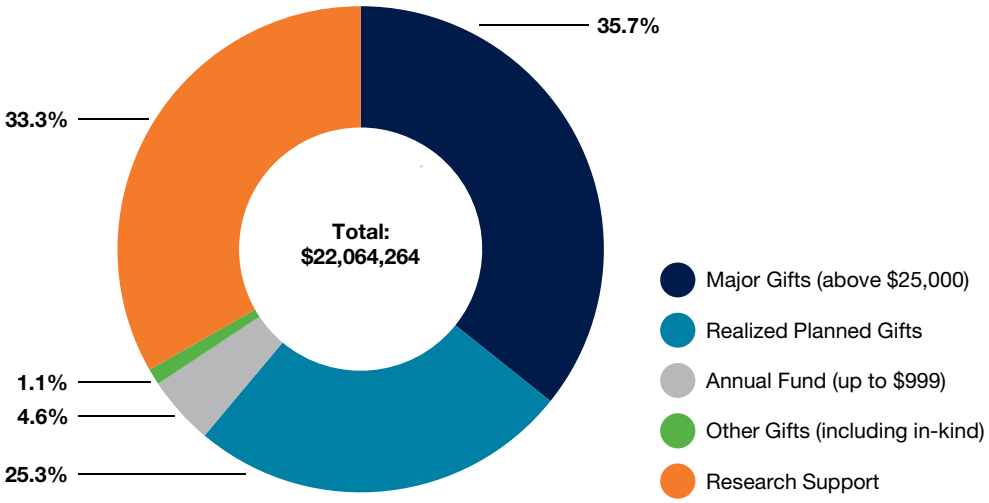
Increased engagement by our department chairs and Faculty leadership has resulted in a number of new gift discussions in support of Faculty-wide research, and our multidisciplinary centres and institutes.

Legacy gifts continue to be an important part of our overall fundraising efforts. This year we received more than $5-million in philanthropic support in the form of bequest intentions.

Our engagement with the Graditude senior-class giving program to support student clubs continued to be strong. Graditude offers graduating students, as well as faculty, staff, alumni and friends, an opportunity to give back to Skule™ and enhance the experiences of students. More than 33% of graduating students took part, with MinE achieving a 95% participation rate.

In 2016–2017, we identified three transformational research areas — water innovation, robotics and sustainability — in which we have a critical mass of expertise. Significant investment in the form of philanthropic gifts, industry partnerships and government funding will enable us to create visionary programming and initiatives, and establish U of T Engineering as a world leader in these areas.

Figure 7.1a **Advancement Results, 2016–2017**



Data in this chapter are presented by fiscal year (May to April).

Figure 7.1b **Philanthropic Support, 2007–2008 to 2016–2017**

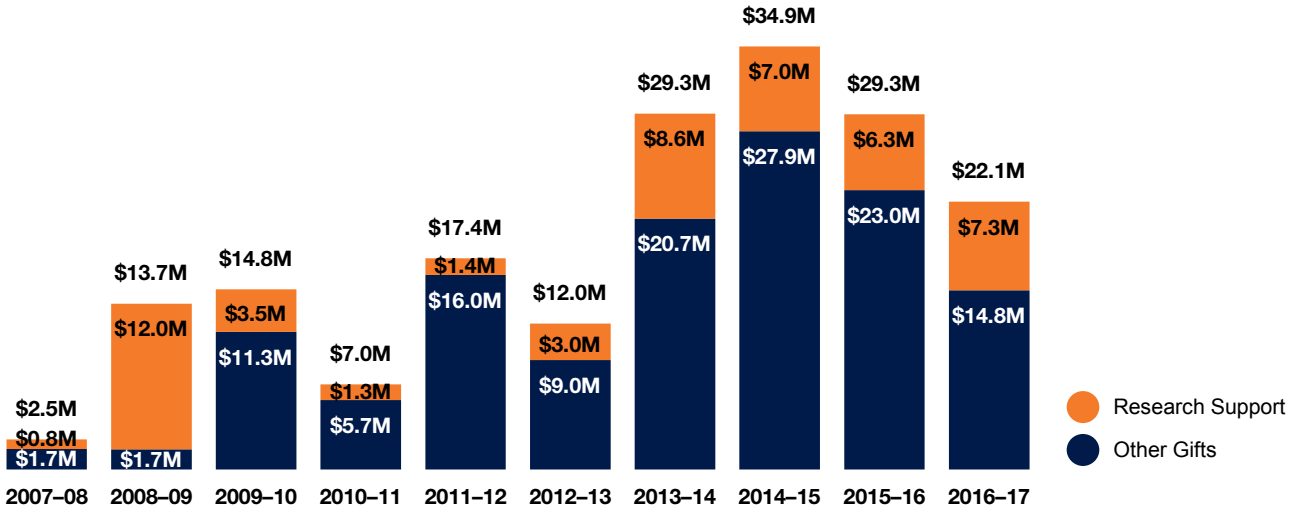


Figure 7.1c **Gift Designation, 2016–2017**

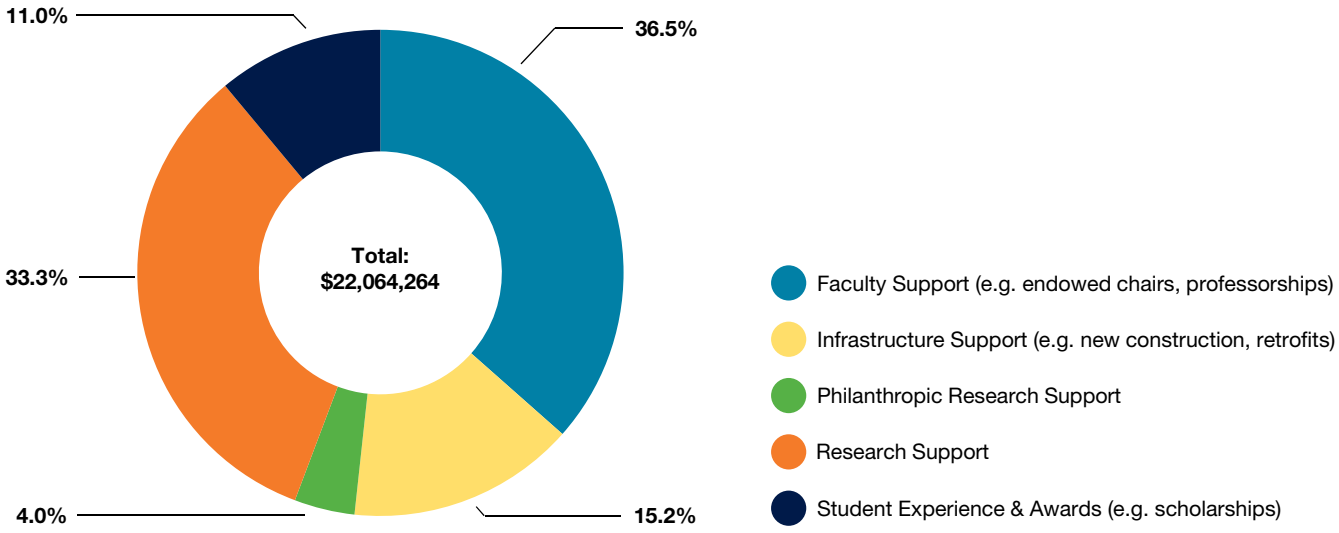
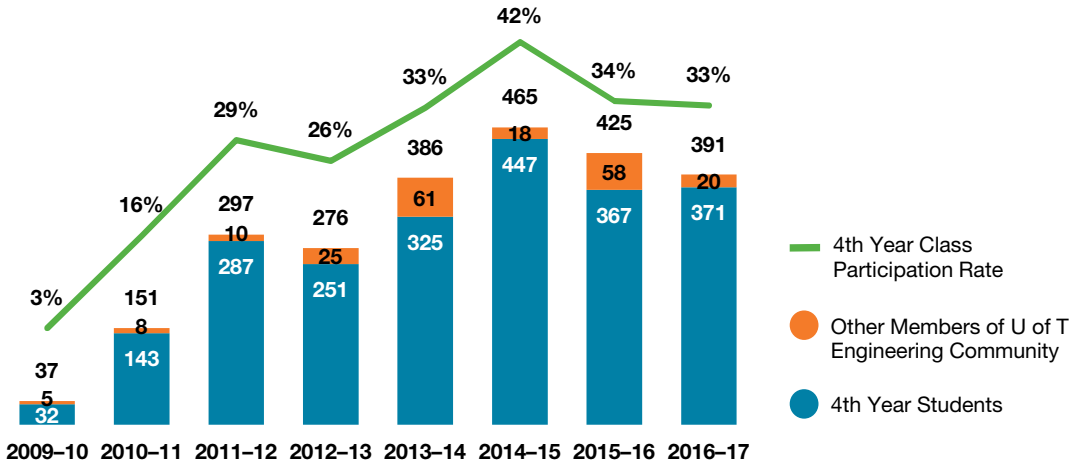


Figure 7.1d **Graditude Participation, 2009–2010 to 2016–2017**



Gift Highlights

Richard Clarke — $1 million

The Institute for Leadership Education in Engineering (ILead) was the beneficiary of a $1-million gift from Richard Clarke (ChemE 5T4), a generous combination of an outright gift and a bequest intention. This gift establishes the Richard M. Clarke Fund for Leadership in Engineering Design for the Improvement of the Environment, which supports the development and delivery of learning platforms for leadership in the application of engineering technologies.

Havelaar EV — $2.5 million

Havelaar EV made a philanthropic investment of $2.5 million to establish the U of T Havelaar Electric Vehicle Research Centre. The gift will provide seed funding for lab space, equipment and administrative needs. Combined with additional support for a robust research collaborative partnership, U of T Engineering and Havelaar are taking a holistic approach to a corporate/university partnership, which includes supporting talented engineering students, addressing global technical challenges and building a commercialization pipeline for academic research outcomes.

Lorne Heuckroth — $500,000

Lorne Heuckroth (UTIAS MASc 6T0) increased his philanthropic giving to U of T Engineering with a $500,000 donation to graduate student scholarships at the University of Toronto Institute for Aerospace Studies (UTIAS). The scholarship will be awarded each year to five international students entering their MASc studies at UTIAS. Preference will be given to students from developing nations.

John Peri — $250,000

John Peri (IndE 8T4) and his family made a generous donation of $250,000, which will go toward supporting industrial engineering undergraduate and graduate students. The Peri Family Industrial Engineering Design Award (endowed $50,000) will be awarded to the Industrial Engineering Capstone Design Course team that demonstrates exceptional design capabilities. The Peri Family Graduate Scholarship in Health-Care Engineering (endowed $200,000) will be awarded to one or more MIE graduate students who are undertaking advanced research in the field of health-care engineering.

Initiatives and Projects

Social Media Engagement

We continue to leverage the latest online tools, including social media, to enhance our engagement with our vibrant global engineering community. In 2016–2017, we expanded the U of T Engineering CONNECT online community network (uoftengineeringCONNECT.ca), which began as a pilot project in a few select departments, across the entire Faculty. CONNECT strengthens our ability to engage with our global community of alumni with timely updates on U of T Engineering news, mentorship and volunteer opportunities. It also improves our ability to maintain up-to-date information on our community members. In addition, CONNECT enables direct communication between students and alumni, enhancing the student experience through mentorship. As of June 28, 2017, CONNECT had 5,112 members, including 3,221 alumni, 1,636 students and 255 faculty and staff, and 96% of alumni members have stated they are willing to be volunteers.

We also enriched our engagement with alumni via Facebook (/UofTSkuleAlumni) and Twitter (@skulealumni). We increased the number of Twitter followers by more than 33% and Facebook fans by more than 28% over the previous year.

Annual Giving and Leadership Annual Giving

Annual gifts of between $1,000 and $25,000 enhance our research and educational programs in many ways, from improvements to laboratory facilities to scholarships and funds for student co-curricular activities. In 2016–2017, 257 Leadership Annual Giving donors made contributions amounting to $644,186, which represents 60% of all annual giving to the Faculty. In the fall 2016 issue of *Skulematters*, which was distributed to 36,605 alumni, we included a solicitation insert for the first time. This inspired 89 gifts amounting to $27,042.

In spring 2017, the Advancement Office launched the Inspire Faculty & Staff Giving Campaign, a month-long fundraising initiative that saw more than 20% of donors make their first gift to the Faculty. More than 500 ChemE alumni, students, faculty, staff and friends made a donation in support of the ChemE 500 for 50K Challenge, which unlocked a $50,000 gift from alumnus Bill Dowkes (ChemE 6T2) to establish the William J. Dowkes Undergraduate Summer Research Grant. In total, our generous annual giving supporters contributed more than $1.07 million to help fund our innovative programs, student scholarships, co-curricular programs and other priorities.

Alumni Events and Engagement

We invite our alumni to see Skule™ not only as a place where they earned their degrees, but also as an ongoing resource for ideas, networking and partnerships. To nurture this engagement, we create boundless opportunities to connect with faculty members, students, fellow alumni and industry partners, including learning events and volunteer opportunities. These activities strengthen our alumni network, cultivate new collaborations, highlight our commitment to excellence and encourage alumni to support our vision.

In 2016–2017, we engaged more than 3,500 alumni around the world through 133 events and activities, ranging from academic lectures to networking and professional development events. These included:

- **The Engineering Society Heritage Awards Celebration**, which included alumni who had held leadership roles in the Engineering Society and current Engineering Society leaders. Approximately 100 people attended the event, including 45 alumni.
- Five **BizSkule** events — one in Calgary, one in California's Silicon Valley and three in Toronto — on topics such as big data, artificial intelligence and electric vehicles. BizSkule showcases engineering leadership in business through keynote speakers and industry panellists ranging from startup founders to global executives. Total attendance for all five events was 374. We also engaged more than 200 people via live-streaming of the Toronto events.

We grew our Alumni Mentorship Program in 2016–2017, with 182 mentors and 357 mentees taking part — increases of 13% and 27.5%, respectively, over the previous year. This program, which is open to third- and fourth-year students (including PEY participants), fosters valuable relationships between Skule™ alumni and students. It also allows alumni to give back in a unique and rewarding way by sharing their knowledge and experience with students who are making important decisions about their engineering careers.

8

Communications

The University of Toronto's Faculty of Applied Science & Engineering is Canada's #1-ranked engineering school and among the top-ranked in the world. From autonomous drones delivering life-saving defibrillators, to students designing and racing the world's fastest human-powered vehicle, U of T Engineering embodies boundless creativity, ingenuity, collaboration, exploration and innovation. How we tell our story matters.

The Faculty employs comprehensive marketing and communications strategies that leverage print and digital platforms to advance our priorities and visibility with key stakeholders across campus, throughout Canada and around the world. Our team includes the Engineering Strategic Communications office, along with more than 30 colleagues in communications and external relations roles across the Faculty who constitute our Engineering Communications Network (ECN).

In 2016–2017, Faculty communicators were recognized with 10 awards from professional communication and design organizations locally, nationally and internationally. These included accolades for the "Future of Health-Care Engineering" issue of our alumni magazine *Skulematters;* for the dynamic "You Belong Here" microsite designed to encourage admitted students to accept their offers; and for the engaging and innovative graffiti mural surrounding the site of the forthcoming Centre for Engineering Innovation & Entrepreneurship.

U of T Engineering has an international reputation for our world-class research, the diversity and global fluency of our faculty and students, excellence in experiential engineering education, and for driving innovations to market through commercialization and entrepreneurship. In all of these endeavours, our Faculty is addressing the world's most pressing challenges and preparing the next generation of engineering leaders. Our communications efforts continue to enhance and expand the Faculty's reputation for excellence and leadership in these areas.

Selected Communication Projects

#DisplayYourPride

Diversity deepens the engineering creative process, enhances student experience and enriches the profession — it is a core value of U of T Engineering. Engineering Strategic Communications leveraged International Pride Month in June to showcase our Faculty's diversity. On June 21, 2016, our students, staff, faculty and Dean united to display their pride by forming the Pride flag, a symbol of inclusivity, out of 24 colourful balloons. Conceived as a social-first communications piece designed to engage our community online, the event was captured in photos and videos. This highly visual content generated more than 100,000 post impressions — a measure of reach — on Facebook alone. The project reinforced our message of diversity and inclusivity in a fresh, fun and unexpected way, and showcased U of T Engineering as a positive, creative and supportive place to study and work.

Innovate U

On May 13, 2016, more than 1,400 students in grades 3 to 8 converged on U of T for Innovate U, a day of hands-on activities celebrating science, technology, engineering and math (STEM) and the power of innovation. The one-day event was a first-of-its-kind partnership between U of T Engineering, Google Canada and Actua, a leading Canadian STEM-outreach charity. Innovate U engaged students and teachers from 30 elementary schools within the Toronto District School Board (TDSB), making it Canada's largest STEM event for kids. Innovate U positioned U of T Engineering as a leader in experiential learning and educational innovation, and strengthened relationships with key government and industry partners. The event garnered 24 earned media stories worth more than 5.6 million impressions across broadcast, print and online outlets, including *Global News, CBC, Toronto Star, Huffington Post* and others.

Strategic Website Redesigns

From August through December 2016 we redesigned four key Faculty websites: U of T Engineering News (news.engineering.utoronto.ca), Discover Engineering (discover.engineering.utoronto.ca), Engineering Alumni & Friends (alumni.engineering.utoronto.ca), and the Lassonde Institute of Mining (lassondeinstitute.utoronto.ca). These sites were migrated to new WordPress themes reflecting best practices in information architecture and digital design, further streamlining the visual identity and user experience across all Faculty sites. Site analytics informed content reconfigurations to deliver key messages and critical information to specific target audiences, from prospective students and parents, to members of the media, to alumni and donors. In 2016–2017, the UTIAS and MIE websites became the final two departmental sites to migrate to the mobile-adaptive, modular WordPress platform, completing this multi-phase migration.

Thought Leadership through Opinion Pieces

U of T Engineering took a leadership position in several key issues this year, including celebrating alumna Elsie MacGill's (ElecE 2T7) nomination as the face of the new Canadian banknote as a victory for women in engineering, and standing shoulder-to-shoulder with peer institutions on the important issue of meeting this country's urgent need to replace retiring engineers. In December 2016, Deans Cristina Amon, Mary Wells of University of Waterloo and Kim Woodhouse of Queen's University penned a joint opinion piece arguing that MacGill should be the choice for the new banknote on the grounds that her pioneering career reflects Canadian values. The piece was published in both the *Kingston Whig-Standard* and the *Waterloo Region Record*. In late 2016 and early 2017, Engineering Strategic Communications worked with Vice-Dean, Graduate Studies Markus Bussmann, and the Canadian Graduate Engineering Consortium (CGEC) to develop a profile-building opinion piece for the five-university group. The piece was published in *Policy Options* magazine on March 16, 2017, under the headline "Canada's engineering shortfall," and presented a compelling call to action for Canadian business leaders to capitalize on advanced-degree holders from Canadian engineering schools. The five partner universities all shared this content on their social media channels, where it reached more than 50,000 additional readers on Facebook alone.

Enhancing Communications Capacity

Our Engineering Strategic Communications team continues to deliver professional development opportunities to enhance capacity in our Engineering Communications Network (ECN). With more than 30 communicators across the Faculty's departments, divisions, institutes and administrative offices, the ECN is a powerful group of multi-talented staff members working together to advance our shared and respective communications objectives. The ECN meets monthly to share information and updates, and participate in a professional development session — topics this year included best practices in photography and

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Data and highlights in this chapter are presented by fiscal year (May to April).
Note: Impressions are the estimated number of people who may have interacted with a story, based on circulation (newspapers/magazines), viewers (TV), listeners (radio) and unique monthly visitors (online).

videography, effective digital storytelling, fast and accurate news writing, and basics of visual identity and graphic design. Relationships with the ECN, and with colleagues on the central University of Toronto Communications team, are critical to our shared success, and we are continually refining our processes to ensure efficient coordination and information-sharing across all three levels.

Fourth-Year Exit Survey

To better understand the experiences of our students and how their time at U of T Engineering shaped their future aspirations, the Office of the Vice-Dean, Undergraduate and Engineering Strategic Communications created a Faculty-wide exit survey in consultation with departments and student services across the Faculty. While some departments previously administered surveys to their own graduating students, a survey of all graduating students offers a more comprehensive understanding of life as an engineering student. Survey results will assist the Faculty in further enhancing existing services and programming. Results may also inform our best practices for staff and faculty to communicate more effectively with current students. Longer term, survey results will enable us to draw comparisons between the results of the Faculty's first-year exit survey, administered by the First Year Office, and the nationwide survey of graduating students conducted by Engineers Canada.

Refined Media Reporting and Social Media Analytics

In 2016–2017, we continued to focus our earned media efforts along the five strategic priority areas identified in the Faculty's Academic Plan, tracking coverage of U of T Engineering stories across all media locally, nationally and internationally. These results are compiled monthly, including relevant comparisons against an average month, and reported to communications colleagues and senior leaders across the University. In May 2016, Engineering Strategic Communications subscribed to analytics platform Sprout Social and added social media metrics to our monthly report. These data provide a benchmark of the effectiveness of our social media strategy and reflect the traction of our messages with key audiences across our three primary social media channels: Facebook, Instagram and Twitter.

Media Coverage

U of T Engineering earned 3,563 stories in external media outlets between April 1, 2016 and March 31, 2017, a 5% increase over the previous period. Almost half of these stories appeared in international outlets, and 65% of earned media impressions — an indicator of impact measured by the estimated number of people who may have interacted with a story — reached audiences outside of Canada. In total, stories mentioning U of T Engineering faculty, students, staff or alumni generated more than 668 million impressions in 2016–2017. This coverage was distributed across digital, print and broadcast media, including mainstream, niche and industry-targeted outlets. This coverage builds the profile for U of T Engineering strategic priority areas with key global audiences, including prospective undergraduate and graduate students, engineering thought leaders and policymakers, peer institutions, alumni, donors and friends of the Faculty.

The following list of media headlines includes selected highlights of our coverage:

Bioengineering/Health

- Coffee shops, 24-hour ATMs the best locations for life-saving AEDs, research shows *(CNN, U.S. News and World Report, Reuters, CBC News, Toronto Star, CTV News, Global News, The Globe and Mail)*
- Diesel trains may expose passengers to exhaust *(Toronto Star, CBC News, CTV News, Metro Toronto, Environmental News Network, Railway Age)*
- Clean air map from U of T Engineering researchers helps cyclists avoid air pollution *(MetroNews Canada, The Weather Network, GlobalNews, CBC Metro Morning, Fast Company)*
- Drone-delivered AEDs offer novel approach to saving lives at home *(CBC The National, CBC News, Toronto Star, The Loop, Futurism, Unmanned Aerial, EMS World)*
- Many life-saving defibrillators behind locked doors during off-hours, study finds *(The Globe and Mail, Yahoo! News, Torontoist, Medical News Today)*

Sustainability

- Saving sunshine for a rainy day: New catalyst offers efficient storage of alternative energies *(The Globe and Mail, Western Daily Press, Phys.org, Green Car Congress, Design News)*
- Analyzing the lifetime greenhouse gas emissions of Toronto's Sheppard subway line *(WIRED, Toronto Star, Metro Toronto)*
- Printable solar cells just got a little closer *(Economic Times, India.com, Bangladesh Daily Star, Optics, Nanowerk, Indian Express)*
- Recycling carbon dioxide: U of T researchers efficiently reduce climate-warming CO_2 into building blocks for fuels *(VICE Motherboard, Forbes, CBC News, Science Daily, TVO)*

Engineering Experiential Learning

- Saving the stacks: First-year Engineering students inspire retrofit for Fisher Rare Book Library *(CBC News, CBC Metro Morning, CityTV, Metro Toronto, Toronto Star)*
- Self-driving electric car to be created by new U of T Engineering student team *(Financial Post, Globe and Mail, CTV News, CleanTechnica, Engadget, CNET)*
- How does water behave in space? U of T Engineering researchers aim to solve longstanding mystery *(Metro Toronto, Toronto Star, National Post)*
- U of T Engineering students bring design solutions to challenges in Toronto communities *(Toronto Star, City News, 680 News Toronto)*
- Making sense of disasters: U of T Engineering offers new certificate in Forensic Engineering *(CBC News, Global News, Toronto Star, Toronto Sun, Victoria Times-Colonist, Waterloo Region Record)*

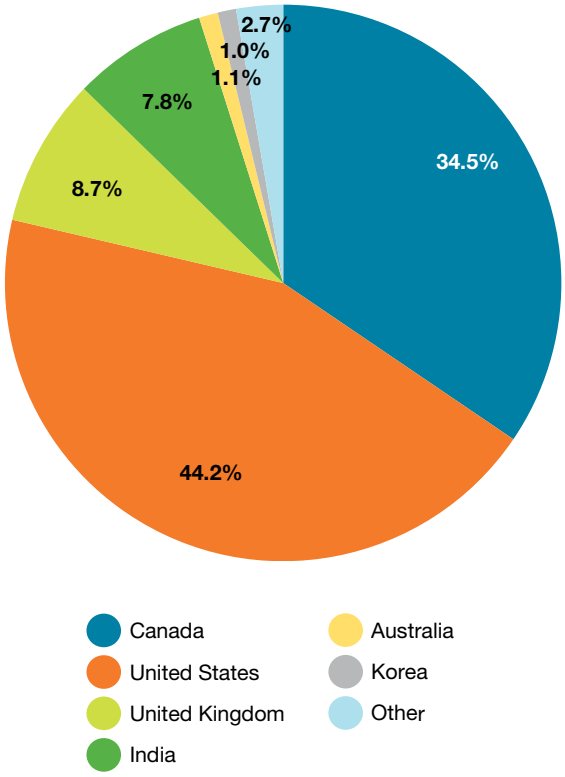
Entrepreneurship/Commercialization

- ModiFace invests in developing augmented reality, artificial intelligence talent at U of T Engineering *(BetaKit, CBC News, CBC Metro Morning, Yahoo! News, CanadaIT, Exchange Morning Post)*
- U of T Engineering alumni set world record for fastest human-powered vehicle — again *(Popular Mechanics, Gizmodo, International Business Times, designboom, MSN, Engineering.com, Design Engineering)*

Information & Communications Technology

- New AI algorithm taught by humans learns beyond its training *(CBC.ca, Nature World News, Research and Development Magazine, EconoTimes, Phys.org, Futurism, Engineering.com, Science Daily)*
- 'Flying saucer' quantum dots hold secret to brighter, better lasers *(Cosmos Magazine, Research and Development Magazine, Phys.org, Nanowerk)*

Figure 8.1a **Proportion of U of T Engineering Media Stories by Outlet Location, 2016–2017**



Note 8.1a: The impressions for one story may be included in the counts of multiple countries.

Figure 8.1b **Proportion of U of T Engineering Impressions by Strategic Priority Area, 2016–2017**

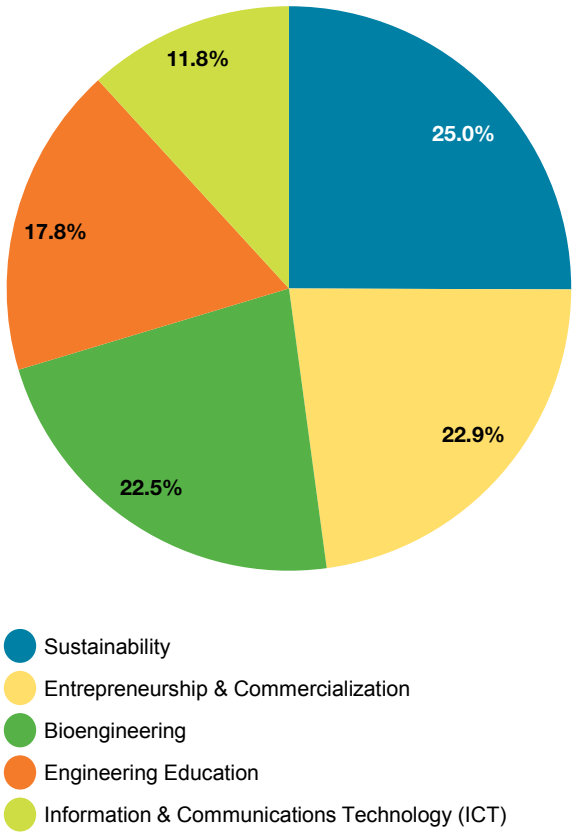
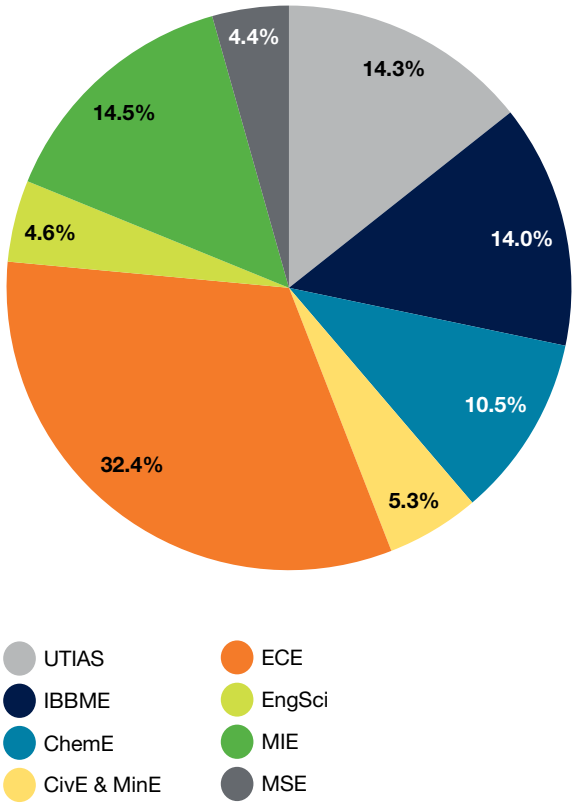


Figure 8.1c **Proportion of U of T Engineering Impressions by Academic Area, 2016–2017**



Engineering News at U of T

Social media channels are among the most powerful and direct communications vehicles for engaging with key stakeholders, and are a key instrument in enhancing the Faculty's reputation as Canada's top-ranked engineering school. Engineering Strategic Communications integrates current best practices in social media into its storytelling approaches and daily processes. We use social media to augment and amplify our key messages to peer institutions, prospective and current students, alumni, policymakers and select influencers, as well as staff and faculty. Social media evolves swiftly, and we leverage key metrics to continuously inform our strategy and measure our effectiveness in reaching these audiences.

In 2016–2017 we ran several social-first communications campaigns designed to engage the U of T Engineering community and prospective students while growing our followers across our Facebook, Instagram and Twitter channels. Monitoring social media analytics in real time through Sprout Social allows us to measure the effectiveness of our efforts and iterate quickly. Our National Engineering Month campaign in March 2017 is a successful example: throughout the month, we shared highly visual content showcasing discoveries, innovations or inventions with roots in U of T Engineering. Launched under the hashtag #EngineeredHere, these postcard-style images gained strong traction on Facebook and Twitter. Across both platforms,

Note 8.1b: One media story can reference multiple strategic priority areas. In those cases, the impressions are included in the counts for both areas. Here, 'other' refers to stories not directly classifiable into one of the five strategic priority areas.
Note 8.1c: One media story can reference multiple academic areas. In those cases, the impressions are included in the counts for both areas.

the campaign generated 309,101 impressions, an increase of 30.4% over the previous period, and sparked 8,699 total engagements, an increase of 97.3%.

Further refinement of our audience segmentation across the Faculty's three primary platforms has yielded results: Facebook largely reaches students and young alumni, Twitter engages peer institutions, policymakers and the research community, and Instagram is targeted exclusively to current and prospective students and celebrates our vibrant student experience. Tailoring our messaging for each platform has generated unprecedented gains in followers across all channels, including Recruitment, Alumni and the main Faculty accounts. In 2016–2017, these channels attracted a total of 18,497 fans, an increase of 41.3% over the previous period. Engagements, the number of unique people who have clicked, liked, commented on or shared our posts, climbed to 60,335 in 2016–2015, a 157.8% increase.

Figure 8.2 **Top Stories on the Engineering News and U of T News Websites, 2016–2017**

Page Title	Date Posted	Engineering News Site	U of T News Pageviews	Total
U of T's youngest student sets her sights on the stars	Mar. 15, 2017	3,989	8,314	**12,303**
Alumnus funds scholarship for U of T students involved in eSports	Jan. 18, 2017	4,241	7,232	**11,473**
Five U of T Engineering alumni make the shortlist to become Canada's next astronaut	Feb. 2, 2017	2,519	7,547	**10,066**
Printable solar cells just got a little closer	Feb. 16, 2017	7,603	634	**8,237**
U of T Engineering student wins Rhodes Scholarship	Nov. 22, 2016	1,308	6,801	**8,109**
New AI algorithm taught by humans learns beyond its training	Nov. 16, 2016	3,847	2,475	**6,322**
Women make up more than 40% of U of T Engineering first-year class	Dec. 8, 2016	3,609	272	**3,881**
Grads to Watch: Meet 16 global engineering leaders	June 8, 2016	3,077	241	**3,318**
Professor Elizabeth Edwards wins Killam Prize	Apr. 18, 2016	912	2,248	**3,160**
U of T Engineering alumni set world record for fastest human-powered vehicle — again	Sept. 26, 2016	2,719	272	**2,991**
Making sense of disasters: U of T Engineering offers new certificate in Forensic Engineering	Dec. 13, 2016	1,336	1,479	**2,815**
Recycling carbon dioxide: U of T researchers efficiently reduce climate-warming CO_2 into building blocks for fuels	Aug. 3, 2016	1,348	1,252	**2,600**
15 U of T Engineering students honoured with 2016 Gordon Cressy Student Leadership Awards	Apr. 21, 2016	1,915	436	**2,351**
How does water behave in space? U of T Engineering researchers aim to solve longstanding mystery	July 18, 2016	1,381	899	**2,280**
Clean air map from U of T Engineering researchers helps cyclists avoid air pollution	Apr. 22, 2016	956	1,151	**2,107**
Canada's largest STEM event for kids inspires 1,400 future innovators	May 12, 2016	2,103	-	**2,103**
Drone-delivered AEDs offer novel approach to saving lives at home	Nov. 14, 2016	1,069	981	**2,050**
Alumnus leaves landmark $20-million bequest to U of T Engineering	May 26, 2016	1,322	674	**1,996**
Engineering students construct monument to mark National Day of Remembrance and Action on Violence Against Women	Dec. 6, 2016	1,533	226	**1,759**
U of T Engineering doctoral students receive Vanier Scholarships worth $150,000	Oct. 14, 2016	1,563	-	**1,563**
The Entrepreneurship Hatchery: Three student startups to watch	May 31, 2016	1,054	257	**1,311**
U of T engineer says diesel trains may expose passengers to exhaust	Feb. 7, 2017	289	1,011	**1,300**
Can microwaves make mining more sustainable?	Feb. 1, 2017	660	604	**1,264**
Double-fortified salt to improve nutrition for 24 million in Uttar Pradesh	Feb. 13, 2017	627	528	**1,155**
11 U of T Engineering professors and alumni inducted into Canadian Academy of Engineering	June 27, 2016	1,142	-	**1,142**
Three startups to watch from Demo Day at U of T Engineering's Entrepreneurship Hatchery	Sept. 13, 2016	785	257	**1,042**
Hart Professorships awarded to seven early-career faculty members	Sept. 1, 2016	1,035	-	**1,035**
Meet 14 new professors joining U of T Engineering	Oct. 25, 2016	1,014	-	**1,014**
Academic excellence and athletics: 25 U of T Engineering students recognized	Nov. 25, 2016	993	-	**993**
Peter Zandstra named University Professor, U of T's highest academic rank	June 3, 2016	956	-	**956**
'Our students are fearless': Deepa Kundur starts as chair of Engineering Science	Jan. 6, 2017	916	-	**916**
Sponging up oil from tailings ponds	Feb. 27, 2017	529	362	**891**
New stem cell-based gene test predicts patient risk in acute myeloid leukemia	Dec. 7, 2016	327	543	**870**
The next generation of solar pioneers: Electrifying a nation	Dec. 7, 2016	455	377	**832**
Four recent U of T Engineering graduates go through business bootcamp at The Next 36	May 31, 2016	762	-	**762**

Note 8.2: Data shown is as of May 1.

Online Activity

Faculty Website

A refresh of the Faculty website (engineering.utoronto.ca) in spring 2016 for improved homepage design and enhanced search engine optimization yielded a 5% increase in acquisition through organic search (the most common way visitors reach the site). Direct traffic to the homepage was also up 19% over 2015–2016, and referral from other sites is down 42%, revealing that the majority of visitors seek out the site directly. The average amount of time users spent on each page increased almost 19% to 3:46, and exits from the site dropped almost 7% over the previous period, indicating that users are finding the information they seek more quickly. More than 40% of users visited the site from outside of Canada. The proportion of users accessing the Faculty site via mobile devices climbed 11.8% from 2015–2016, continuing an accelerating trend across all sites.

Recruitment and Admissions Websites

Our Discover Engineering website (discover.engineering.utoronto.ca) is the first destination for prospective students and their families seeking information about U of T Engineering programs, culture and offerings. It is our first impression to this critical audience. Unique visitors to the site increased from 154,781 to 212,963, a jump of 37.6% over the same period in 2015–2016 and pageviews climbed 16%, from 759,245 to 882,231. The proportion of users visiting the site from mobile devices almost doubled since the previous year. Visitors to the site came from 195 countries, illustrating the strong international draw of our programs.

Once they receive an offer, admitted students are provided exclusive access to our You Belong Here microsite (uoft.me/YouBelongHere). This dynamic site presents positive and congratulatory imagery and key messaging, as well as information on next steps for students to accept their offers. The You Belong Here site is not indexed by Google, and is therefore exclusively viewed by admitted students, providing valuable insight into students' actions and decision-making processes post-offer. When it was introduced as a component of the 2016 recruitment cycle, U of T Engineering extended 2,971 printed offers of admission, and 3,100 unique users engaged with the site, resulting in 17,000 pageviews. The higher number of visitors than offers is likely due to admitted students sharing the site with their friends or families. Of students offered admission, 40% ultimately accepted — a record-high yield — and their entering average was at an all-time high of 93.2%. The 2016 first-year class was the most gender-diverse in the Faculty's history, with 40.1% women, up from 31.4% in fall 2015.

During the 2017 recruitment and admissions cycle, the site proved an incredibly popular and effective communications vehicle for our admitted students: unique users increased 279.1% over the previous year, and pageviews climbed 241.3%. At the same time, the site's bounce rate decreased by 17%, indicating that students who arrive to the site find valuable information immediately. Women represent more than 40% of visitors to the site (source: Google Analytics). Besides the homepage, the page providing step-by-step guidance on how to accept an offer is the most-visited location, and the average time spent on this page is 5:13, compared to a site average of 1:42.

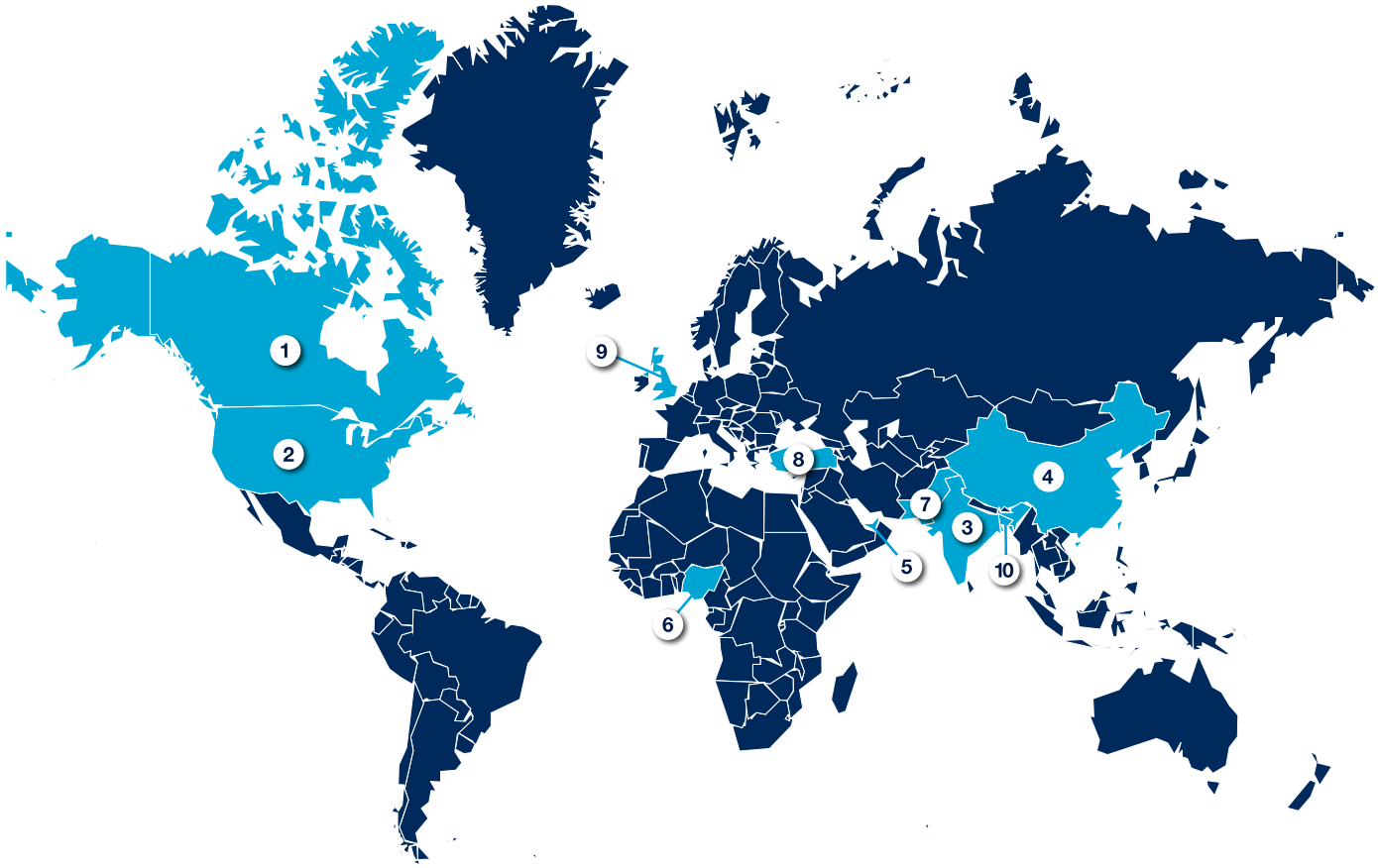
Figure 8.3a Summary of Analytics for engineering.utoronto.ca and news.engineering.utoronto.ca, 2016–2017

	Faculty Site	News Site
Pageviews	402,686	199,707
Unique visitors	146,455	104,973
Average number of pageviews per session	1.66	1.43
Average amount of time spent on site	2:31 min	0:54 min
Cities of origin	5,862	6,153
Countries of origin	198	192

Figure 8.3b Summary of Analytics for admit.engineering.utoronto.ca, 2016–2017

	You Belong Here Microsite
Pageviews	23,969
Unique visitors	4,632
Average number of pageviews per session	2.81
Average amount of time spent on site	3:05 min
Cities of origin	630
Countries of origin	91

Figure 8.4 **Visitors to discover.engineering.utoronto.ca: Top 10 Countries, 2016–2017**



Country	Visits
1. Canada	210,981 (60.32%)
2. United States	20,506 (5.86%)
3. India	18,966 (5.42%)
4. China	10,734 (3.07%)
5. United Arab Emirates	6,756 (1.93%)
6. Nigeria	5,925 (1.69%)
7. Pakistan	4,443 (1.27%)
8. Turkey	3,914 (1.12%)
9. United Kingdom	3,426 (0.98%)
10. Bangladesh	3,375 (0.96%)

9

The engineering leaders of the 21st century need to work seamlessly across borders to address pressing and complex global challenges. By enhancing the diverse perspectives within our classrooms and research labs, and strengthening opportunities for our students to think creatively and to study and work around the world, we enable them to better understand their role as catalysts for global change.

Our Centre for Global Engineering (CGEN) is a microcosm of this approach. CGEN's courses, at both the undergraduate and graduate levels, expose students to leading-edge ideas and experts who provide global perspectives. It also offers cross-disciplinary certificates and fellowship programs that support research in sanitation, alternative energy, health care and clean water. In each of these areas, U of T Engineering solutions are specifically designed to meet the unique needs of the local communites in which they will be deployed.

Our robust co-curricular programs provide undergraduate and graduate students with a range of opportunities to develop their cross-cultural fluency. These include international exchanges with partner institutions and Professional Experience Year (PEY) internships with employers around the world. In 2016–2017, nearly one in 10 PEY participants undertook an international placement.

We further strengthen our reputation as a global leader in engineering innovation through research and educational collaborations with partner organizations worldwide. These include companies such as Apple, Intel and General Electric as well as academic partners, including Tianjin University and Shanghai Jiao Tong University. Through all of these initiatives, we are ensuring that the next generation of engineering innovators and entrepreneurs is prepared to lead in the global marketplace.

International Students and Exchanges

The strength and breadth of our programming and outstanding international reputation for excellence in research and teaching continue to attract top students from around the world. In 2016–2017, international student applications rose 10.8%, and international students made up 28% of our overall undergraduate population, up from 11.3% a decade ago. The proportion of international graduate students also increased from 17.4% to 33.7% over the same period.

Through strategic partnerships and initiatives, we provide international students with the opportunity to study at U of T Engineering, including:

- **International Foundations Program (IFP)** – IFP enables academically strong students who do not meet the University's minimum English proficiency requirements to receive conditional offers of admission as non-degree students. After completing an intensive, eight-month English-language program as well as Engineering Strategies and Practice, these students continue in their second year into a Core 8 engineering program. Fourteen students joined our Faculty through this program in 2016–2017.
- **MasterCard Foundation Scholars Program** – Funded by the MasterCard Foundation, this program provides talented young people from economically disadvantaged communities, primarily in sub-Saharan Africa, with access to quality and relevant education. Eight MasterCard Foundation Scholars joined the entering class at U of T Engineering in 2016–2017, bringing the total number of recipients of these scholarships studying at the Faculty to 23.
- **U of T Engineering International Scholar Award** – Established in 2014, this award supports academically accomplished international undergraduate students with demonstrated leadership involvement.
- **Lester B. Pearson International Scholarship** – Established in 2017, this four-year undergraduate scholarship recognizes exceptional academic achievement, creativity, leadership potential and community involvement.

U of T Engineering also offers numerous opportunities for our students to gain international experience, through such initiatives as:

- **Professional Experience Year (PEY) Internship** – PEY places second- and third-year students in 12- to 16-month professional paid internships with employers in Canada and abroad. In 2016–2017, our students undertook 65 international placements — 49 U.S. placements, 16 other international placements. *(For more information on PEY, see Chapter 4: Cross-Faculty Education & Experiential Learning.)*
- **Summer Research Abroad, Structured Exchange Pathways and other exchange programs** – These programs are administered by U of T's Centre for International Experience or coordinated by the Faculty, and enable students to conduct research internships or pursue academic courses at partner institutions abroad. In summer 2017, 71 students participated in these exchange programs.
- **Global Educational Exchange (Globex)** – Hosted each summer by Peking University, Globex brings together students and faculty from engineering schools around the world for a three-week program. The Department of Mechanical & Industrial Engineering became the first Canadian partner in 2012, and four MIE students participated in summer 2016.

International Agreements

International agreements create academic pathways and partnerships that enhance our engagement with peer institutions around the world. Through these relationships, our students gain unique opportunities to increase their global fluency through summer research exchanges and cross-cultural engineering design projects, and by sharing classes with students from partner universities. International agreements also formalize and strengthen collaboration between our faculty members and researchers around the world. As of June 2017, our Faculty had more than 25 active international agreements, with access to other top institutions through University-wide partnerships.

In 2016–2017, U of T Engineering entered into new agreements on academic and research exchanges and student mobility with the following peer institutions:

- University of Brescia (Italy)
- King Mongkut's University of Technology Thonburi (Thailand)

In addition, UTIAS signed an implementation memorandum of agreement with Shanghai Jiao Tong University for a joint placement PhD program, and MIE established a dual degree program with South China University of Technology's School of Mechanical & Automotive Engineering (SMAE). This allows outstanding third-year SMAE students to apply to complete their fourth year of undergraduate study as Visiting International Non-degree Students and receive conditional offers of admission to the MEng program in their fifth year.

We also engaged with U of T's Office of the Vice-President, International, U of T's School of Graduate Studies and the National University of Singapore (NUS) to develop an International Doctoral Cluster in the area of cybersecurity. Expected to be finalized later in 2017, this will enable faculty from U of T and NUS to co-supervise doctoral students.

Data and highlights in this chapter are presented by academic year (September to August).

Selected International Education and Research Partnerships

ChemE PhD candidate finds breath of fresh air in the Netherlands

To learn more about air pollution in Canada, Kerolyn Shairsingh (ChemE PhD candidate) travelled to the Netherlands in fall 2016. Her exchange at Utrecht University is part of a three-way international research collaboration between the University of Toronto, Utrecht University and the Chinese University of Hong Kong that represents U of T's first-ever tripartite research collaboration. Shairsingh's PhD research is part of the Canadian Urban Environmental Health Research Consortium, which is working to explain the complex relationships between disease and exposure to pollution. Shairsingh's project involves quantifying the amount and type of pollution people are exposed to based on where they live. She develops air pollution concentration maps with Professors Jeffrey Brook (ChemE) and Greg Evans (ChemE) in U of T's Southern Ontario Centre for Atmospheric Aerosol Research, taking models designed to help predict pollutant exposure in specific urban areas and making them transferrable to other areas.

U of T Engineering projects receive Connaught Global Challenge Award funding

Three U of T Engineering teams that are working to resolve globally pressing issues are sharing $750,000 in funding from the recently relaunched Connaught Global Challenge Award. The internal award, funded by the Connaught Fund, is designed to support new collaborations involving leading U of T researchers and students from multiple disciplines, along with innovators and thought leaders from other sectors. Recipients include:

- **Information Technology, Transparency, and Transformation (IT3) Lab** led by Professor David Lie (ECE); includes U of T researchers from the Faculty of Law and Rotman School of Management, as well as collaborators from Princeton University, Harvard University, Tel Aviv University, Google and the Office of the Privacy Commissioner of Canada;
- **Network for Engineering Education for Sustainable African Cities (NEESAC)** led by Professor Brent Sleep (CivE); includes: U of T researchers from the Ontario Institute for Studies in Education (OISE), Faculty of Arts & Science and the Daniels Faculty of Architecture, Landscape and Design, as well as collaborators from the University of Victoria, University of Ontario Institute of Technology, and a number of African institutions;
- **Urban Genome Project** led by Mark Fox (MIE), U of T's Distinguished Professor of Urban Systems Engineering; includes U of T researchers from the Rotman School of Management, Daniels Faculty of Architecture, Landscape and Design, Faculty of Arts & Science and the University of Toronto Scarborough.

Indo-Canadian partnerships advance research into safer, more sustainable buildings

Two new collaborations between researchers at U of T Engineering and the Indian Institute of Technology Bombay (IIT Bombay) aim to improve the safety, resilience and sustainability of buildings in both countries. The India-Canada Initiative for Resilient Global Urban Shelter is a partnership between Professor Constantin Christopoulos (CivE) and Professor Ravi Sinha (IIT Bombay) that focuses on low-cost seismic isolation platforms to help buildings withstand earthquakes. Smart Sensor Deployment in Buildings: Evacuation Planning and Energy Management is a project led jointly by Professor Mark Fox (MIE) and Professor Krithi Ramamritham (IIT Bombay) that leverages a network of sensors within buildings to optimize energy use and emergency evacuation plans. Both projects received funding from IC-IMPACTS, a Canadian Network Centre of Excellence that brings communities together with academia, industry and government to develop solutions to key challenges in both India and Canada. These projects reflect the goals of India's Smart Cities Mission, a major urban renewal and retrofitting program taking place in more than 100 cities across the subcontinent.

U of T Engineering professor leads international team studying how physical stress turns on genes in stem cells

A new international collaboration led by Professor Penney Gilbert (IBBME) is studying how muscle stem cells turn genes on and off in response to physical stresses that arise in response to tissue injury. Funded by a $1.4-million grant from the Human Frontier Science Program (HFSP), it brings together Gilbert's expertise in muscle stem cells with advanced methods in biophysics from Professor Timo Betz at the University of Münster, as well as molecular imaging techniques developed by Professor Xavier Darzacq at the University of California, Berkeley. Together the team will comprehensively examine the ways in which muscle stem cells transmit the physical stresses they experience into changes in their DNA and gene expression. The results of the study could provide scientists with new, non-chemical strategies for turning genes on and off, not only in muscle stem cells, but other cell types as well. This in turn could help treat genetic diseases or other conditions caused when genes fail to turn on or off in the right place or the right time.

Professor Christopher Yip to head international partnerships at U of T

Professor Christopher Yip (IBBME), a leading researcher in the field of single-molecule biophysics, has been appointed the University of Toronto's first associate vice-president, international partnerships. He started a five-year term on July 1, 2017 and aims to foster international academic and industry collaborations. Yip brings years of leadership experience within U of T Engineering's Institute of Biomaterials and Biomedical Engineering (IBBME), which includes faculty members from engineering, medicine and dentistry who look for innovative solutions to pressing problems at the intersection of health care and engineering. In recent years, Yip's lab has hosted students from Singapore and Cuba, and sent U of T students to Asia and Europe. He also facilitated a partnership with the U.S. Department of Energy, which led two of his grad students to study at the Sandia National Laboratories in Albuquerque, NM.

Huawei and U of T strengthen strategic partnership

The University of Toronto and multinational telecommunications giant Huawei signed a bilateral research partnership agreement that will see Huawei commit $3 million to a wide range of projects, in fields from computer hardware and software to bioengineering and materials. The agreement is the product of a longstanding and productive relationship between Huawei and The Edward S. Rogers Sr. Department of Electrical & Computer Engineering, which has now grown to include 19 faculty members in several U of T Engineering departments, as well as the Department of Computer Science. Huawei is active in 170 countries and employs more than 79,000 researchers in 16 R&D centres around the world. The company has also hosted U of T Engineering undergraduate students as part of its Seeds for the Future work experience program, which invites undergraduate students from across the country to enhance their technical expertise and learn about Chinese language and culture during a two-week exchange to Beijing and Shenzhen.

Havelaar EV investment launches new era in electric vehicle research at U of T

In 2016, Havelaar EV signed a five-year, $10-million partnership agreement with U of T Engineering to establish the U of T Havelaar Electric Vehicle Research Centre (UTHEV). The agreement includes $7.5 million in collaborative research project funding and $2.5 million in seed funding for lab space, equipment and administrative needs. UTHEV represents one of the largest industry collaborations undertaken by the Faculty and is led by Professors Olivier Trescases and Peter Lehn (both ECE), with multidisciplinary collaborations with professors from MIE and UTIAS. Research activities will advance power electronics for EV drivetrains, charging infrastructure and energy storage.

10

Diversity is critical to the engineering profession and a core value of our Faculty. A vast array of perspectives and ideas deepen the creative process, enrich our learning environment, accelerate innovation and prepare our students for the global marketplace.

We have made tremendous progress in advancing diversity and inclusivity within both our Faculty and the broader profession. In fall 2016, our incoming first-year class included 40% women — the highest proportion of any engineering school in Canada — bringing the total proportion of women across all of our undergraduate programs to 30%. These advances are driving Engineers Canada toward its '30 by 30' objective of 30% female representation among newly licensed engineers by 2030.

Among our faculty, women engineers lead many of our multidisciplinary research centres and institutes, and hold positions of senior leadership at the University level. Twelve of the Faculty's 31 Canada Research Chairs are women, and in the past year, we hired 14 outstanding professors, nine of whom are women. Their areas of expertise span the breadth and depth of the profession.

We are committed to working with Indigenous communities to address educational gaps between Indigenous and non-Indigenous peoples. Building on our established outreach and recruitment activities that inspire students to engage in STEM subjects, we have created a steering committee for the discussion of ideas, information and initiatives to ensure a welcoming and supportive environment for Indigenous students, faculty, staff and communities, and to improve access to engineering education for Indigenous peoples.

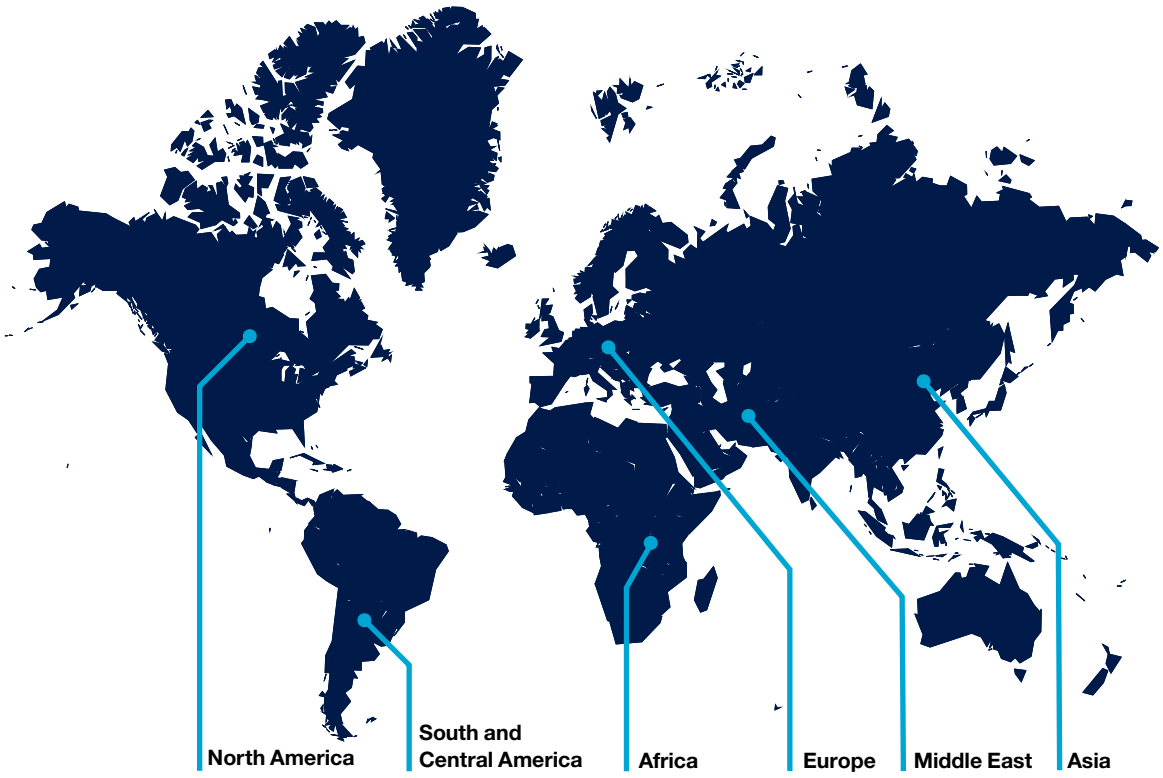
U of T Engineering is located at the heart of one of the world's most diverse cities, and our students, staff and faculty represent more than 100 countries around the globe. Together, our vibrant community shares an array of perspectives, cultivates innovative ideas and contributes to the prosperity of the region, Canada and the world.

Diversity: Measures of Progress

International Diversity

In 2016–2017, international students comprised 28.0% of all undergraduates, up from 11.3% a decade ago, while among our graduate students, 33.7% were international students, up from 17.4% in 2007–2008. To further increase the geographic and cultural diversity among our international undergraduate students, we enhanced strategic recruitment in key regions, including Brazil, Colombia, Costa Rica, Ecuador, India, Malaysia, Mexico, Peru, Singapore, Turkey, the United Arab Emirates and the United States. *(For more information about our international recruitment initiatives, please see Chapter 9: International Initiatives.)*

Figure 10.1 **Continent of Origin: Undergraduate and Graduate Students, Fall 2016**



	North America	South and Central America	Africa	Europe	Middle East	Asia
Undergraduate Students	55.1%	1.2%	1.1%	1.4%	3.6%	37.5%
Graduate Students	49.0%	1.4%	1.6%	3.1%	12.5%	32.3%
Overall	53.3%	1.2%	1.3%	1.9%	6.3%	35.9%

Data and highlights in this chapter are from September 2016 to August 2017.

Note 10.1: Not shown—0.1% of undergraduate and graduate students from Oceania, which includes Australia, New Zealand and other countries in the Pacific Ocean. Country of origin is derived from a combination of citizenship, location(s) of previous studies (e.g., elementary school, high school and university) and permanent address. This information does not indicate current Canadian immigration status, which is used to determine domestic/international student status for tuition and funding purposes.

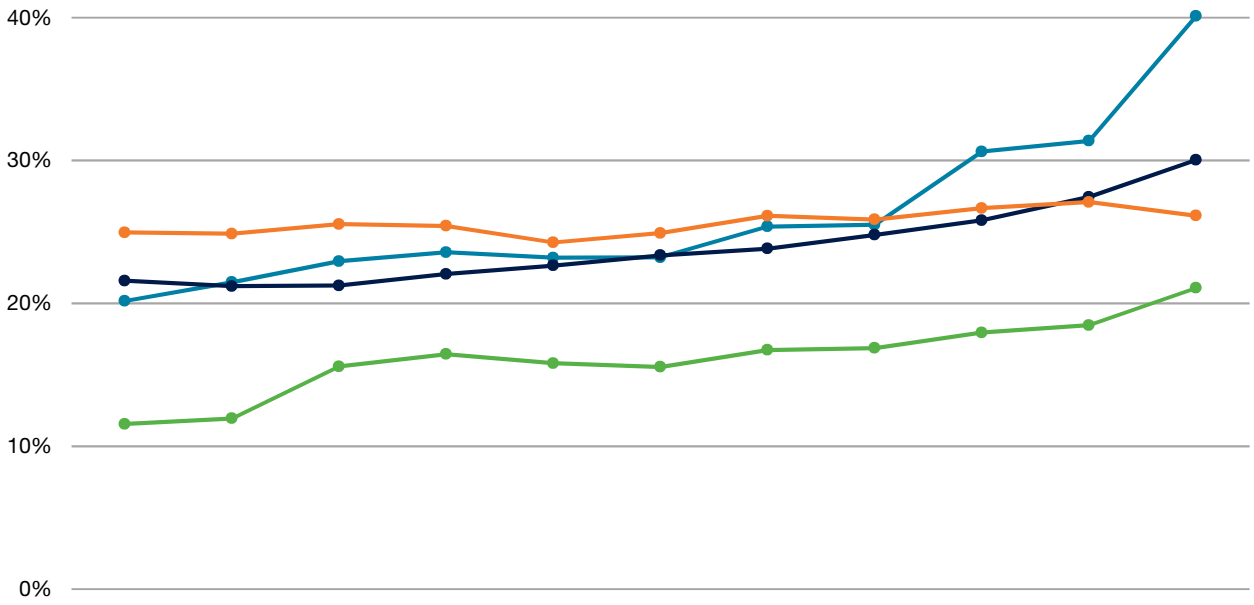
Outreach and Inclusivity

Many of our Faculty's strategic outreach and recruitment initiatives focus on increasing the number of talented women who apply to and enrol in our programs. Our approach builds awareness of the profession and enhances students' understanding of U of T Engineering and its role as a global leader in research and education.

Events such as the Young Women in Engineering Symposium (YWIES) and the Girls' Leadership in Engineering Experience (GLEE) inspire students as they learn more about the impact they can make as engineers in fields from sustainable energy to health care. In October 2016, we welcomed 53 top female Grade 12 students from the Toronto area to the third annual YWIES, which enabled them to participate in experiential workshops on topics ranging from sustainable energy to engineering leadership. Thirty-one of the attendees applied to the Faculty for September 2017.

GLEE, a weekend-long program for top female applicants who have received offers of admission to U of T Engineering, inspires students to learn more about the contributions they can make as engineers and the many opportunities our Faculty provides. It enables talented young women to meet with the Dean, professors, alumni and current students and to learn about their experiences studying and working in engineering. This year, 99 of the 115 students who participated in GLEE accepted their offers of admission.

Figure 10.2 **Percentage of Women Students and Faculty, 2007–2008 to 2016–2017**



	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
First Year Undergrad	21.5%	22.9%	23.6%	23.2%	23.2%	25.4%	25.5%	30.6%	31.4%	40.1%
All Undergrad	21.2%	21.3%	22.1%	22.6%	23.4%	23.8%	24.8%	25.8%	27.4%	30.0%
Graduate Students	24.9%	25.5%	25.4%	24.3%	24.9%	26.1%	25.9%	26.7%	27.1%	26.1%
Faculty	11.9%	15.6%	16.5%	15.8%	15.5%	16.7%	16.9%	18.0%	18.5%	21.1%

In 2016–2017, we engaged more than 10,000 pre-university students, about half of whom are girls, through our innovative and robust outreach programs, such as:

- **Da Vinci Engineering Enrichment Program (DEEP) Summer Academy**, which provides high school students from around the world with the opportunity to engage in experiential learning activities in a variety of engineering, technology, business and science disciplines;
- **Jr. DEEP** and **Girls' Jr. DEEP** summer day camps and Saturday programs, which enable students in Grades 3 to 8 to explore engineering;
- **Go Eng Girl** and **Go CODE Girl** workshops, which enable girls in middle and high school to explore engineering and computer coding;
- **ENGage**, a collaboration between between the U of T chapter of the National Society of Black Engineers and the Faculty of Applied Science & Engineering, which highlights black role models, encourages literacy in science, technology, engineering and math (STEM), and promotes academic and social growth.

U of T Engineering undergraduate students, including members of the Engineering Society's Hi-Skule outreach group and Women in Science and Engineering (WISE), also visit schools throughout the province each year. These STEM ambassadors lead students in immersive workshops on engineering topics, acting as mentors and sharing the boundless possibilities of an engineering education with students of all backgrounds.

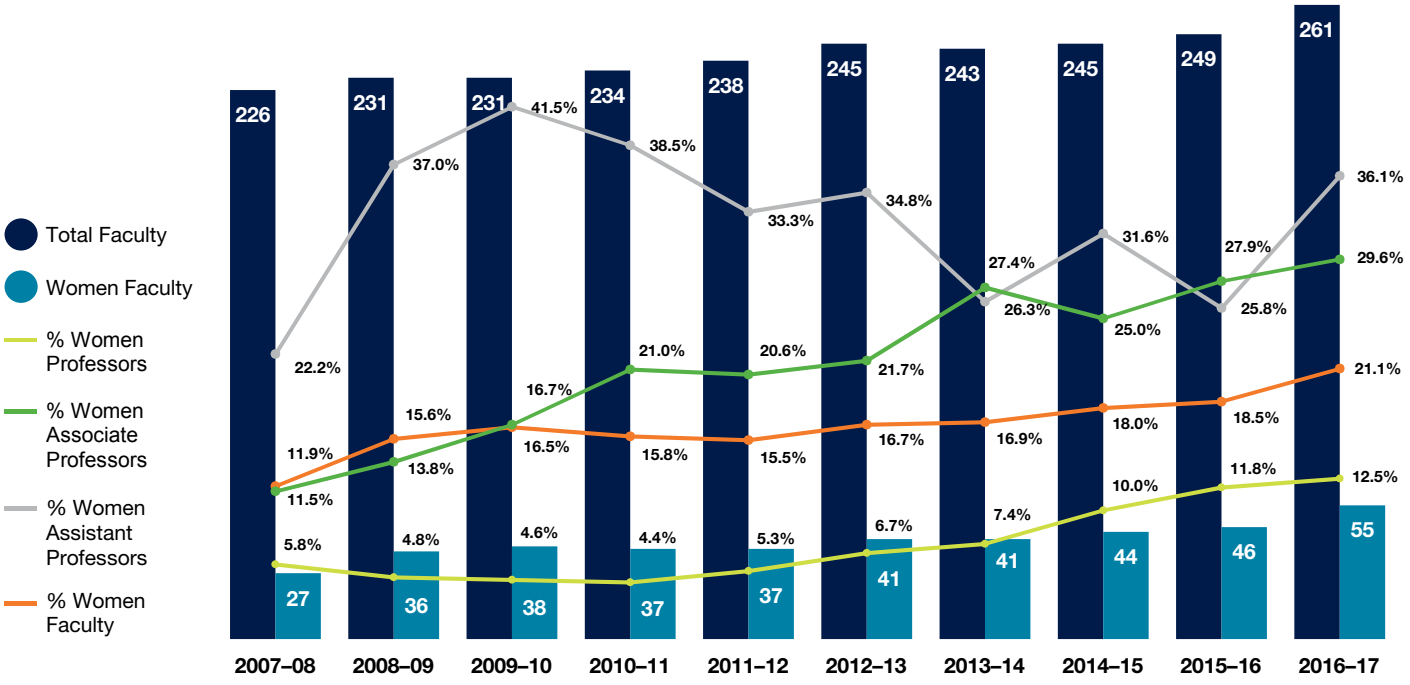
In 2016–2017, WISE ambassadors visited 13 high schools, delivering as many as three presentations at each school, and gave five presentations to organizations such as Big Brothers Big Sisters. Hi-Skule held six outreach events throughout 2016–2017, highlighted by the Back to Hi-Skule event, which included presentations by student ambassadors at 21 high schools in the Greater Toronto Area. Hi-Skule also hosted several events that drew more than 500 pre-university students, including two Mentorship Coffeehouses, a networking event for high school students, a robotics workshop for middle school students, and a high school design competition that drew more than 200 students.

Indigenous Youth and STEM

We are working with U of T's First Nations House and with Indigenous peoples and communities to increase the number of Indigenous students who apply to and enrol in U of T Engineering programs, and to ensure a welcoming, supportive and inclusive environment for students, faculty and staff. Following the Truth and Reconciliation Commission (TRC) of Canada's call to eliminate educational gaps between Indigenous and non-Indigenous peoples, the University of Toronto published a report, *Answering the Call: Wecheehetowin,* which called on the U of T community to take action in six key areas: Indigenous spaces, Indigenous faculty and staff, Indigenous curriculum, Indigenous research ethics and community relationships, Indigenous students and co-curricular education, and Institutional leadership and implementation.

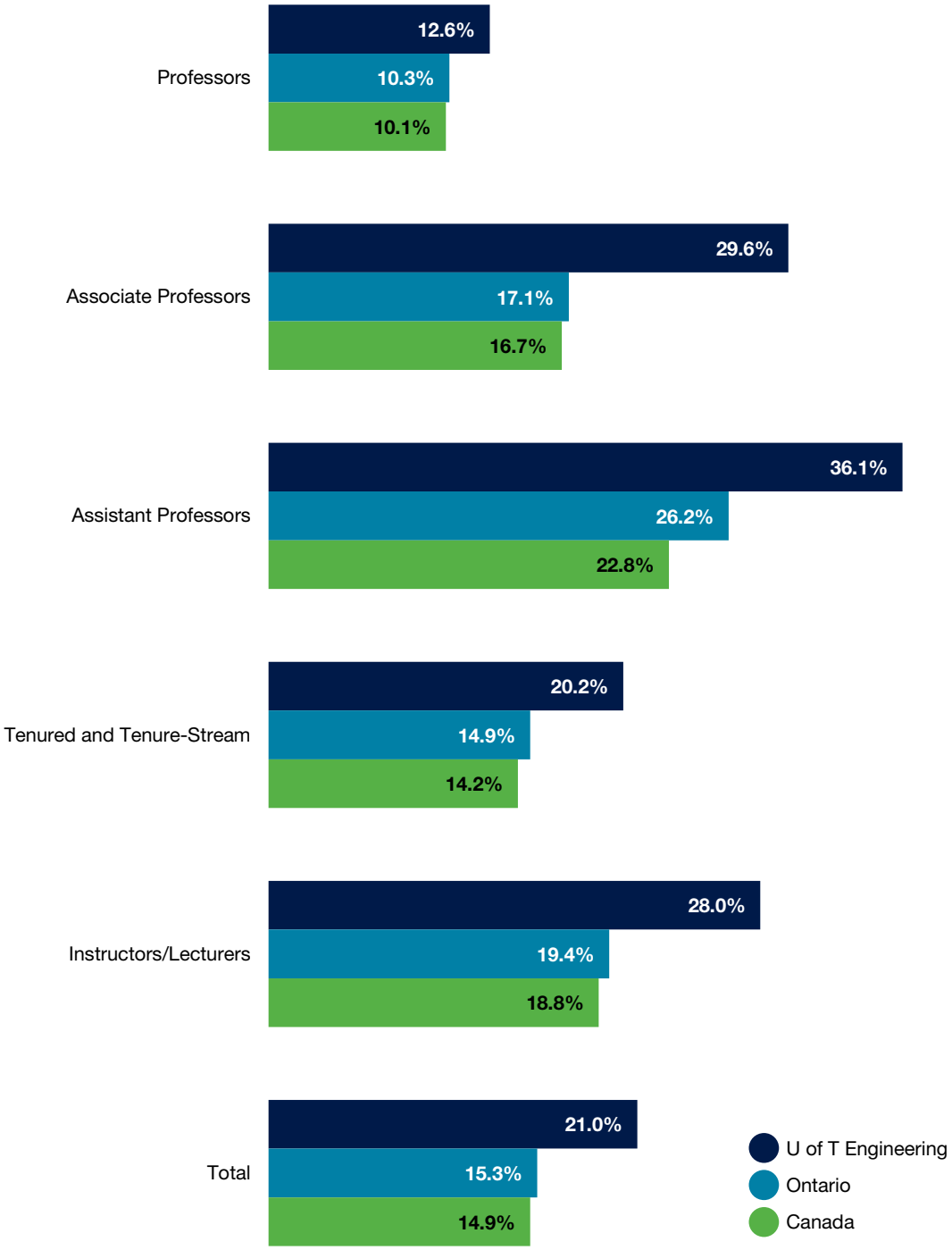
In response to *Answering the Call,* U of T Engineering established the Eagles' Longhouse: Engineering Indigenous Initiatives Steering Committee, with members from across the Faculty and the Oneida Nation, in winter 2017. The steering committee has a mandate to engage Indigenous representatives and engineering educators to design a *Blueprint for Action* to effect immediate and ongoing improvements in the relationship between the Faculty and Indigenous communities, including facilitating greater integration of existing outreach, recruitment and retention initiatives, both within the Faculty and across the University, that affect Indigenous engineering students. The steering committee is establishing a series of working groups, including an Indigenous Hiring Working Group, Indigenous Spaces Working Group, Anti-discrimination Hiring Process Working Group and Indigenous Advisory Network Working Group. In fall 2017, the steering committee will present its recommendations.

Figure 10.3 **Total Number of Faculty with Percentage of Women, 2007–2008 to 2016–2017**



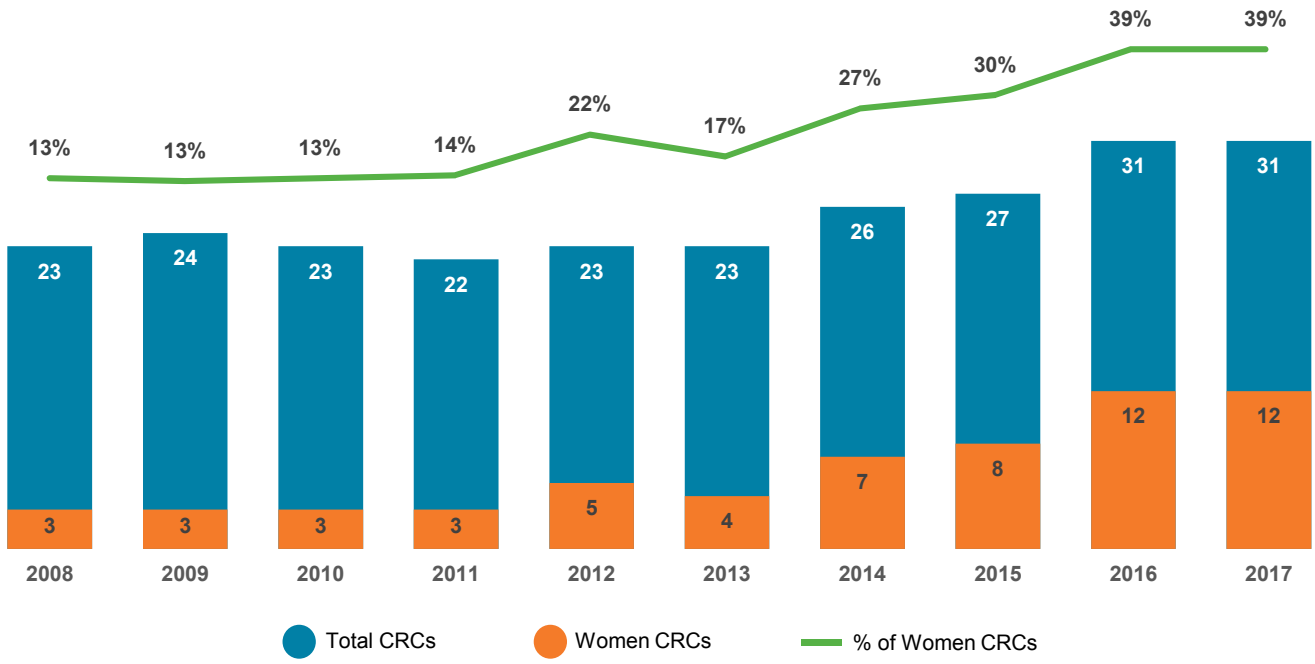
Note 10.3: Data for this figure are based on headcount.

Figure 10.4 **Percentage of Women Faculty at U of T Engineering Compared with Women Faculty in Ontario and Canadian Engineering Faculties, Fall 2016**



Note 10.4: Data in this figure comes from Engineers Canada. Counts are based on full-time equivalent (FTE) faculty as of November 15, 2016.

Figure 10.5 **Canada Research Chairs with Number and Percentage of Women Chairholders, 2008–2017**



Diversity: Selected Highlights

WISE conference highlights professional and personal development

More than 300 leading academics, industry professionals and students from universities across Canada convened at U of T Engineering in January 2017 for the fifth-annual Women in Science and Engineering (WISE) national conference. The two-day event serves as a catalyst to inspire and empower young women to pursue their passions, broaden their horizons and form meaningful connections. This year's theme was *Ignite Your Passion,* and the program included professional and personal development opportunities, including Women Creating Impact research and technology panels, sessions on breaking the glass ceiling, storytelling, job interviewing and networking, a Three-Minute Thesis competition, a business consulting case competition, and a career fair.

Dean Amon appointed U of T's Provostial Advisor on STEM

Dean Cristina Amon will serve in the role of U of T's Provostial Advisor on Women in Science, Technology, Engineering and Math (STEM) beginning July 1, 2017. She fosters a rich culture of diversity and inclusivity within the U of T Engineering community and the profession, and has championed strategic recruitment initiatives that have resulted in greater diversity among new students and faculty members. In this newly created role, Dean Amon will advise on matters related to women in STEM at the University and will work with the vice-provosts and divisions to develop strategies for recruitment, retention and professional development.

U of T Engineering ENGages students in under-served communities

A unique partnership between U of T Engineering and the U of T Chapter of the National Society of Black Engineers (NSBE) provides opportunities for black youth to experience engineering. ENGage on Campus, which is in its seventh year, is a week-long day camp for students in Grades 3 to 8 that provides participants with hands-on activities that demonstrate engineering principles and practices. ENGage in Schools, now in its third year, partners with the Toronto District School Board to bring 30 black students with an interest in STEM from schools in a priority community to the University for engineering-oriented classes taught by U of T Engineering students who are from the same neighbourhood. ENGage in Your Community, which was piloted in 2016–2017, offers both in-school workshops and one-week camps in schools and community centres in areas identified as under-served. While not limited to black participants, this program, like all ENGage programs, operates on a barrier-breaking model and all participants come from under-represented communities. In addition to ENGage programs, the Engineering Outreach Office also delivers the Urban In-school Workshop program (ISW), which has been running for more than 20 years. The Urban ISW program provides more than 100 STEM-related workshops each May and June that are delivered in schools that are defined as sitting in at-risk communities.

U of T Engineering hosts 2016 Young Women in Engineering Symposium

More than 50 aspiring female engineers gathered at U of T for the annual Young Women in Engineering Symposium (YWIES) in October 2016. Now in its third year, the symposium brought together high-achieving high school students for a day of hands-on workshops, talks and discussion panels designed to inspire young women to choose U of T Engineering. Current U of T Engineering student ambassadors led YWIES delegates in icebreaker activities, Professor Jason Foster (EngSci) and Professor Chirag Variawa of the First Year Office facilitated workshops in the Faculty's Technology Enhanced Active Learning (TEAL) room, and University Professor Molly Shoichet (IBBME, ChemE) delivered the keynote address.

Nine women among 14 new U of T Engineering faculty members

Nine women working at the forefront of engineering education and research were among the 14 professors who joined the Faculty in 2016–2017. Each brings a unique passion for experiential engineering education and research expertise that addresses important challenges facing people around the world, from sustainability in the mining sector to optimizing health-care systems. The nine include:

- **Professor Fae Azhari** (MIE, CivE), who specializes in structural health monitoring of bridges, aircraft, wind turbines and other engineering systems to advance sustainable infrastructure management.
- **Professor Erin Bobicki** (MSE, ChemE), who aims to improve the sustainability of mining operations by developing enhanced techniques for mineral processing that reduce energy and water use, as well as overall environmental impact.
- **Professor Merve Bodur** (MIE), whose research focuses on new mathematical methods and big-data analytics to optimize complex processes, including staffing, decision-making and resource allocation.
- **Professor Jennifer Farmer** (ChemE), a teaching-stream faculty member with expertise in synthetic and organometallic chemistry.
- **Professor Naomi Matsuura** (MSE, IBBME), whose research focuses on the application of nanotechnology, including injectable nanoparticles used as imaging agents, to the diagnosis and treatment of cancer.
- **Professor Alison Olechowski** (MIE, ILead), a teaching-stream faculty member who uses a systems engineering approach to develop improved methods for corporate processes, such as product development and risk management.
- **Professor Shoshanna Saxe** (CivE), who is an expert on public transit, in particular the impact of public infrastructure investments on society and the environment.
- **Professor Patricia Sheridan** (ILead), who has developed novel tools to teach and evaluate team effectiveness and leadership competencies in undergraduate engineering courses.
- **Professor Marianne Touchie** (CivE, MIE), whose research focuses on improving the energy performance and indoor environmental quality of existing buildings through comprehensive retrofits.

U of T Engineering observes Pink Shirt Day

Our Faculty continues to raise awareness of LGBTQ perspectives and experiences, and we have had representation on the U of T Positive Space Committee since its inception in 1996. The committee promotes safe and inclusive spaces for LGBTQ students, staff, faculty, alumni and allies. These spaces are marked by rainbow triangle stickers posted on doors and in offices across campus. We also hold a number of events, including Pink Shirt Day and Pride Month, that celebrate diversity and inclusivity, and that demonstrate our commitment to ensuring that all engineering space is positive space. Students, staff and faculty gathered in the atrium of the Sandford Fleming Building on Feb. 22, 2017, to observe Pink Shirt Day. The annual event, which aims to end bullying, began after students at a Nova Scotia high school wore pink shirts to support a boy who had been bullied for wearing a pink shirt. Members of the U of T Engineering community posted photos of themselves on social media using the hashtag #pinkskule.

11

Financial and Physical Resources

To achieve the ambitious goals set out in our Academic Plan, we have made strategic decisions that maximize the efficiency of our resources — including funding, space, infrastructure and personnel — and lead to an overall strengthening of our financial position.

Total revenue in 2016–2017 grew by 6.0% over the previous year, driven by strong growth in MEng enrolment. Our net revenue, after the deduction of central costs, increased by 6.5% over the previous year. Growing revenue, combined with prudent budgeting and careful fiscal management, facilitated ongoing infrastructure improvements as well as investment in strategic initiatives and funding for planned future priorities.

The Dean's Strategic Fund (DSF) continues to provide seed funding for projects and collaborations that have a broad impact on our Faculty. These include research collaborations that bring experts together across disciplines to address major challenges, as well as initiatives to enhance the student experience, from improvements to teaching labs and fabrication spaces to new experiential learning programs. In 2017, we committed $5.3 million through the DSF for a number of initiatives that will be implemented over the next three years.

The Engineering Instructional Innovation Program (EIIP), an extension of the DSF, continues to foster curriculum innovation through strategic investments aimed at enhancing teaching and learning and the overall student experience. The new TEAL Fellows Program supports the design of undergraduate and graduate courses to include active-learning approaches that leverage our Technology Enhanced Active Learning (TEAL) classrooms. In spring 2017, the Faculty announced the inaugural cohort of 23 TEAL Fellows (see p. 28).

In 2016, we created the Dean's Infrastructure Improvement Fund (DIIF) to support large-scale infrastructure improvements within our Faculty. We also partnered with the federal and provincial governments to invest a total of $31.6 million in renovations to 89 laboratory facilities across our Faculty over the next two years through the Lab Innovation for Toronto (LIFT) project.

The most significant capital project the Faculty is undertaking is the Centre for Engineering Innovation & Entrepreneurship (CEIE). When the CEIE opens, it will provide a new home for multidisciplinary research institutes such as the Centre for Global Engineering and the Institute for Robotics & Mechatronics, as well as TEAL classrooms, prototyping and fabrication facilities, design studios and dedicated space for student clubs and teams. It will serve as a vibrant hub that will enable us to strengthen our world-leading collaborative multidisciplinary research and teaching enterprise, drive innovation, facilitate entrepreneurship and cultivate global engineering leaders.

Total Revenue and Central Costs

The Faculty's total revenue and associated costs are reflected in Figures 11.1 and 11.2. Revenue in 2016–2017 grew to $222.8 million, an increase of 6.0% over 2015–2016, with a compound annual growth rate of 6.6% since 2007–2008.

Total central costs rose to $99.1 million, a 5.4% increase over 2015–2016, with a compound annual growth rate of 5.2% since 2007–2008. Central costs include the student aid levy, university fund contribution and university-wide costs, which experienced year-over-year increases of 1.9%, 10% and 5.0%, respectively (Figures 11.2 and 11.3). The rise in our student aid levy is part of our commitment to provide need-based assistance. U of T's Student Access Guarantee makes this goal clear: "No student offered admission to a program at the University of Toronto should be unable to enter or complete the program due to lack of financial means." Student aid ensures we continue to attract the very best students regardless of their financial situation.

University-wide costs, which include caretaking, utilities, central human resources, student services, information technology, central library, advancement and research services, to name a few, also increased. Factors included: compensation increases, development of a new student information system, improved wireless access across campus, pension deficit special payments, Provostial academic initiatives, and an enhanced Advancement marketing plan.

When these costs are subtracted from our total revenue, the result is a net revenue increase of 6.5% to $123.6 million year-over-year, with a compound annual growth rate of 7.9% since 2007–2008.

Figure 11.1 **Total Revenue, 2007–2008 to 2016–2017**

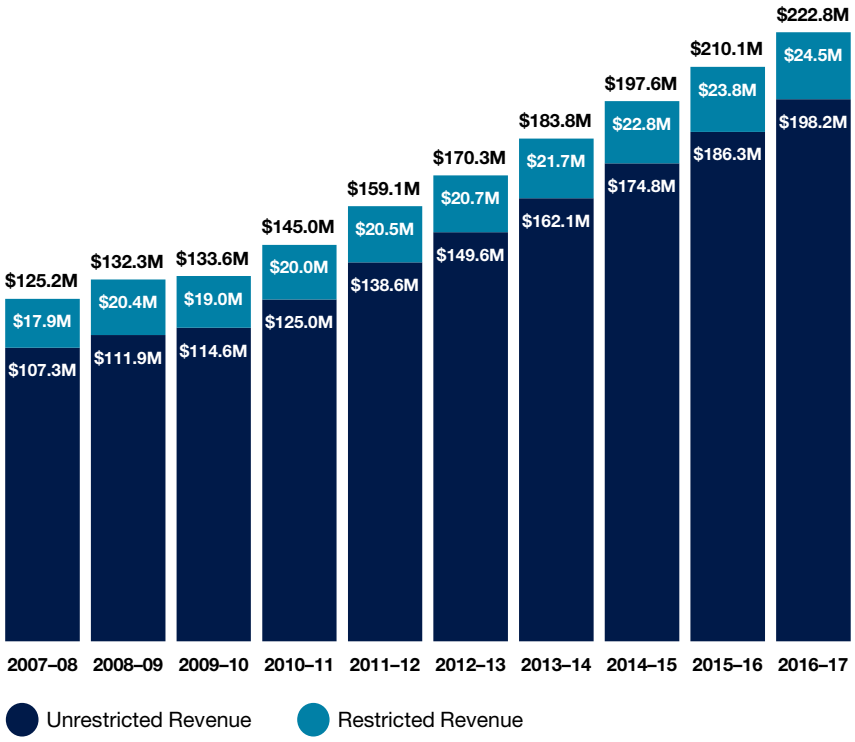
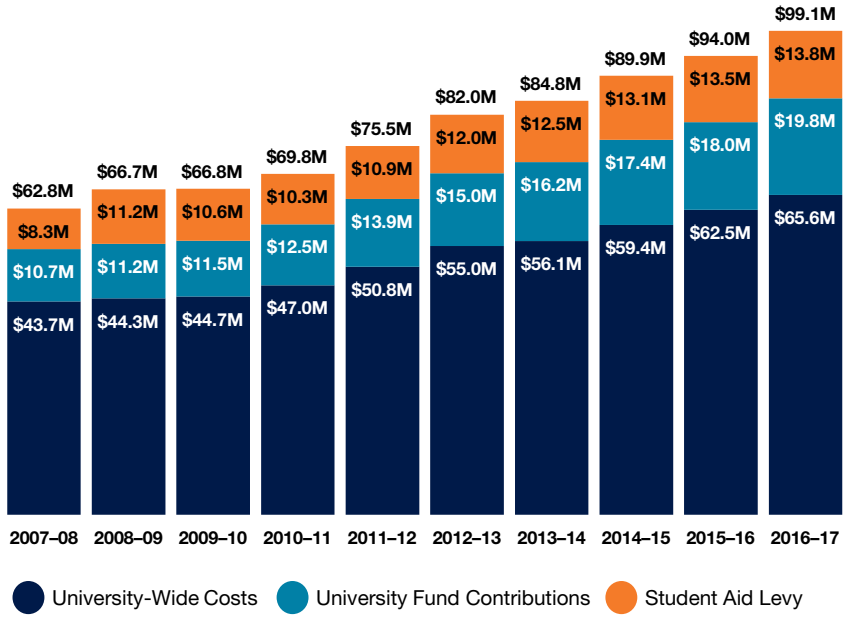


Figure 11.2 **Total Central Costs, 2007–2008 to 2016–2017**



Data in this chapter are presented by fiscal year (May to April). Selected projects were completed or begun between September 2016 and July 2017.

Figure 11.3 **Budget Data, 2007–2008 to 2016–2017**

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Unrestricted Revenue	$107,347,671	$111,937,605	$114,602,697	$124,966,518	$138,597,605	$149,615,656	$162,048,175	$174,819,446	$186,298,686	$198,246,669
Restricted Revenue	$17,885,747	$20,395,795	$18,969,092	$20,009,763	$20,483,566	$20,726,973	$21,737,177	$22,751,425	$23,766,755	$24,525,299
Total Revenue	**$125,233,418**	**$132,333,400**	**$133,571,789**	**$144,976,282**	**$159,081,170**	**$170,342,629**	**$183,785,352**	**$197,570,871**	**$210,065,441**	**$222,771,967**
Inter-Divisional Teaching Revenue Transfer									**$6,042,335**	**$5,084,764**
University-Wide Costs	$43,698,011	$44,307,203	$44,693,620	$47,027,056	$50,817,454	$55,028,273	$56,089,556	$59,390,462	$62,461,112	$65,553,462
University Fund Contributions	$10,734,767	$11,193,761	$11,460,270	$12,496,652	$13,859,760	$14,961,566	$16,167,220	$17,443,377	$17,985,353	$19,787,234
Student Aid Levy	$8,322,264	$11,166,550	$10,614,513	$10,313,864	$10,859,371	$11,995,084	$12,539,417	$13,093,888	$13,541,938	$13,793,571
Total Central Costs	**$62,755,042**	**$66,667,514**	**$66,768,403**	**$69,837,572**	**$75,536,585**	**$81,984,923**	**$84,796,193**	**$89,927,727**	**$93,988,403**	**$99,134,267**
Net Revenue	**$62,478,376**	**$65,665,886**	**$66,803,386**	**$75,138,710**	**$83,544,585**	**$88,357,706**	**$98,989,159**	**$107,643,144**	**$110,034,703**	**$118,552,936**

Budget Overview

Our revenue sources, attributed central costs and budget breakdown for 2016–2017 are shown in Figures 11.4, 11.5 and 11.6, respectively. Revenues are up 6.0% year-over-year, driven by solid growth in MEng enrolment and historically higher undergraduate enrolment over the past decade. Government grant revenues have remained relatively stagnant as the grant per domestic student has not changed for a number of years.

The ability to consistently grow net revenue at the Faculty level enables us to pursue renewal objectives, including major strategic initiatives such as the CEIE and the Lab Innovation for Toronto (LIFT) fund matching requirement. Further prudent budgeting and fiscal management across the Faculty have allowed us to fund reserves to meet future commitments, upgrade existing classrooms and laboratories and invest in Dean's Strategic Fund (DSF) and Dean's Infrastructure Improvement Fund (DIIF) initiatives.

Figure 11.4 **Revenue Sources, 2016–2017**

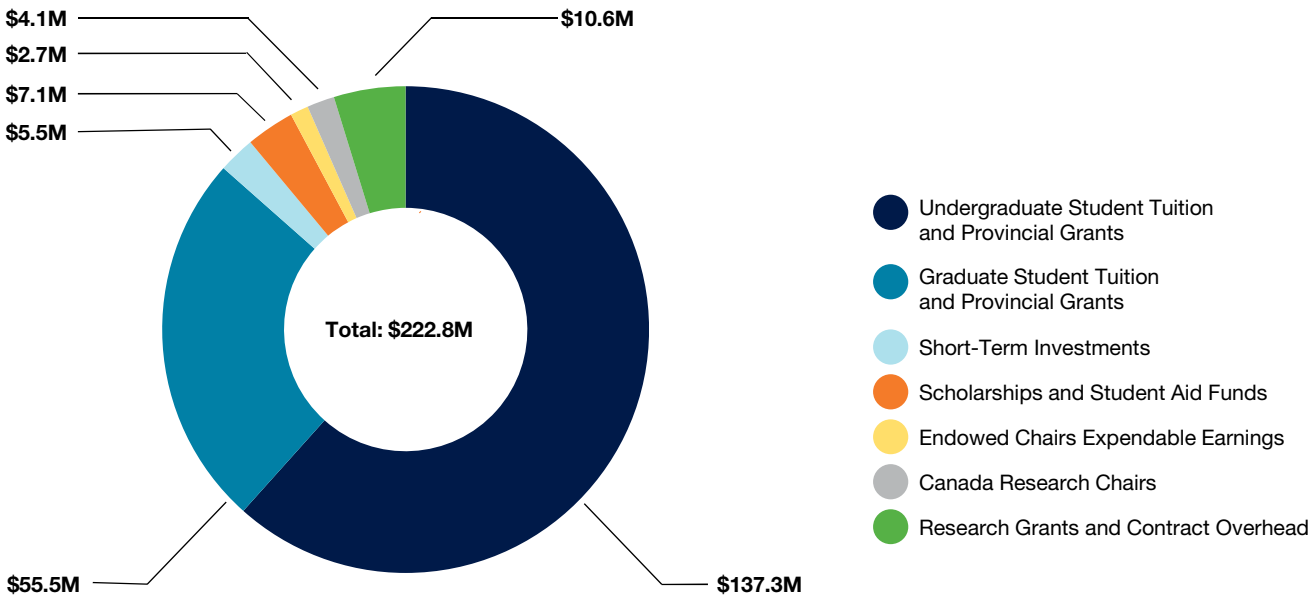


Figure 11.5 **Revenue Distribution, 2016–2017**

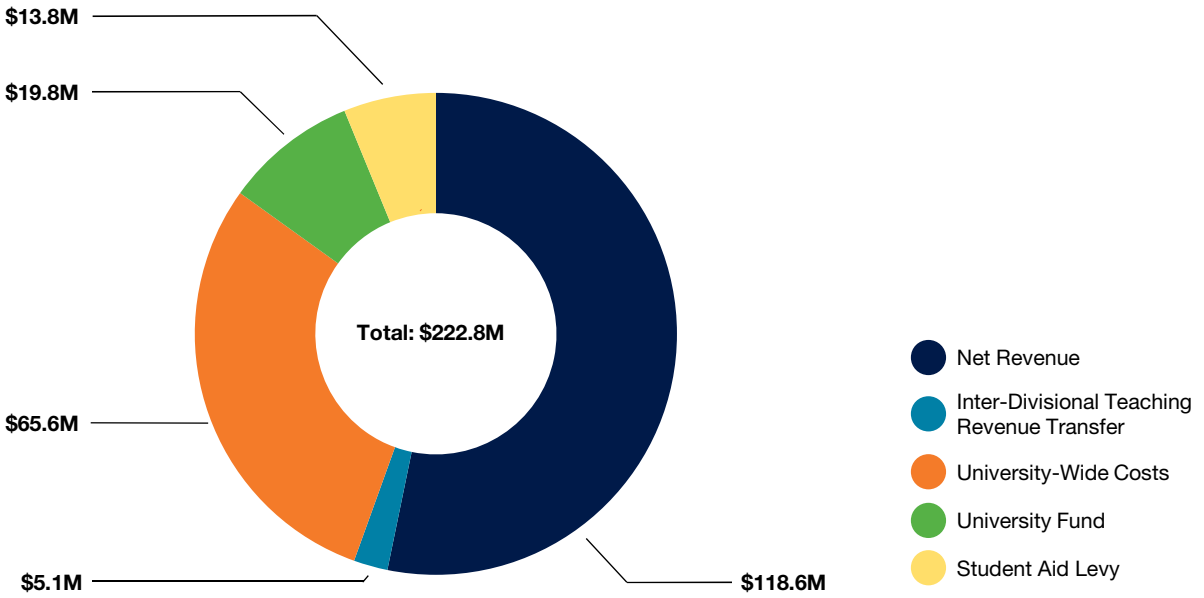
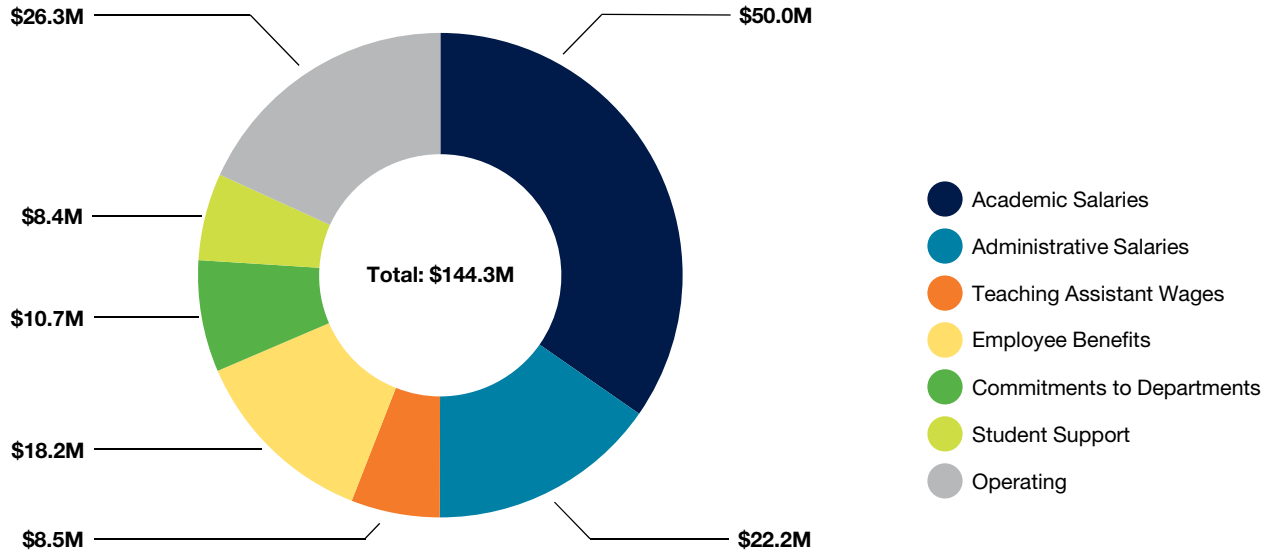


Figure 11.6 **Total Operating Budget: Breakdown by Expense, 2016–2017 (net of central university costs)**



Lab Innovation for Toronto (LIFT)

In 2016, the Government of Canada launched the Post-Secondary Institutions Strategic Investment Fund (SIF), a program that will provide up to $2 billion over three years (2016–2019) to accelerate infrastructure projects at universities and colleges across Canada. Our Faculty was a lead contributor to the University of Toronto's Lab Innovation for Toronto (LIFT) project, which sought support from this fund and from the Province of Ontario for improvements to research infrastructure.

In July 2016, we partnered with the federal and provincial governments to invest a total of $32.6 million in renovations to 89 laboratory facilities across our Faculty over two years (2016–2018) through LIFT. Some of the improvements include:

- Renovations to lab space in the Galbraith, Sandford Fleming and the Engineering Annex buildings to further enhance collaboration among researchers within and across disciplines. These renovations will also upgrade environmental controls to protect sensitive research equipment and experimental processes;
- Purchase of new laboratory equipment, including more fumehoods to increase the number of experiments that can be run simultaneously, for labs at the Institute of Biomaterials & Biomedical Engineering (IBBME), the Department of Chemical Engineering & Applied Chemistry and the Department of Mechanical & Industrial Engineering;
- Expansion of the Sustainable Aviation Design Lab at the University of Toronto Institute for Aerospace Studies, enhancing the work of researchers who are reducing emissions and cutting fuel costs in the global aviation industry.

See page 126 for more projects underway.

Dean's Infrastructure Improvement Fund (DIIF)

We created the Dean's Infrastructure Improvement Fund (DIIF) in 2016 to fund large-scale infrastructure improvements within our Faculty. These projects are brought forward by the sponsoring departments or institutes, who share the costs 50:50 with the Faculty. The purpose of the DIIF is to upgrade facilities and enhance teaching and research laboratory spaces in order to improve the student experience. Projects funded under the DIIF include:

- **Aiming for a Higher CALIBRE Experience** — An extension to the recent renovations of the IBBME teaching laboratory in the Lassonde Mining Building, this project involves upgrading a number of systems, including electrical work, CO_2 gas lines and eyewash stations;
- **Undergraduate Materials Science Labs** — These labs in the Wallberg Building are widely used in first-, second- and third-year courses. They will receive a complete renovation, including new fumehoods, lab benches and moveable furniture;
- **The Catapult Innovation Research Space** — This project will create a joint facility for IBBME and the Department of Medical Imaging. It will upgrade a laboratory facility on the fourth floor of the Rosebrugh Building to Level 2 biosafety standards, which includes a new fumehood, new lab benches and electrical upgrades;
- **Lecture Theatres** — Air-conditioning systems will be added to three lecture theatres in the Mechanical Engineering Building to improve student comfort during lectures.

Dean's Strategic Fund

The Dean's Strategic Fund (DSF) provides seed funding for projects and initiatives that will have a broad impact within the Faculty. The DSF awarded $5.3 million over three years to support 20 new projects designed to further the goals of the Faculty's Academic Plan over the next three years. These projects included:

Lassonde Institute of Mining Hub

This initiative will create a hub for academic-industry partnerships that brings together the Faculty's deep expertise in mineral exploration, mining engineering, computational geomechanics, mineral process engineering, metallurgy and water management to develop transformative solutions to pressing challenges faced by the mining and mineral industry. It will establish an administrative structure for the LMH that includes the creation of an Industry Co-Director to strategically accelerate industry engagement, foster industry-relevant collaborative research and deepen industry connections to the Faculty.

CGEN Global Partners Initiative

The Centre for Global Engineering (CGEN) is creating a Global Partners Initiative to establish strong partnerships with NGOs, universities, aid agencies and other development organizations for a new global engineering capstone course that will be introduced in 2018. CGEN has identified energy poverty as the next key challenge to be addressed through this course. Students will travel abroad to gather contextual and stakeholder data so they can define problems accurately, and to evaluate and implement technological solutions that they develop. Our partners will facilitate these activities and provide avenues for field translation of our research results. To enable the development of such partnerships, the DSF will support a one-year exploratory initiative to conduct online and field surveys to identify and recruit strong partners to start the capstone course and to identify specific challenges in the area of energy poverty to enable a new research thread within the CGEN community.

iCity Centre for Automated and Transformative Transportation Systems

The University of Toronto Transportation Research Institute has received DSF support for the creation of the iCity Centre for Automated and Transformative Transportation Systems (iCity-CATTS), which will bring together transportation and technology researchers from across U of T, industry and government to address the transportation system implications of automated vehicle (AV) technologies. Technological advances in this area are proceeding at a rapid pace but many critical questions pertinent to the future of AVs remain unanswered. Most pressing, and least addressed, are the transportation system challenges and implications for both transportation demand and system performance. A multidisciplinary team drawn from across the Faculty will create analysis tools, methods and decision support systems to quantify the impacts of AV technologies on transportation demand, land use and system performance, which will guide the design, adoption and governance of transportation systems in the new era of driving automation.

Following is a complete list of DSF-funded projects:

- A bio-manufacturing facility for training, research and technology demonstration (BioZone)
- Stimulating enhanced collaboration across ChemE and ECE (ChemE / ECE)
- Raising OCCAM – The Next Step (ChemE / MSE / OCCAM)
- Process Intensification Laboratory – moving towards greener and more sustainable process engineering practises through a scaled-down Approach (ChemE)
- Lassonde Institute of Mining Hub (LMH): Leadership in Mining Innovation (CivE)
- TNFC — UofT's open-access nano-fabrication facility (ECE)
- Graduate student space revival (ECE)
- The Professional Experience Year: program development to increase impact (ILead / Engineering Career Centre)
- Establishing a pathway to sustainability of the Institute for Robotics & Mechatronics (IRM)
- Education & training program: Computer Numerical Controlled Manufacturing (MIE)
- Collaborative Specialization in Psychology and Engineering (MIE)
- Design Catapult (MIE / IMDI)
- Where the Rubber Meets the Road: Seed Funding for Collaborative Self-Driving Car Research Between FASE (Robotics) and the Department of Computer Science (Artificial Intelligence) (UTIAS)
- iCity Centre for Automated and Transformative Transportation Systems (UTTRI)
- Academic advising "portal" (2015) (VDU RO)
- Transformation of library space to enhance innovative learning activities (VDU / Engineering and Computer Science Library)
- SAE AutoDrive Challenge (UTIAS)
- The CGEN Global Partners Initiative (CGEN)
- The metabolomics of environmental and human microbiomes (BioZone)
- Industry Liaison Initiative (IBBME)

Infrastructure and Facilities

Figure 11.7 Summary of Buildings and Area Occupied by the Faculty of Applied Science & Engineering, 2016–2017

Code	Building	Office of the Dean	EngSci	UTIAS	ChemE	CivE & MinE	ECE	IBBME	MIE	MSE	Total NASMs
AS	Aerospace (Downsview)			5,293							5,293
BA	Bahen Centre	1,112	561		67		5,744		1,375		8,859
DC	CCBR				667			889			1,556
EA	Eng Annex	328					946				1,274
EL	Electrometal									149	149
FI	Fields Institute	325									325
GB	Galbraith	1,667				4,886	4,146				10,699
HA	Haultain				198	110			639	721	1,668
	MaRS West Tower						136	791	183		1,110
MB	Mining					1,205		1,362	1,885	831	5,283
MC	Mech Eng	63							5,397		5,460
PT	D.L. Pratt						1,330			1,488	2,818
RS	Rosebrugh							814	2,096		2,910
SF	Sandford Fleming	766		692		1,559	3,552				6,569
WB	Wallberg	375			8,138		130			1,327	9,970
RM	256 McCaul	528									528
	Total Area	**5,164**	**561**	**5,985**	**9,070**	**7,760**	**15,984**	**3,856**	**11,575**	**4,516**	**64,471**
		64,471 NASMs (Net Assignable Square Metre)									

Projects Completed — By Building

D.L. Pratt Building

Room 162 Lab Renovation

To accommodate new research equipment and processes, we renovated and upgraded the MSE research lab space.

Lassonde Mining Building

Student Study Seating

To improve access to student study space, we built additional hallway seating in April 2017.

Office Renovations

We renovated the first-floor west wing office area to accommodate additional grad student offices for the Lassonde Mineral Engineering Program.

Wallberg Building

Video-Conferencing System

We installed a pilot video-conferencing system in WB 407 and commenced its evaluation for Faculty-wide deployment. This will enhance collaboration with partners external to the University.

University of Toronto Institute for Aerospace Studies

Room 194 Lecture Room

We completed a small-scale visualization facility and lecture room for computational modeling to improve research capabilities.

Galbraith Building

Accessibility

We installed lift systems at the main entrance (35 St. George St.) and from the main lobby to the first-floor corridor near the Registrar's Office to enhance building accessibility

Projects Underway — By Building

LIFT Projects

Over 30 infrastructure projects valued at $31.6 million are in progress and will be completed by April 2018. They include:

- **University of Toronto Institute for Aerospace Studies Lab Renovation** – We are renovating the Field Robotics Lab and expanding and renovating the Sustainable Aviation Design Lab.
- **Civil Engineering and Electrical & Computer Engineering Lab Renovations** – To create collaborative facilities that will support more graduate researchers and to bring research lab space up to current standards, we are renovating 49 labs in the Galbraith Building, Sandford Fleming Building and the Engineering Annex.
- **Mechanical Engineering Building Lab Renovations** – We are renovating six labs, including the replacement of six fume hoods, the addition of two new fume hoods, and the installation of HVAC systems.
- **Mechanical & Industrial Engineering Lab Renovations** – To better accommodate research in thermal and fluid sciences, and energy and environmental engineering, we are renovating five research labs in the Lassonde Mining and Haultain Buildings.
- **Institute of Biomaterials & Biomedical Engineering Lab Renovations** – To create a more open and collaborative research space, we are renovating 10 labs in the Rosebrugh Building. This includes replacement of fume hoods, the provision of emergency power and the installation of new mechanical and electrical devices.
- **Chemical Engineering & Applied Chemistry Lab Renovations** – We are renovating 10 labs and upgrading the infrastructure of the Wallberg and Pratt Buildings. This includes new fume hoods and windows, and the replacement and modification of mechanical and electrical services.

Centre for Engineering Innovation & Entrepreneurship

Construction Progress

We have made significant progress on our new building since the official groundbreaking in June 2015. The concrete pour "topping off" took place in May 2017. Exterior cladding installation, mechanical and electrical rough-ins on the lower levels and construction of a bridge link between the CEIE and Simcoe Hall are in progress.

University of Toronto Institute for Aerospace Studies

Gas Turbine Combustion Research Lab Renovation
We have begun construction of this new research lab, created in tandem with the associated combustion wind tunnel. We expect to complete the project in late 2017.

Galbraith Building

Room 412 Lab Renovation
We have begun the conversion of a tutorial room into a wet lab for water-related research in CivE. The project is expected to be complete by July 2017.

Gull Lake

Bunkhouse Project
Conceptual design of a new bunkhouse to accommodate 68 students has been completed and the compiling of pre-design space-use documentation is in progress.

Lassonde Mining Building

IBBME Undergraduate Teaching Lab Expansion
We have begun the pre-design phase for a project that will convert room 322 in the Lassonde Mining Building from a research lab to an undergraduate teaching lab.

Engineering Annex

Havelaar EV Lab EA 109
We are in the design stage for renovations to this lab to support electric vehicle research.

Mechanical Engineering Building

Lobby Renovations
This renovation will expand the lobby area of the Mechanical Engineering Building. Construction is scheduled to begin in summer 2018.

MC Lecture Theatres – AC
To improve the student experience, we will install air conditioning in three lecture theatres (in partnership with F&S and ACE) in summer 2018.

MC 3rd-Floor Office Renovations
To enhance faculty space, renovations to create additional faculty offices are scheduled for 2018.

Wallberg Building

Undergraduate Teaching Labs
We have scheduled upgrades to the undergraduate teaching labs for the summer of 2018.

Unit Operations Lab
We will install a new HVAC system in 2018.

Space Audits

We conduct regular audits to inform our infrastructure needs and the most efficient use of space. Over the past year, we made progress on the following audits and reports:

- A space audit of undergraduate teaching labs (final report expected by 2018)
- A report on the Faculty makerspaces completed
- A project planning report for the rooftop expansion on the Wallberg Building to create sustainability labs is in progress (final report expected by fall 2017)
- A safety audit of all common and study rooms completed
- Room data sheets for the Gull Lake Bunkhouse Project are being prepared

Glossary

Faculty of Applied Science & Engineering Academic Area Terms

Academic Area	For the purpose of this annual report, Academic Area refers to the following departments, divisions and institutes: UTIAS, IBBME, ChemE, CivE, ECE, EngSci, MIE and MSE. While General First Year is not an academic unit, it is also included as an academic area in specific contexts Chapter 1: Undergraduate Studies.
ChemE	Department of Chemical Engineering & Applied Chemistry Graduates who studied the discipline of Chemical Engineering are also designated as ChemE.
CivE	Department of Civil Engineering Graduates who studied the discipline of Civil Engineering are also designated as CivE.
CompE	Graduates of The Edward S. Rogers Sr. Department of Electrical & Computer Engineering (ECE) who studied the discipline of Computer Engineering.
ElecE	Graduates of The Edward S. Rogers Sr. Department of Electrical & Computer Engineering (ECE) who studied the discipline of Electrical Engineering.
ECE	The Edward S. Rogers Sr. Department of Electrical & Computer Engineering Graduates of Electrical Engineering are designated as ElecE; graduates of Computer Engineering are designated as CompE.
EngSci	Division of Engineering Science Graduates of this Division are also designated as EngSci.
IBBME	Institute of Biomaterials & Biomedical Engineering Graduates who studied the discipline of Biomedical Engineering are referred to as BioMedE.
IndE	Graduates of the Department of Mechanical & Industrial Engineering (MIE) who studied the discipline of Industrial Engineering.
MechE	Graduates of the Department of Mechanical & Industrial Engineering (MIE) who studied the discipline of Mechanical Engineering.
MIE	Department of Mechanical & Industrial Engineering Graduates of Mechanical Engineering are designated as MechE; graduates of Industrial Engineering are designated as IndE.
MinE	Graduates from the Department of Civil Engineering (CivE) who studied the discipline of Mineral Engineering.
MSE	Department of Materials Science & Engineering Graduates who studied the discipline of Materials Engineering are also designated as MSE.
TrackOne	General first-year undergraduate studies in Engineering. Upon successful completion of TrackOne, students choose from one of the Engineering undergraduate programs, excluding Engineering Science.
UTIAS	University of Toronto Institute for Aerospace Studies Graduates who studied the discipline of Aerospace Engineering within this Institute are designated as AeroE.

Additional Terms

AAAS	American Association for the Advancement of Science
AAU	Thomson Reuters Association of American Universities
ARWU	Shanghai Jiao Tong Academic Ranking of World Universities
ASEE	American Society for Engineering Education
BASc	Bachelor of Applied Science
BizSkule	Alumni speaker series
CCR	Co-Curricular Record
CEIE	Centre for Engineering Innovation & Entrepreneurship
CFI	Canada Foundation for Innovation
CGEN	Centre for Global Engineering
CHE	Centre for Healthcare Engineering
CHRP	Collaborative Health Research Projects
CIE	Centre for International Experience
CIHR	Canadian Institutes of Health Research
CRC	Canada Research Chair; the Canadian government invests $300M per year in Tier 1 renewable chairs held for seven years and Tier 2 chairs held for five years and renewable once
CREATE	NSERC Collaborative Research and Training Experience program
DEEP	Da Vinci Engineering Enrichment Program
DSF	Dean's Strategic Fund
ECN	Engineering Communications Network
ECP	Engineering Communication Program
EDU	Extra-Departmental Unit
EIIP	Engineering Instructional Innovation Program
ELITE	Entrepreneurship, Leadership, Innovation & Technology in Engineering
Endowed Chair	Fixed-term chairs created through donor support
EngEd	Engineering Education, graduate-level programs
eSIP	Engineering Summer Internship Program
ESOO	Engineering Student Outreach Office
ESROP	Engineering Science Research Opportunities Program
FTE	Full-time equivalent
G-IFP	Graduate International Foundation Program
GLEE	Girls' Leadership in Engineering Experience
Graditude	Fundraising campaign for students
GTA	Greater Toronto Area
H-index	A measurement of both the productivity and impact of published work based on citations
HC	Headcount, or number of degree-seeking students
IEEE	Institute of Electrical and Electronics Engineers
IFP	International Foundation Program
ILead	Institute for Leadership Education in Engineering
IRC	Industrial Research Chair; funded jointly by NSERC and industry to enable universities to build on existing strengths or develop research capacity in areas of interest to industry
ISE	Institute for Sustainable Energy
IWI	Institute for Water Innovation
MASc	Master of Applied Science
MCP	Multidisciplinary Capstone Projects
MEng	Master of Engineering
MEngCEM	MEng in Cities Engineering & Management
MEng, SCFI	MEng program for the Stronach Centre for Innovation
MHSc	Master of Health Science (Clinical Engineering)
MFP	MasterCard Foundation Scholarship Program
NASM	Net Assignable Square Metre
NCE	Networks of Centres of Excellence

NSERC	Natural Sciences and Engineering Research Council of Canada
NTU	National Taiwan University
OGS	Ontario Graduate Scholarship
OISE	Ontario Institute for Studies in Education
ONWiE	Ontario Network of Women in Engineering
ORF	Ontario Research Fund
OSAP	Ontario Student Assistance Program
PASS	Peer-Assisted Study Sessions
PEY	Professional Experience Year internship program
PhD	Doctor of Philosophy
PPIT	Prospective Professors in Training Program
QS	QS World Rankings
SGS	University of Toronto School of Graduate Studies
Skule™	Refers to the U of T Engineering community
SSHRC	Social Sciences and Humanities Research Council
STEM	Science, Technology, Engineering and Mathematics
SwB	Science without Borders
TBEP	Translational Biology and Engineering Program
TEAL	Technology Enhanced Active Learning
THE	Times Higher Education–Thomson Reuters World University Ranking
TIAM	Toronto Institute for Advanced Manufacturing
TRCHR	Ted Rogers Centre for Heart Research
Tri-Agency	Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC) and Social Sciences and Humanities Research Council (SSHRC)
U15	Group of 15 leading, research-intensive universities in Canada, including: University of Alberta, University of British Columbia, University of Calgary, Dalhousie University, Université Laval, University of Manitoba, McGill University, McMaster University, Université de Montréal, University of Ottawa, Queen's University, University of Saskatchewan, University of Toronto, University of Waterloo, Western University
UnERD	Undergraduate Engineering Research Day
University Professor	The highest possible rank at U of T, awarded to a maximum of 2% of tenured faculty
UT-IMDI	University of Toronto Institute for Multidisciplinary Design & Innovation
UTAPS	University of Toronto Advanced Planning for Students
U of T Distinguished Professor	Designed to advance and recognize faculty with highly distinguished accomplishments. This chair is limited to no more than 3% of tenured faculty
UTTRI	University of Toronto Transportation Research Institute
WISE	Women in Science & Engineering
YWIES	Young Women in Engineering Symposium

Appendices

Appendix A: Student Clubs and Teams

Below is a list of Engineering student clubs and teams, which is referenced in *Chapter 1: Undergraduate Studies*. Beyond the groups presented here, our students also participate in clubs and teams across U of T.

Arts

- Appassionata Music Group
- Engineering Movie Club
- Engineering Toastmasters
- Skule™ Arts Festival
- Skule™ Choir
- Skule™ Orchestra
- Skule™ Stage Band
- Tales of Harmonia
- U of T Music Clubs Initiative

Athletics

- Iron Dragons
- Rock Climbing and Bouldering Club
- Skule™ Badminton Club
- U of T Engineering Iron Dragons
- U of T Ironsports Club

Community

- Bridges to Prosperity
- Engineers Without Borders – U of T Chapter
- Engineering World Health – U of T
- IEEE Student Branch
- Institute of Industrial and Systems Engineers (Chapter 0889)
- Pakistan Development Foundation
- Power to Change U of T
- Project Include
- Promise to Future Generations
- Students Fighting Cancer
- Student Research Teams
- Suits U
- Tetra Society
- Toronto Students for the Advancement of Aerospace (TSAA)
- TrackOne Mentorship Program
- Volunteer Engineering Experience Program
- Women in Science and Engineering

Cultural

- Arabs in Engineering
- Bangladeshi Engineering Students' Association
- Chinese Engineering Students' Association
- East Essence Society
- Engineering French Conversation Club
- Indian Engineering Students' Association
- Indian Students' Society
- Korean Engineering Students' Association
- Malaysian Student Association of University of Toronto
- Muslim Students Association
- U of T Engineering Chinese Club
- University of Toronto Ismaili Students Association (ISA)
- U of T Mandarin Chinese Christian Fellowship

Design & Competition

- Blue Sky Solar Racing
- Boomerang Design Club
- ChemE Car Team
- Global Engineering Design Association
- Human-Powered Vehicle Design Team
- International Genetically Engineered Machine (iGEM)
- Mechatronics Design Association
- Multidisciplinary Analytical Kinesthetic Education
- Project Holodeck (UTOPH)
- Robotics for Space Exploration
- Seismic Design Team
- Spark Design Club
- Steel Bridge Team
- Supermileage Team
- University of Toronto Aerospace Team
- U of T Baja Team
- U of T Biomod Team
- U of T Concrete Canoe Team
- U of T Concrete Toboggan Team
- U of T Destination Imagination
- U of T Formula SAE Racing Team
- U of T Robotics Association
- U of T Space Design Contest
- U of T Steel Bridge Team

Hobby & Special Interest

- Hacker Academy
- LeadingGreen
- Outing Club
- Peer Wellness Group
- Skule™ Dance Club
- Skule™'s Got Talent
- Skule™ Improv
- U of T Emergency First Responders
- U of T Engineering Photography Club
- U of T Engineering Toastmasters
- UTFOLD
- UTTTC (University of Toronto Table Tennis Club)
- U of T Smash
- Skule™ Dev
- Skule™ Juggling Club
- Skule™ Pokémon League
- Skule™ Smash Bros.

Professional Development & Industry

- ALChemE
- American Society of Mechanical Engineers
- ASHRAE U of T
- Biomedical Engineering Students Association
- Canadian Association of Food Engineers – University of Toronto
- Canadian Electrical Contractors Association
- Canadian Society for Chemical Engineering
- Canadian Society for Mechanical Engineering
- Canadian Institute of Mining, Metallurgy and Petroleum – University of Toronto Chapter
- Canadian Society for Civil Engineering U of T Chapter
- CECA/NECA Student Chapter
- Club for Undergraduate Biomedical Engineering
- Digital Trinity Labs
- Energy Network
- Engineering Finance Association
- Galbraith Society
- Institute of Electrical and Electronics Engineers University of Toronto Student Branch
- Institute of Industrial Engineers Chapter 0889
- Institute of Transportation Engineers
- Materials Industry Club
- Math and Physics Club (UTMPC)
- Mechanical Engineering Club
- MIE Mentorship Program
- MechEngage
- National Society of Black Engineers
- Nsight Mentorship
- Nspire Innovation Network
- Materials Industry Club
- Rational Capital Investment Fund
- Society of Petroleum Engineers at the University of Toronto
- Sustainable Engineers Association
- TechXplore
- U of T Business Association
- U of T Consulting Association
- University of Toronto Energy Network
- University of Toronto Engineering Finance Association
- University of Toronto Ontario Water Works Association-Student Chapter
- UT Industry Insights
- Water Environment Association of Ontario Student Chapter
- Women In Science and Engineering (WISE)

Appendix B: Outreach Programs

Between July 2016 and June 2017, we offered the following pre-university outreach programs, reaching more than 5,000 students from across Ontario, Canada and the world.

Program	Date	Total # of Participants	Female	Male	Audience
DEEP Summer Academy	July 3-30, 2016	399	99	300	Grades 9-12
DEEP Leadership Camp	July 3-30, 2016	75	21	54	Grades 9-12
Girls' Jr. DEEP	July 4-8, 2016	71	71	0	Grades 3-8
ENGage	July 4-8, 2016	57	21	36	Grades 3-8
Jr. DEEP	July 11 - August 19, 2016	708	260	448	Grades 3-8
Pop-up Coding Event	August 3-4, 2016	50	24	26	Grades 3-6
High School Math Academy	August 22-24, 2016	22	3	19	Grades 10-11
Go ENG Girl	October 15, 2016	70	70	0	Grades 7-9
Girls' Jr. DEEP Saturday Fall	October 22 - November 5, 2016	70	70	0	Grades 3-8
Jr. DEEP Saturday Fall	November 12-26, 2016	74	17	57	Grades 3-8
High School Saturdays Fall	October 22 - November 26, 2016	102	25	77	Grades 9-11
Coding Workshops Fall	October 22 - November 26, 2016	81	30	51	Grades 3-6
Grade 12 Enriched Programs	October 22 - November 5, 2016	48	27	21	Grade 12
Enginering in the Classroom	Novermber 19, 2016 - June 11, 2017	24	15	9	Teachers
Girls' Jr. DEEP Saturday Winter	January 14-28, 2017	65	65	0	Grades 3-8
Jr. DEEP Saturday Winter	February 4-25, 2017	73	22	51	Grades 3-8
High School Saturdays Winter	January 14 - February 25, 2017	95	23	72	Grades 9-12
Coding Workshops Winter	January 14 - February 25, 2017	58	22	36	Grades 3-6
"Learn to Code" Workshop Series	December 2, 2016 - February 17, 2017	43	14	29	Grades 9-11
DEEP Leadership at March Break	March 13-17, 2017	49	21	28	Grades 7-11
Jr. DEEP at March Break	March 13-17, 2017	72	31	41	Grades 3-8
Jr. DEEP Math Camp	March 13-17, 2017	25	9	16	Grades 5-6
High School March Break	March 13-17, 2017	71	19	52	Grades 9-11
In-School and On-Campus Workshops	May 30 - June 19, 2017	1,528	764	764	Grades 3-8
Go North	May 19, 2017	1,400	700	700	Grades 3-8
Skule™ Kids	June 3, 2017	41	17	24	Grades 1-8
Total		**5,371**	**2,460**	**2,911**	

Appendix C: Time to Completion for Graduate Students

The following figures indicate the median time to completion for graduating cohorts in each master's and doctoral degree program by academic area for the past decade. Time to completion represents the number of years between a student's initial enrolment in a graduate program and meeting all the requirements for graduation. The data includes only terms in which a student is registered, excluding leaves, lapses and (in most cases) the term in which convocation occurs. Where a student is fast-tracked from the MASc into a PhD, the total time for both programs is counted. Distinguishing full-time (FT), extended full-time (ExtFT) and part-time (PT) MEng students provides greater clarity.

Figure C.1 **University of Toronto Institute for Aerospace Studies**
Time to Completion for Graduate Students, 2007–2008 to 2016–2017

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
PhD	5.2	5.3	6.0	7.0	4.7	5.3	5.3	5.7	6.3	5.3
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.0	2.0
MEng (FT)		1.3	1.2	1.3	1.3	1.0	1.0	1.0	1.0	1.0
MEng (Ext FT)								1.7	1.7	1.7
MEng (PT)	1.7	1.0	1.8			1.7	1.3	2.0	2.3	3.0

Figure C.2 **Institute of Biomaterials and Biomedical Engineering**
Time to Completion for Graduate Students, 2007–2008 to 2016–2017

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
PhD	3.3	4.3	4.3	6.0	5.7	5.0	5.0	6.0	5.7	5.2
MASc	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0
MHSc (FT)		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Figure C.3 **Department of Chemical Engineering & Applied Chemistry**
Time to Completion for Graduate Students, 2007–2008 to 2016–2017

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
PhD	4.7	5.0	5.3	6.0	5.3	5.2	5.5	5.7	5.7	5.5
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.0
MEng (FT)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MEng (Ext FT)								1.5	1.7	1.7
MEng (PT)	2.0	3.7	2.2	1.8	1.3	2.0	2.0	1.8	1.5	2.0

Figure C.4 Department of Civil Engineering
Time to Completion for Graduate Students, 2007–2008 to 2016–2017

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
PhD	4.7	5.0	5.0	5.3	5.3	5.3	5.0	5.3	5.3	5.7
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng (FT)	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.0
MEng (Ext FT)								1.3	1.7	1.3
MEng (PT)	1.7	1.7	2.0	2.3	1.8	2.0	2.0	1.7	2.0	2.2
MEngCEM (FT)								1.3	1.3	1.3

Figure C.5 The Edward S. Rogers Sr. Department of Electrical & Computer Engineering
Time to Completion for Graduate Students, 2007–2008 to 2016–2017

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
PhD	4.7	4.7	4.7	5.0	5.2	5.5	5.3	5.0	5.0	5.3
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0
MEng (FT)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MEng (Ext FT)								1.3	1.3	1.3
MEng (PT)	2.0	2.0	3.0	2.7	2.0	2.2	2.0	2.0	2.0	2.3

Figure C.6 Department of Mechanical & Industrial Engineering
Time to Completion for Graduate Students, 2007–2008 to 2016–2017

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
PhD	4.7	4.7	4.0	4.7	5.0	5.7	5.0	4.8	5.0	4.7
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng (FT)	1.3	1.0	1.3	1.0	1.3	1.0	1.0	1.0	1.0	1.0
MEng (Ext FT)								1.7	1.7	1.7
MEng (PT)	2.3	2.3	2.3	2.0	2.0	2.0	2.0	2.0	1.7	2.3
MEngDM (PT)	2.2	3.3	2.7	2.3	2.7	2.5	2.7	2.3	3.5	2.8

Figure C.7 Department of Materials Science & Engineering
Time to Completion for Graduate Students, 2007–2008 to 2016–2017

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
PhD	5.3	4.0	5.3	6.0	6.3	5.7	4.7	5.3	5.5	5.8
MASc	2.0	1.7	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0
MEng (FT)		1.5	1.7		0.8	1.0	1.0	1.0	1.0	1.0
MEng (Ext FT)								1.3	1.7	1.7
MEng (PT)		1.3	2.0	2.3	2.3	2.0	2.7	2.8		

Note: Based on Ontario Council of Graduate Studies (OCGS) data from ROSI. Data reflects median values based on the total number of terms in which a student is registered.

Appendix D: Research Chairs

Our Faculty is home to 90 research chairs held by 83 individual chairholders. The following list reflects five types of chairs: Canada Research Chair, Endowed Chair, Industrial Research Chair, U of T Distinguished Professor and University Professor.

Figure D.1 Research Chairs, 2015–2016

Title	Chairholder	Sponsor	Tier	Dep't
Alumni Chair in Bioengineering	Cristina Amon	Endowed		MIE
Bahen/Tanenbaum Chair in Civil Engineering	Jeffrey Packer	Endowed		CivE
Bahen/Tanenbaum Chair in Civil Engineering	Michael Collins	Endowed		CivE
Bell Canada Chair in Multimedia	Kostas Plataniotis	Endowed		ECE
Bell Canada Chair in Software Engineering	Michael Stumm	Endowed		ECE
Bell University Labs Chair in Computer Engineering	Baochun Li	Endowed		ECE
Bell University Labs Chair in Software Engineering	Hans-Arno Jacobsen	Endowed		ECE
Canada Research Chair in Advanced Catalysis for Sustainable Chemistry	Cathy Chin	NSERC	Tier 2	ChemE
Canada Research Chair in Anaerobic Biotechnology	Elizabeth Edwards	NSERC	Tier 1	ChemE
Canada Research Chair in Autonomous Space Robotics	Timothy Barfoot	NSERC	Tier 2	UTIAS
Canada Research Chair in Cellular Hybrid Materials	Glenn Hibbard	NSERC	Tier 2	MSE
Canada Research Chair in Computational Modelling and Design Optimization Under Uncertainty	Prasanth Nair	NSERC	Tier 2	UTIAS
Canada Research Chair in Diffusion-Wave Sciences and Technologies	Andreas Mandelis	NSERC	Tier 1	MIE
Canada Research Chair in Endogenous Repair	Penney Gilbert	NSERC	Tier 2	IBBME
Canada Research Chair in Environmental Engineering and Stable Isotopes	Elodie Passeport	NSERC	Tier 2	ChemE, CivE
Canada Research Chair in Freight Transportation and Logistics	Matthew Roorda	NSERC	Tier 2	CivE
Canada Research Chair in Fuel Cell Materials and Manufacturing	Olivera Kesler	NSERC	Tier 2	MIE
Canada Research Chair in Functional Cardiovascular Tissue Engineering	Milica Radisic	NSERC	Tier 2	IBBME, ChemE
Canada Research Chair in Human Factors and Transportation	Birsen Donmez	NSERC	Tier 2	MIE
Canada Research Chair in Information Processing and Machine Learning	Brendan Frey	NSERC	Tier 1	ECE
Canada Research Chair in Information Theory and Wireless Communications	Wei Yu	NSERC	Tier 1	ECE
Canada Research Chair in Integrated Photonic Devices	Joyce Poon	NSERC	Tier 2	ECE
Canada Research Chair in Micro and Nano Engineering Systems	Yu Sun	NSERC	Tier 2	MIE
Canada Research Chair in Microfluidics and Energy	David Sinton	NSERC	Tier 1	MIE
Canada Research Chair in Modelling of Electrical Interconnects	Piero Triverio	NSERC	Tier 2	ECE
Canada Research Chair in Nano- and Micro-Structured Electromagnetic Materials and Applications	George Eleftheriades	NSERC	Tier 1	ECE
Canada Research Chair in Nanotechnology	Edward Sargent	NSERC	Tier 1	ECE
Canada Research Chair in Network Information Theory	Ashish Khisti	NSERC	Tier 2	ECE
Canada Research Chair in Novel Optimization and Analytics in Health	Timothy Chan	NSERC	Tier 2	MIE
Canada Research Chair in Organic Optoelectronics	Zheng-Hong Liu	NSERC	Tier 1	MSE
Canada Research Chair in Quantitative Cell Biology and Morphogenesis	Rodrigo Fernandez-Gonzalez	NSERC	Tier 2	IBBME
Canada Research Chair in Robots for Society	Goldie Nejat	NSERC	Tier 2	MIE
Canada Research Chair in Secure and Reliable Computer Systems	David Lie	NSERC	Tier 2	ECE
Canada Research Chair in Seismic Resilience of Infrastructure	Constantin Christopoulos	NSERC	Tier 2	CivE
Canada Research Chair in Stem Cell Bioengineering	Peter Zandstra	NSERC	Tier 1	IBBME
Canada Research Chair in Thermofluidics for Clean Energy	Aimy Bazylak	NSERC	Tier 2	MIE
Canada Research Chair in Tissue Engineering	Molly Shoichet	NSERC	Tier 1	ChemE, IBBME
Canada Research Chair in Transportation and Air Quality	Marianne Hatzopoulou	NSERC	Tier 2	CivE
Celestica Chair in Materials for Microelectronics	Doug Perovic	Endowed		MSE
Chair in Information Engineering	Joseph Paradi	Endowed		MIE
Clarice Chalmers Chair of Engineering Design	Greg Jamieson	Endowed		MIE
Claudette MacKay-Lassonde Chair in Mineral Engineering	Lesley Warren	Endowed		CivE

Title	Chairholder	Sponsor	Tier	Dep't
Dusan and Anne Miklas Chair in Engineering Design	Paul Chow	Endowed		ECE
Edward S. Rogers Sr. Chair in Engineering	Glenn Gulak	Endowed		ECE
Eugene V. Polistuk Chair in Electromagnetic Design	Costas Sarris	Endowed		ECE
Foundation CMG Industrial Research Chair in Fundamental Petroleum Rock Physics and Rock Mechanics	Giovanni Grasselli	Foundation CMG		CivE
Frank Dottori Chair in Pulp and Paper Engineering	Honghi Tran	Endowed		ChemE
Gerald R. Heffernan Chair in Materials Processing	Mansoor Barati	Endowed		MSE
Erwin Edward Hart Professor in Chemical Engineering and Applied Chemistry	Alison McGuigan	Endowed		ChemE
Erwin Edward Hart Professor in Civil Engineering	Daman Panesar	Endowed		CivE
Erwin Edward Hart Professor in Materials Science and Engineering	Chandra Veer Singh	Endowed		MSE
Erwin Edward Hart Professor in Mechanical and Industrial Engineering	Tobin Filleter	Endowed		MIE
Percy Edward Hart Professor in Aerospace Engineering	Philippe Lavoie	Endowed		UTIAS
Percy Edward Hart Professor in Biomaterials and Biomedical Engineering	Jonathan Rocheleau	Endowed		IBBME
Percy Edward Hart Professor in Electrical and Computer Engineering	Natalie Enright Jerger	Endowed		ECE
J. Armand Bombardier Foundation Chair in Aerospace Flight	Chris Damaren	Endowed		UTIAS
L. Lau Chair in Electrical and Computer Engineering	Reza Iravani	Endowed		ECE
Michael E. Charles Chair in Chemical Engineering	Michael Sefton	Endowed		ChemE, IBBME
Nortel Institute Chair in Emerging Technology	J. Stewart Aitchison	Endowed		ECE
Nortel Institute Chair in Network Architecture and Services	Jörg Liebeherr	Endowed		ECE
NSERC Chair in Multidisciplinary Engineering Design	Kamran Behdinan	NSERC		MIE
NSERC Industrial Research Chair in Source Water Quality Monitoring and Advanced/Emerging Technologies for Drinking Water Treatment	Robert Andrews	NSERC		CivE
NSERC Industrial Research Chair in Technologies for Drinking Water Treatment	Ron Hofmann	NSERC		CivE
NSERC/Altera Industrial Research Chair in Programmable Silicon	Vaughn Betz	NSERC/Altera		ECE
NSERC/Cement Association of Canada Industrial Research Chair in Concrete Durability and Sustainability	Doug Hooton	NSERC/CAC		CivE
NSERC/P&WC Industrial Research Chair in Aviation Gas Turbine Combustion/Emissions Research and Design System Optimization	Sam Sampath	NSERC/P&WC		UTIAS
NSERC/UNENE Industrial Research Chair in Corrosion Control and Materials Performance in Nuclear Power Systems	Roger Newman	NSERC/UNENE		ChemE
Pierre Lassonde Chair in Mining Engineering	John Hadjigeorgiou	Endowed		CivE
Robert M. Smith Chair in Geotechnical Mine Design and Analysis	Murray Grabinsky	Endowed		CivE
Skoll Chair in Computer Networks and Enterprise Innovation	Elvino Sousa	Endowed		ECE
Skoll Chair in Software Engineering	Jason Anderson	Endowed		ECE
Stanley Ho Professorship in Microelectronics	Sorin Voinigescu	Endowed		ECE
The Stanley L. Meek Chair in Advanced Nanotechnology	Harry Ruda	Endowed		MSE
U of T Distinguished Professor in Application Platforms and Smart Infrastructure	Alberto Leon-Garcia			ECE
U of T Distinguished Professor in Global Engineering	Yu-Ling Cheng			ChemE
U of T Distinguished Professor in Plasma Engineering	Javad Mostaghimi			MIE
U of T Distinguished Professor of Digital Communications	Frank Kshischang			ECE
U of T Distinguished Professor of Microcellular Engineered Plastics	Chul Park			MIE
U of T Distinguished Professor of Nanobioengineering	Warren Chan			IBBME
U of T Distinguished Professor of Urban Systems Engineering	Mark Fox			MIE
University Professor	Michael Collins			CivE
University Professor	Edward Sargent			ECE
University Professor	Michael Sefton			ChemE
University Professor	Molly Shoichet			ChemE, IBBME
University Professor	Peter Zandstra			IBBME
Velma M. Rogers Graham Chair in Engineering	George Eleftheriades	Endowed		ECE
W. M. Keck Chair in Engineering Rock Mechanics	John Harrison	Endowed		CivE
Wallace G. Chalmers Chair of Engineering Design	Axel Guenther	Endowed		MIE

Appendix E: Research Funding by Academic Area

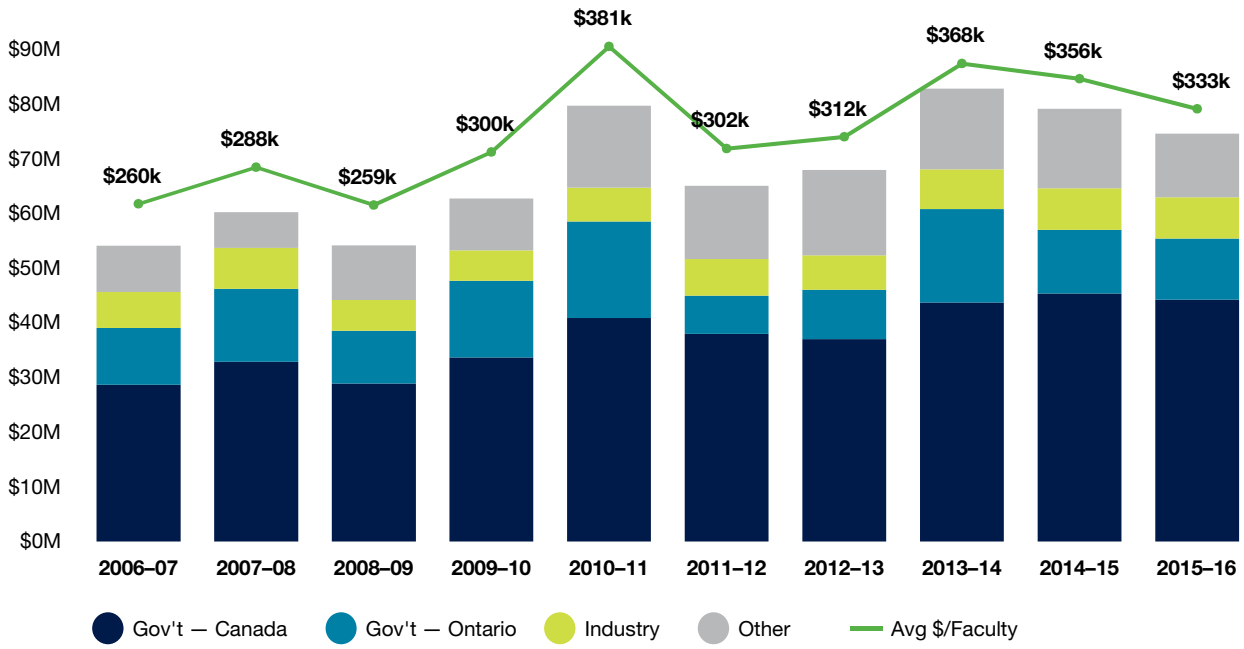
Figure E.1 shows our Faculty's total research funding, including operating and infrastructure.

Figures E.2 to E.8 in this appendix show research operating funding by department and institute over the last decade. This data excludes funding received under the following research infrastructure programs:

- Canada Foundation for Innovation (except the CFI Career Award)
- NSERC Research Tools & Instruments program for Faculty
- Ontario Innovation Trust
- Ontario Research Fund – Research Infrastructure

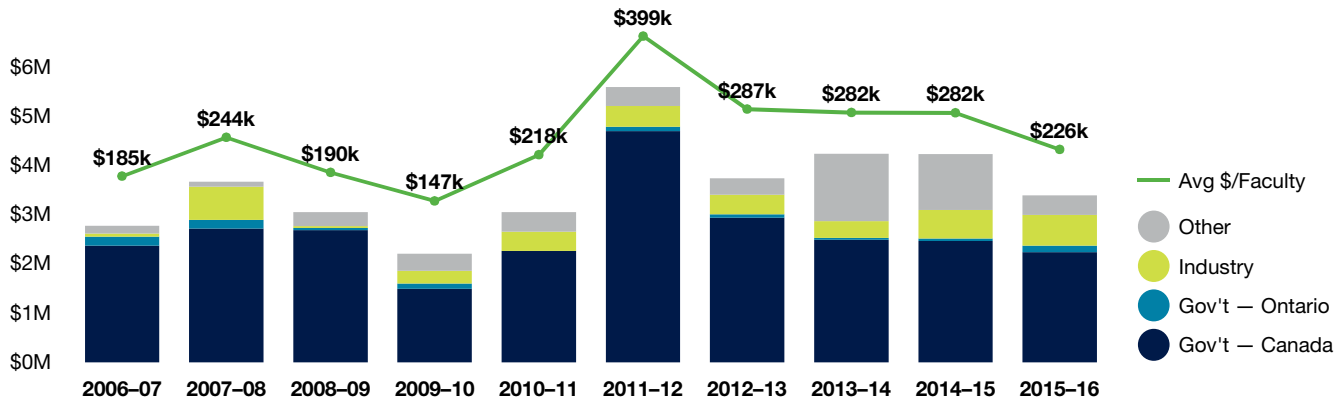
Data is based on grant years (April to March). For example, 2012–13 represents the granting cycle starting in April 2012 and ending in March 2013.

Figure E.1 University of Toronto Faculty of Applied Science & Engineering Total Research Funding by Source and Average Funding per Faculty Member, 2006–2007 to 2015–2016



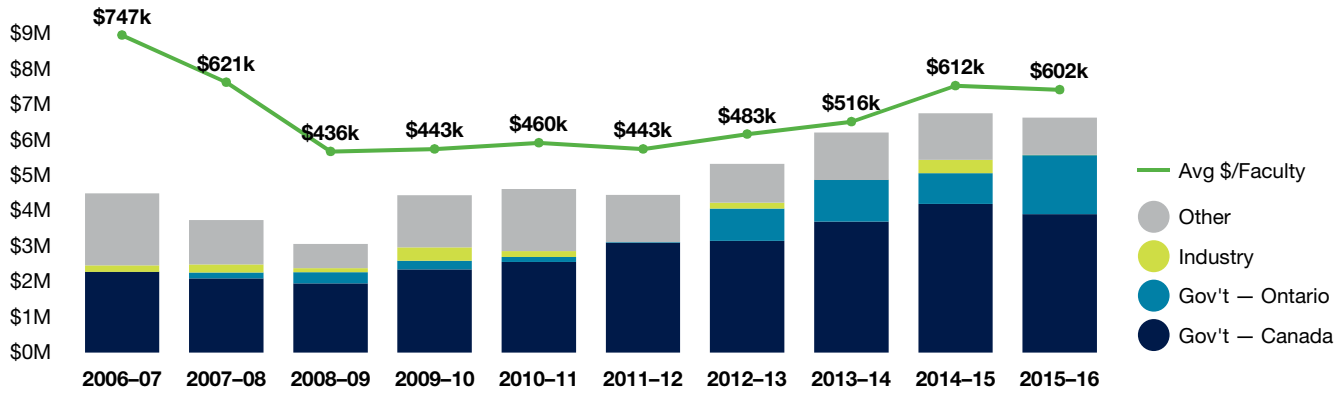
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2006–07	$28,660,565	$10,360,149	$6,583,699	$8,479,398	**$54,083,811**	**$260,018**
2007–08	$32,864,820	$13,319,325	$7,520,781	$6,525,854	**$60,230,780**	**$288,186**
2008–09	$28,853,200	$9,661,808	$5,640,631	$9,995,737	**$54,151,376**	**$259,097**
2009–10	$33,638,570	$14,040,322	$5,540,382	$9,462,900	**$62,682,174**	**$299,915**
2010–11	$40,830,026	$17,675,370	$6,180,621	$14,972,995	**$79,659,012**	**$381,144**
2011–12	$37,956,558	$6,973,334	$6,702,822	$13,400,263	**$65,032,977**	**$302,479**
2012–13	$36,968,592	$9,036,836	$6,315,707	$15,586,318	**$67,907,453**	**$311,502**
2013–14	$43,673,077	$17,089,529	$7,256,554	$14,796,883	**$82,816,043**	**$368,071**
2014–15	$45,359,255	$11,584,635	$7,634,736	$14,514,221	**$79,092,847**	**$356,274**
2015–16	$44,180,592	$11,200,317	$7,562,726	$11,652,375	**$74,596,010**	**$333,018**

Figure E.2 University of Toronto Institute for Aerospace Studies Research Operating Funding by Source and Average Funding per Faculty Member, 2006–2007 to 2015–2016



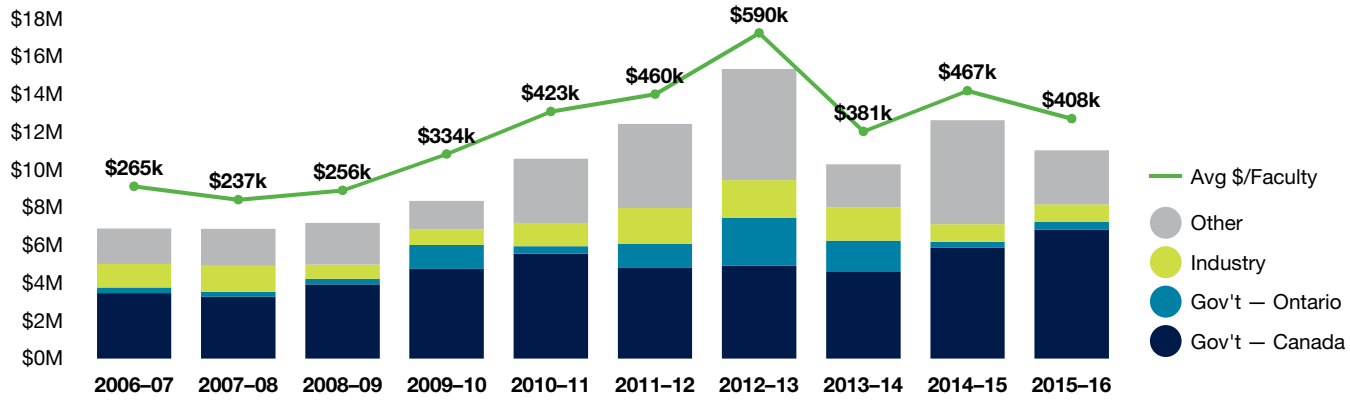
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2006–07	$2,365,513	$185,000	$60,000	$161,533	**$2,772,046**	**$184,803**
2007–08	$2,712,542	$175,000	$679,227	$96,167	**$3,662,936**	**$244,196**
2008–09	$2,682,272	$45,000	$35,500	$282,968	**$3,045,740**	**$190,359**
2009–10	$1,486,735	$107,333	$259,200	$349,358	**$2,202,626**	**$146,842**
2010–11	$2,261,742		$390,200	$396,928	**$3,048,870**	**$217,776**
2011–12	$4,692,109	$89,356	$420,400	$389,239	**$5,591,104**	**$399,365**
2012–13	$2,931,459	$70,157	$397,116	$337,560	**$3,736,292**	**$287,407**
2013–14	$2,485,293	$35,708	$342,400	$1,372,126	**$4,235,527**	**$282,368**
2014–15	$2,458,871	$50,000	$584,609	$1,130,655	**$4,224,135**	**$281,609**
2015–16	$2,232,872	$130,258	$626,320	$396,079	**$3,385,529**	**$225,702**

Figure E.3 Institute of Biomaterials & Biomedical Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2006–2007 to 2015–2016



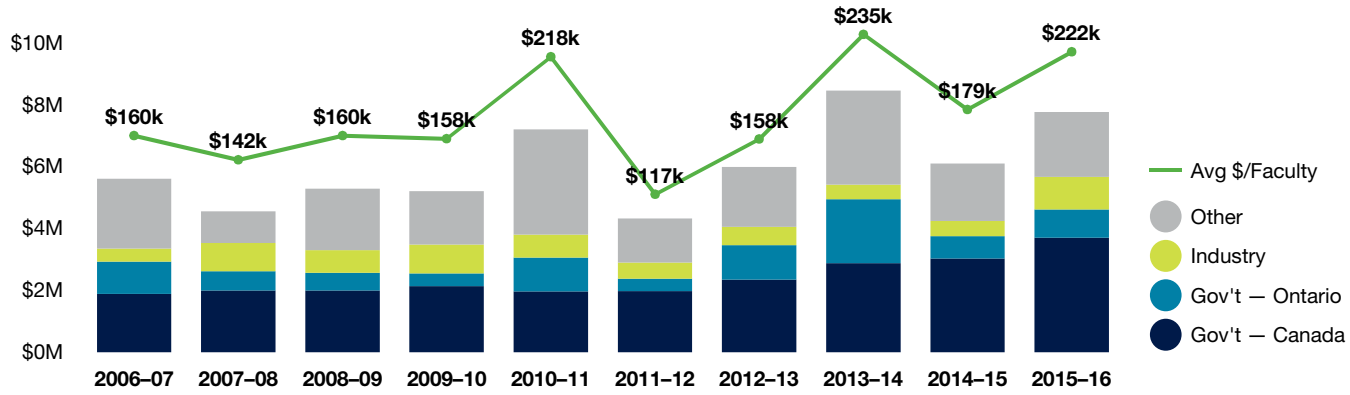
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2006–07	$2,264,946	$1,333	$186,904	$2,027,941	**$4,481,124**	**$746,854**
2007–08	$2,086,500	$165,515	$222,300	$1,251,056	**$3,725,371**	**$620,895**
2008–09	$1,940,671	$317,147	$117,411	$678,498	**$3,053,727**	**$436,247**
2009–10	$2,337,302	$242,228	$375,037	$1,476,045	**$4,430,612**	**$443,061**
2010–11	$2,548,234	$142,383	$160,634	$1,748,405	**$4,599,656**	**$459,966**
2011–12	$3,089,869	$13,500		$1,330,768	**$4,434,137**	**$443,414**
2012–13	$3,144,604	$908,280	$167,789	$1,088,556	**$5,309,229**	**$482,657**
2013–14	$3,686,273	$1,172,808	$1,301	$1,331,778	**$6,192,160**	**$516,013**
2014–15	$4,181,908	$870,159	$371,689	$1,311,847	**$6,735,603**	**$612,328**
2015–16	$3,897,635	$1,658,924	$9,800	$1,051,699	**$6,618,058**	**$601,642**

Figure E.4 Department of Chemical Engineering & Applied Chemistry Research Operating Funding by Source and Average Funding per Faculty Member, 2006–2007 to 2015–2016



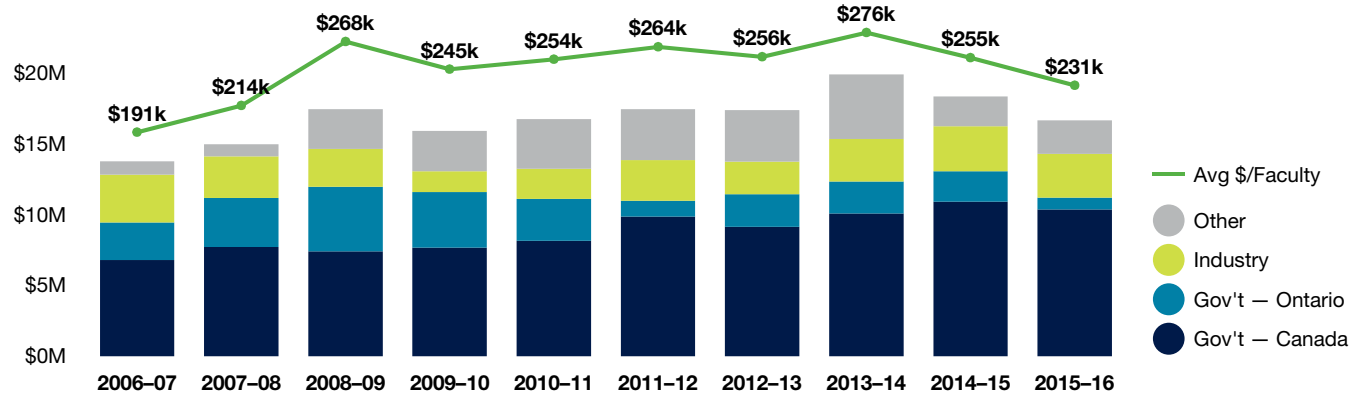
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2006–07	$3,460,090	$290,203	$1,261,279	$1,875,921	**$6,887,493**	**$264,904**
2007–08	$3,267,829	$261,610	$1,368,550	$1,961,293	**$6,859,282**	**$236,527**
2008–09	$3,911,814	$299,378	$757,256	$2,202,402	**$7,170,850**	**$256,102**
2009–10	$4,743,528	$1,257,813	$835,642	$1,500,521	**$8,337,504**	**$333,500**
2010–11	$5,554,010	$388,844	$1,231,226	$3,401,819	**$10,575,899**	**$423,036**
2011–12	$4,787,256	$1,283,133	$1,897,761	$4,450,643	**$12,418,793**	**$459,955**
2012–13	$4,926,371	$2,528,202	$1,990,739	$5,896,678	**$15,341,990**	**$590,077**
2013–14	$4,580,511	$1,652,628	$1,761,315	$2,292,755	**$10,287,209**	**$381,008**
2014–15	$5,870,118	$304,274	$933,138	$5,509,933	**$12,617,463**	**$467,313**
2015–16	$6,834,527	$384,920	$939,633	$2,862,720	**$11,021,800**	**$408,215**

Figure E.5 Department of Civil Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2006–2007 to 2015–2016



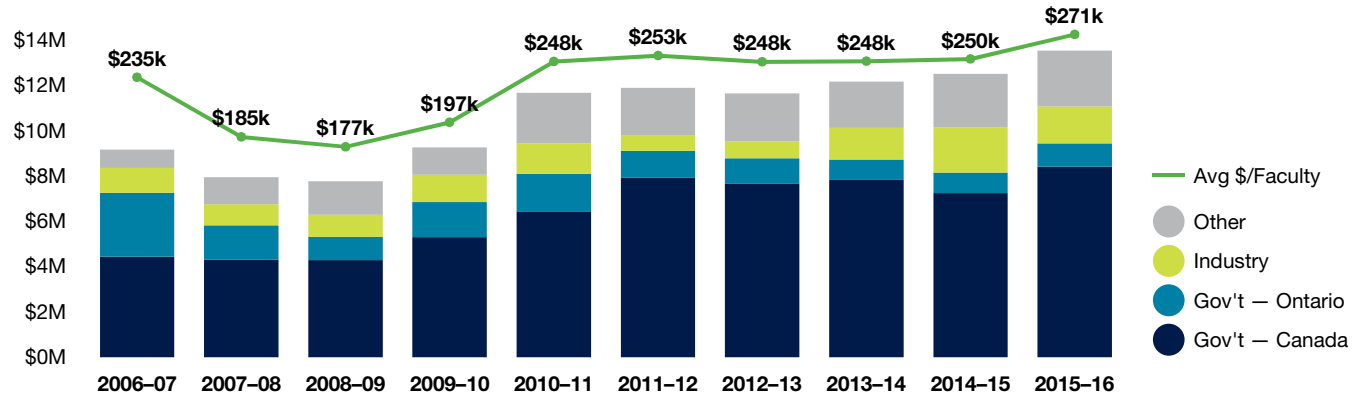
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2006–07	$1,879,079	$1,040,229	$421,708	$2,261,010	**$5,602,026**	**$160,058**
2007–08	$1,990,013	$622,300	$910,734	$1,023,094	**$4,546,141**	**$142,067**
2008–09	$1,990,579	$572,670	$730,460	$1,988,916	**$5,282,625**	**$160,080**
2009–10	$2,129,407	$412,542	$931,988	$1,732,686	**$5,206,623**	**$157,776**
2010–11	$1,956,171	$1,097,073	$747,127	$3,399,792	**$7,200,163**	**$218,187**
2011–12	$1,971,794	$402,645	$515,359	$1,428,083	**$4,317,881**	**$116,699**
2012–13	$2,338,881	$1,121,005	$586,088	$1,941,535	**$5,987,509**	**$157,566**
2013–14	$2,872,286	$2,069,441	$470,776	$3,041,895	**$8,454,398**	**$234,844**
2014–15	$3,019,003	$728,763	$491,188	$1,857,708	**$6,096,662**	**$179,314**
2015–16	$3,699,438	$906,961	$1,062,331	$2,096,656	**$7,765,386**	**$221,868**

Figure E.6 The Edward S. Rogers Sr. Department of Electrical & Computer Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2006–2007 to 2015–2016



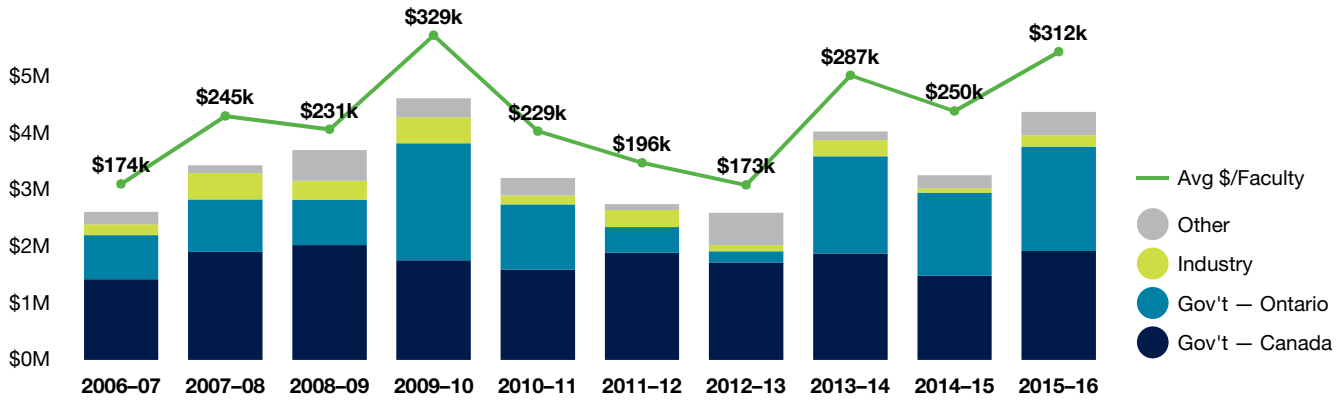
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2006–07	$6,782,878	$2,660,526	$3,363,559	$957,306	**$13,764,269**	**$191,170**
2007–08	$7,697,810	$3,470,568	$2,950,516	$853,280	**$14,972,174**	**$213,888**
2008–09	$7,397,769	$4,551,690	$2,684,325	$2,815,615	**$17,449,399**	**$268,452**
2009–10	$7,663,706	$3,923,865	$1,472,750	$2,856,764	**$15,917,085**	**$244,878**
2010–11	$8,139,058	$2,962,550	$2,139,422	$3,491,863	**$16,732,893**	**$253,529**
2011–12	$9,854,328	$1,107,633	$2,891,235	$3,582,326	**$17,435,522**	**$264,175**
2012–13	$9,131,379	$2,300,498	$2,305,784	$3,647,052	**$17,384,713**	**$255,658**
2013–14	$10,082,197	$2,250,783	$3,001,004	$4,557,823	**$19,891,807**	**$276,275**
2014–15	$10,897,608	$2,160,216	$3,176,267	$2,119,945	**$18,354,036**	**$254,917**
2015–16	$10,356,465	$843,513	$3,088,408	$2,359,321	**$16,647,707**	**$231,218**

Figure E.7 Department of Mechanical & Industrial Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2006–2007 to 2015–2016



	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2006–07	$4,425,552	$2,833,485	$1,095,225	$804,332	**$9,158,594**	**$234,836**
2007–08	$4,297,951	$1,519,533	$924,880	$1,200,988	**$7,943,352**	**$184,729**
2008–09	$4,276,083	$1,027,566	$976,457	$1,486,482	**$7,766,588**	**$176,513**
2009–10	$5,289,382	$1,558,727	$1,203,710	$1,212,155	**$9,263,974**	**$197,106**
2010–11	$6,432,136	$1,653,762	$1,353,512	$2,224,992	**$11,664,402**	**$248,179**
2011–12	$7,912,011	$1,188,878	$679,470	$2,114,359	**$11,894,718**	**$253,079**
2012–13	$7,663,486	$1,115,661	$757,191	$2,105,330	**$11,641,668**	**$247,695**
2013–14	$7,842,378	$879,834	$1,393,542	$2,050,831	**$12,166,585**	**$248,298**
2014–15	$7,239,600	$909,827	$1,997,845	$2,353,777	**$12,501,049**	**$250,021**
2015–16	$8,405,718	$1,027,939	$1,630,519	$2,476,525	**$13,540,701**	**$270,814**

Figure E.8 **Department of Materials Science & Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2006–2007 to 2015–2016**



	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2006–07	$1,417,224	$777,970	$195,024	$216,848	**$2,607,066**	**$173,804**
2007–08	$1,898,382	$927,585	$464,574	$138,250	**$3,428,791**	**$244,914**
2008–09	$2,020,903	$796,601	$339,222	$539,173	**$3,695,899**	**$230,994**
2009–10	$1,754,687	$2,059,894	$462,055	$334,545	**$4,611,181**	**$329,370**
2010–11	$1,587,169	$1,150,973	$158,500	$309,101	**$3,205,743**	**$228,982**
2011–12	$1,886,026	$453,820	$298,597	$104,500	**$2,742,943**	**$195,925**
2012–13	$1,715,249	$196,359	$111,000	$569,275	**$2,591,883**	**$172,792**
2013–14	$1,875,773	$1,711,981	$286,216	$149,675	**$4,023,645**	**$287,403**
2014–15	$1,479,343	$1,464,291	$80,000	$230,356	**$3,253,990**	**$250,307**
2015–16	$1,919,628	$1,835,138	$205,715	$409,375	**$4,369,856**	**$312,133**

Appendix F: Spinoff Companies

Est.	Company Name	Engineering Affiliation	Department
2016	2488138 Ontario Inc.	Roman Genov	ECE
2016	Ardra Bio Inc.	Radhakrishnan Mahadevan	ChemE
2016	Crowd2Know Inc.	Tamer El-Diraby	CivE
2016	Hammock Pharmaceuticals Inc.	Molly Soichet & Michael Cooke	ChemE
2016	Knitt Labs, Inc. (formerly FlexCube Technology Inc.)	Shuze Zhao	ECE
2016	LegUp Computing Inc.	Jason Anderson & Stephen Brown	ECE
2016	Polumiros Inc.	Soror Sharifpoor & Kyle Battiston	IBBME
2016	Sheba Microsystems Inc.	Ridha Ben Mrad & Faez BaTis	MIE
2016	Sonare Inc.	David Steinman & Luis Aguilar	MIE
2015	Appulse Inc. (formerly ICE3 Power Technologies Inc.)	Aleksander Prodic	ECE
2015	Deep Genomics Inc.	Brendan Frey	ECE
2015	Enhanced Biomodulation Technologies Inc.	Paul Yoo	IBBME
2015	ExCellThera Inc.	Peter Zandstra	IBBME
2015	Onyx Motion Inc.	Marissa Wu	IBBME
2015	Tara Biosystems, Inc.	Milica Radisic	IBBME, ChemE
2014	Arrowonics Inc.	Hugh Liu	UTIAS
2014	Enceladeus Imaging	Steve Mann	ECE
2014	IQBiomedical	David Sinton	MIE
2014	Pragmatek Transport Innovations, Inc.	Baher Abdulhai	CivE
2014	QD Solar Inc.	Sjoerd Hoogland and Ted Sargent	ECE
2014	Sonas Systems Inc.	Joyce Poon	ECE
2014	SpineSonics Medical Inc.	Richard Cobbold	IBBME
2014	Toronto Nano Instrumentation Inc. (TNi Inc.)	Yu Sun	MIE
2014	XCellPure Inc.	Milica Radisic	IBBME, ChemE
2014	XTouch Inc.	Parham Aarabi	ECE
2013	CoursePeer	Hadi Aladdin	ECE
2013	eQOL Inc.	Binh Nguyen	ECE
2013	Kydo Engineering	John Ruggieri	ChemE
2013	Whirlscape Inc.	Will Walmsley	MIE
2012	Kinetica Dynamics Inc.	Constantin Christopoulos	CivE
2012	MyTrak Health Systems	Sean Doherty	CivE
2012	OTI Lumionics Inc.	Zheng-Hong Lu	MSE
2012	XTT	Parham Aarabi	ECE
2011	Aereus Technologies Inc. (formerly Aereus Wood)	Javad Mostaghimi	MIE
2011	Bionym Inc.	Karl Martin	ECE
2011	Filaser Inc.	Peter Herman	ECE
2011	Luminautics Inc. (formerly Ensi Solutions)	Graham Murdoch	MSE
2011	Nymi (Formerly Bionym Inc.)	Karl Martin	ECE
2011	Ojiton Inc.	Tom Chau	IBBME
2011	PRISED Solar Inc.	Wahid Shams-Kolahi	ECE
2011	RenWave	Mohamed Kamh	ECE
2011	Sense Intelligent	Brian Hu	ECE
2011	Xagenic Canada Inc.	Ted Sargent	ECE
2010	Arda Power Inc.	Peter Lehn	ECE
2010	FOTA Technologies	Tony Chan Carusone	ECE
2009	Chip Care Corp.	J. Stewart Aitchison	ECE
2009	Cytodiagnostics	Warren Chan	IBBME
2009	Peraso Technologies Inc.	Sorin Voinigescu	ECE
2008	Ablazeon Inc.	Javad Mostaghimi	MIE
2008	Arch Power Inc.	Mohammad (Reza) Iravani	ECE
2008	AXAL Inc.	Milos Popovic and Egor Sanin	IBBME
2008	Incise Photonics Inc.	Peter Herman	ECE
2008	Quantum Dental Technologies	Andreas Mandelis	MIE
2008	Simple Systems Inc.	Milos Popovic, Aleksandar Prodic and Armen Baronijan	ECE, IBBME

2007	002122461 Ontario Inc.	Harry Ruda	MSE
2007	Cast Connex Corp.	Jeffrey Packer and Constantin Christopoulos	CivE
2007	Elastin Specialties	Kimberly Woodhouse	ChemE
2007	Inometrix Inc.	Michael Galle	ECE
2007	Modiface Inc.	Parham Aarabi	ECE
2007	Neurochip Inc.	Berj Bardakjian	IBBME
2007	Viewgenie Inc.	Parham Aarabi	ECE
2006	Anviv Mechatronics Inc. (AMI)	Andrew Goldenberg	MIE
2006	InVisage Technologies Inc.	Ted Sargent	ECE
2006	Metabacus	Jianwen Zhu	ECE
2006	Vennsa Technologies Inc.	Andreas Veneris and Sean Safarpour	ECE
2005	Greencore Composites	Mohini Sain	Forestry, ChemE
2004	Field Metrica Inc. (FMI)	Tim DeMonte, Richard Yoon	IBBME
2004	Tissue Regeneration Therapeutics Inc. (TRT)	J.E. Davies	IBBME
2003	1484667 Ontario Inc.	Brad Saville	ChemE
2003	ArchES Computing Systems Corp.	Paul Chow	ECE
2003	Norel Optronics Inc.	Zheng-Hong Lu	MSE
2003	Vocalage Inc.	Mark Chignell	MIE
2002	Information Intelligence Corporation (IIC)	Burhan Turksen	MIE
2002	MatRegen Corp.	Molly Shoichet	IBBME, ChemE
2002	OMDEC Inc.	Andrew K.S. Jardine	MIE
2002	SiREM	Elizabeth Edwards	ChemE
2001	Fox-Tek	Rod Tennyson	UTIAS
2001	Insception Biosciences	Peter Zandstra	IBBME
2001	Interface Biologics	Paul Santerre	IBBME
2000	Biox Corporation	David Boocock	ChemE
2000	Photo-Thermal Diagnostics Inc.	Andreas Mandelis	MIE
2000	Simulent Inc.	Javad Mostaghimi	MIE
2000	Virtek Engineering Science Inc.	Andrew Goldenberg	MIE
1999	Accelight Networks Inc.	Alberto Leon-Garcia and Paul Chow	ECE
1999	em2 Inc.	J.E. Davies	IBBME
1999	Soma Networks	Michael Stumm and Martin Snelgrove	ECE
1999	Vivosonic Inc.	Yuri Sokolov and Hans Kunov	IBBME
1998	1208211 Ontario Ltd. (affiliate: Regen StaRR)	Robert Pilliar, Rita Kandel and Marc Grynpas	IBBME
1998	BANAK Inc.	Andrew K.S. Jardine	MIE
1998	BoneTec Corp. (now owned by subsidiary of TRT)	J.E. Davies and Molly Shoichet	IBBME
1998	Right Track CAD Corp.	Jonathan Rose	ECE
1998	SMT HyrdaSil	Rod Tennyson	UTIAS
1998	Snowbush Microelectronics	Kenneth Martin and David Johns	ECE
1997	Rimon Therapeutics	Michael Sefton	IBBME, ChemE
1996	OANDA Corp.	Michael Stumm	ECE
1996	Rocscience Inc.	John Curran	CivE
1995	Amilog Systems		MIE
1995	Electrobiologies	Paul Madsen	IBBME
1995	Hydrogenics Corp.		MIE
1995	Tribokinetics Inc.	Raymond Woodhams	ChemE
1994	Key Lime Co.	Honghi Tran	ChemE
1994	Trantek Power		ECE
1993	Electro Photonics	Raymond Measures	UTIAS
1993	Liquid Metal Sonics Ltd.		MSE
1993	SAFE Nozzle Group	Honghi Tran	ChemE
1993	SmartSpeaker Corp.	Anees Munshi	ECE
1992	Condata Technologies Ltd.		ECE
1992	Gao Research & Consulting Ltd.	Frank Gao	ECE
1992	Novator Systems Ltd.	Mark Fox	MIE
1992	Paul Madsen Medical Devices	Hans Kunov	IBBME
1992	PolyPhalt Inc.	Raymond Woodhams	ChemE

Appendix G: Descriptions of Major Awards

Chapter 5: Awards and Honours summarizes the international, national and provincial awards our faculty and alumni received. Below are descriptions of some of those awards and honours.

International

American Association for the Advancement of Science (AAAS) Fellowship — Engineering Section
Recognition of extraordinary achievements across disciplines by a member whose efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished. The AAAS is the world's largest general scientific society.

MIT Top 35 Under 35
Awarded to world's top 35 young innovators under the age of 35 by *MIT Technology Review* magazine.

U.S. National Academies
The National Academies serve (collectively) as the scientific national academy for the United States.

National

Brockhouse Prize
Recognition of outstanding Canadian interdisciplinary research teams for internationally significant achievement in the natural sciences and engineering.

Canadian Academy of Engineering (CAE) Fellowship
Recognition for distinguished achievements and career-long service to the engineering profession.

Engineering Institute of Canada (EIC) Fellowship
Recognition for exceptional contributions to engineering in Canada and for service to the profession and to society.

Engineering Institute of Canada (EIC) Awards
Recognition of outstanding engineers for exemplary contributions to engineering achievement in Canada and the world.

Engineers Canada Awards
Recognition of outstanding Canadian engineers, teams of engineers, engineering projects and engineering students.

Killam Prize
Awarded to distinguished Canadian scholars conducting research in one of five fields of study, including engineering, by the Canada Council for the Arts.

Killam Research Fellowship
Awarded to an established scholar who has demonstrated outstanding research ability and has published research results in substantial publications in their field by the Canada Council for the Arts.

Manning Innovation Award
Recognition of Canadian innovators who are improving the lives of Canadians and others around the world through their commercialized innovations.

Royal Society of Canada (RSC) Fellowship
Highest Canadian honour a scholar can achieve in the arts, humanities and sciences.

Royal Society of Canada (RSC) College of New Scholars, Artists and Scientists
Members are Canadian scholars who, at an early stage in their career, have demonstrated a high level of achievement and excellence.

Steacie Fellowship
Awarded to enhance the career development of outstanding and highly promising scientists and engineers by the Natural Sciences and Engineering Research Council (NSERC).

Steacie Prize
Awarded to a scientist or engineer 40 years of age of less for outstanding scientific research carried out in Canada.

Synergy Award for Innovation
Recognition for university-industry collaboration that stands as a model of effective partnership.

Provincial

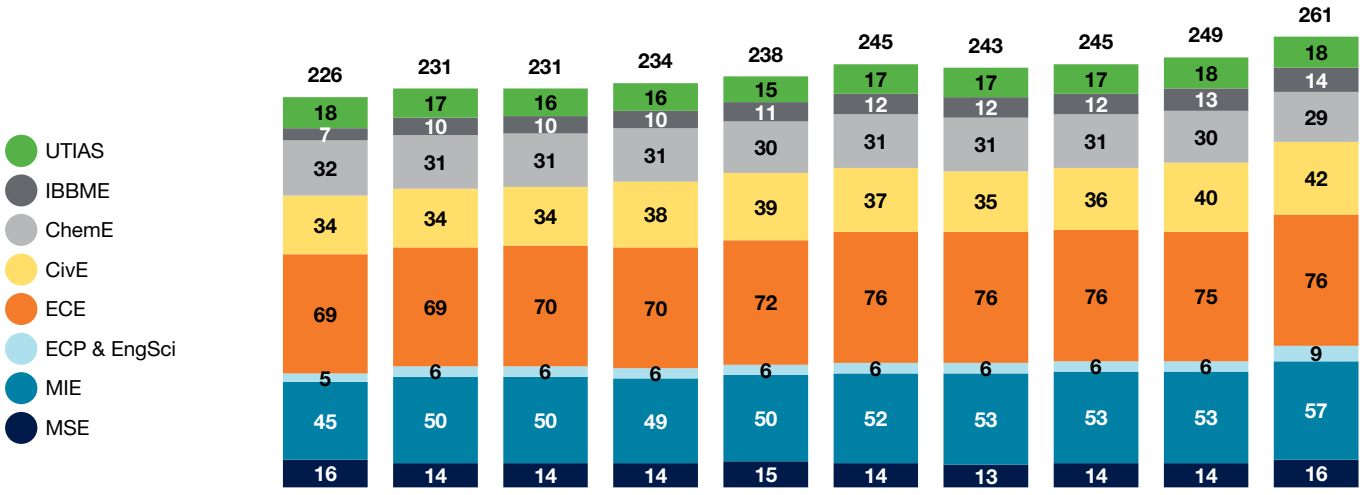
Ontario Professional Engineers Awards
Awarded to Professional Engineers Ontario members who have contributed substantially to the advancement of the engineering profession in any of its branches.

Ontario Confederation of University Faculty Associations (OCUFA) Teaching Award
Recognition of individuals with exceptional contributions to the higher education community in Ontario, including teaching philosophy, curriculum development and research on university teaching.

Appendix H: Academic Staff by Academic Area

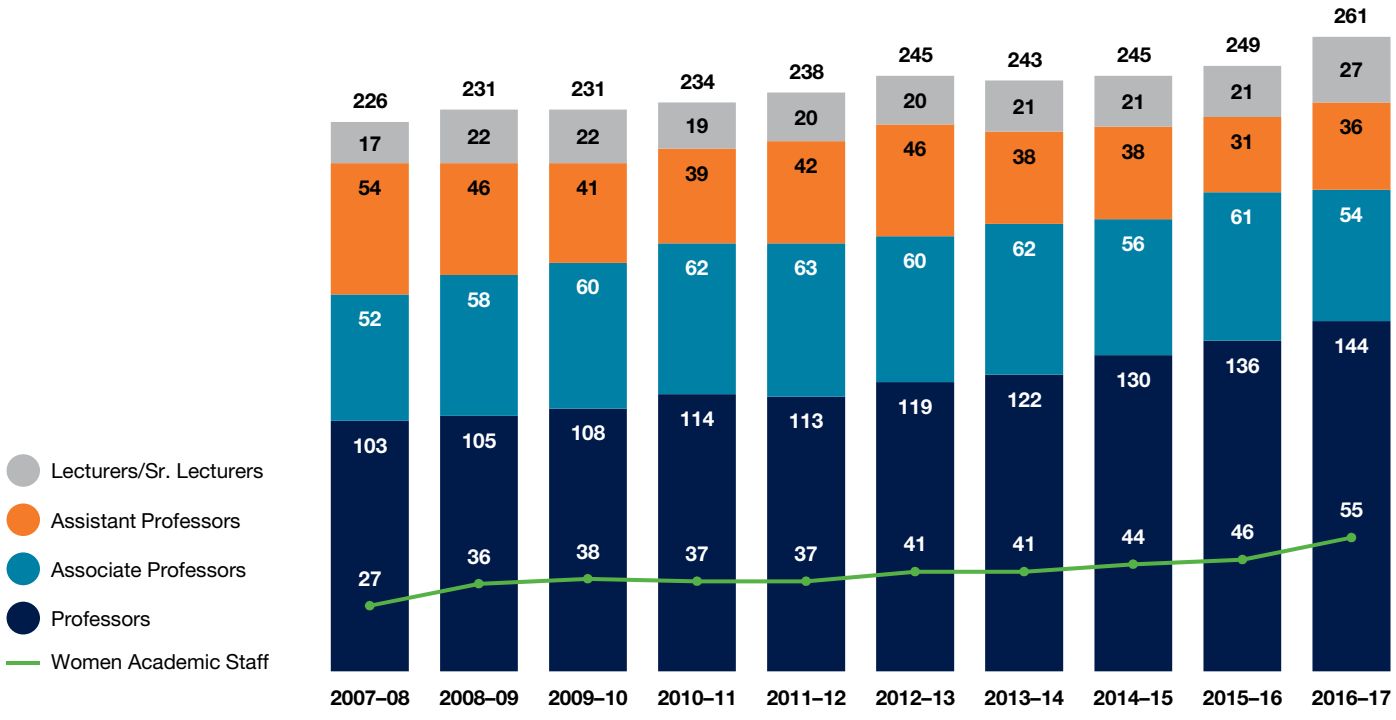
The figures in Appendix H show the composition of our academic staff from 2006–2007 to 2015–2016. Figures H.1a and H.1b provide a Faculty overview and H.2 to H.8 present a detailed analysis by academic area.

Figure H.1a **Total Academic Staff by Academic Area, 2007–2008 to 2016–2017**



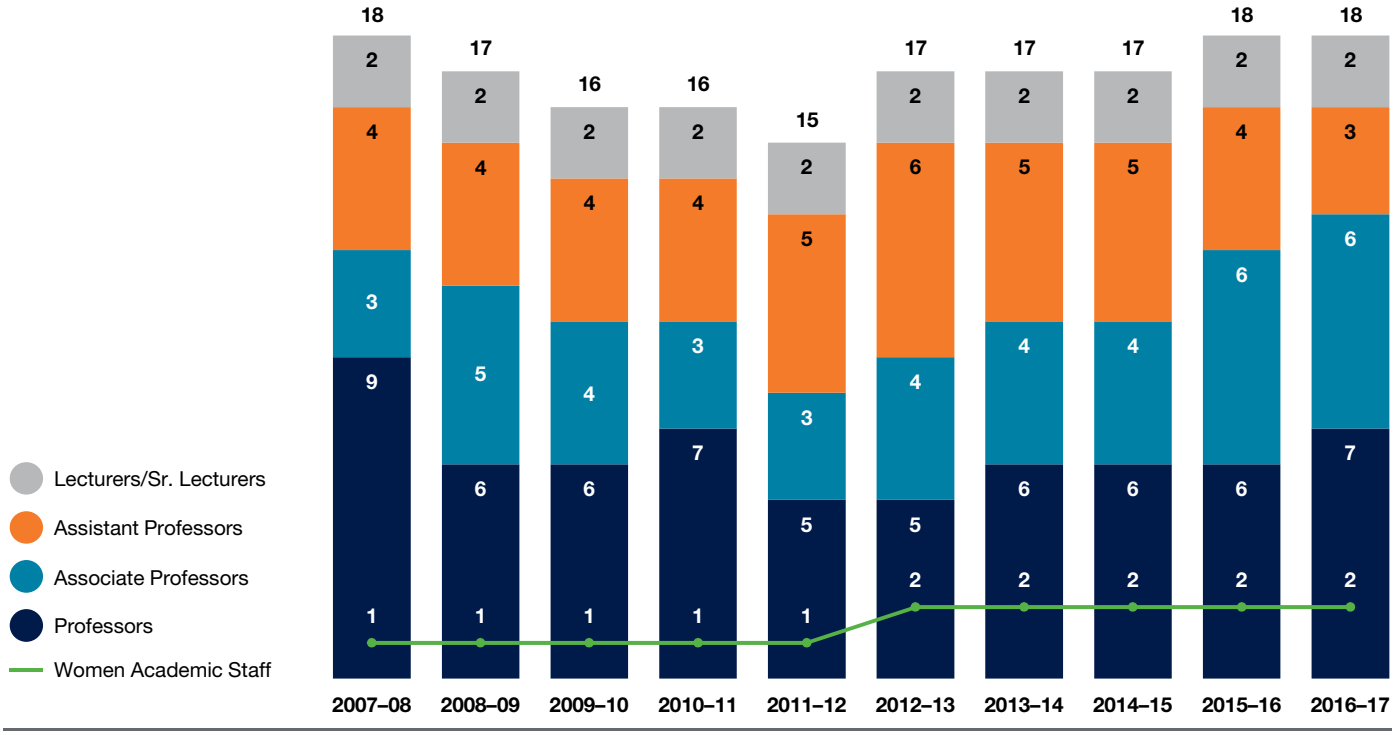
		2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
UTIAS	Assistant Profs	4	4	4	4	5	6	5	5	4	3
	Associate Profs	3	5	4	3	3	4	4	4	6	6
	Professors	9	6	6	7	5	5	6	6	6	7
	Lecturers	2	2	2	2	2	2	2	2	2	2
IBBME	Assistant Profs	3	6	5	3	5	6	5	4	4	4
	Associate Profs	3	3	1	3	3	2	2	3	4	4
	Professors	1	1	4	4	3	4	4	4	4	4
	Lecturers	0	0	0	0	0	0	1	1	1	2
ChemE	Assistant Profs	5	5	6	7	5	6	4	5	4	4
	Associate Profs	3	3	2	2	3	3	5	5	5	2
	Professors	20	17	17	18	18	18	18	17	17	20
	Lecturers	4	6	6	4	4	4	4	4	4	3
CivE	Assistant Profs	8	6	6	9	9	8	7	8	5	8
	Associate Profs	10	12	12	11	10	11	11	9	14	12
	Professors	15	15	15	17	19	17	16	18	20	21
	Lecturers	1	1	1	1	1	1	1	1	1	1
ECE	Assistant Profs	18	9	8	7	9	11	9	7	5	5
	Associate Profs	22	26	26	25	25	22	20	16	16	15
	Professors	25	30	32	34	34	39	43	49	50	51
	Lecturers	4	4	4	4	4	4	4	4	4	5
FASE	Lecturers	5	6	6	6	6	6	6	6	6	9
MIE	Assistant Profs	14	13	11	8	7	7	6	6	6	9
	Associate Profs	7	8	12	15	16	14	16	15	12	11
	Professors	23	26	24	24	24	28	28	29	32	33
	Lecturers	1	3	3	2	3	3	3	3	3	4
MSE	Assistant Profs	2	2	1	1	2	2	2	3	3	3
	Associate Profs	4	2	3	3	3	4	4	4	4	4
	Professors	10	10	10	10	10	8	7	7	7	8
	Lecturers	0	0	0	0	0	0	0	0	0	1
Total		**226**	**231**	**231**	**234**	**238**	**245**	**243**	**245**	**249**	**261**

Figure H.1b **University of Toronto Faculty of Applied Science & Engineering Total Academic Staff by Position with Percentage of Women, 2007–2008 to 2016–2017**



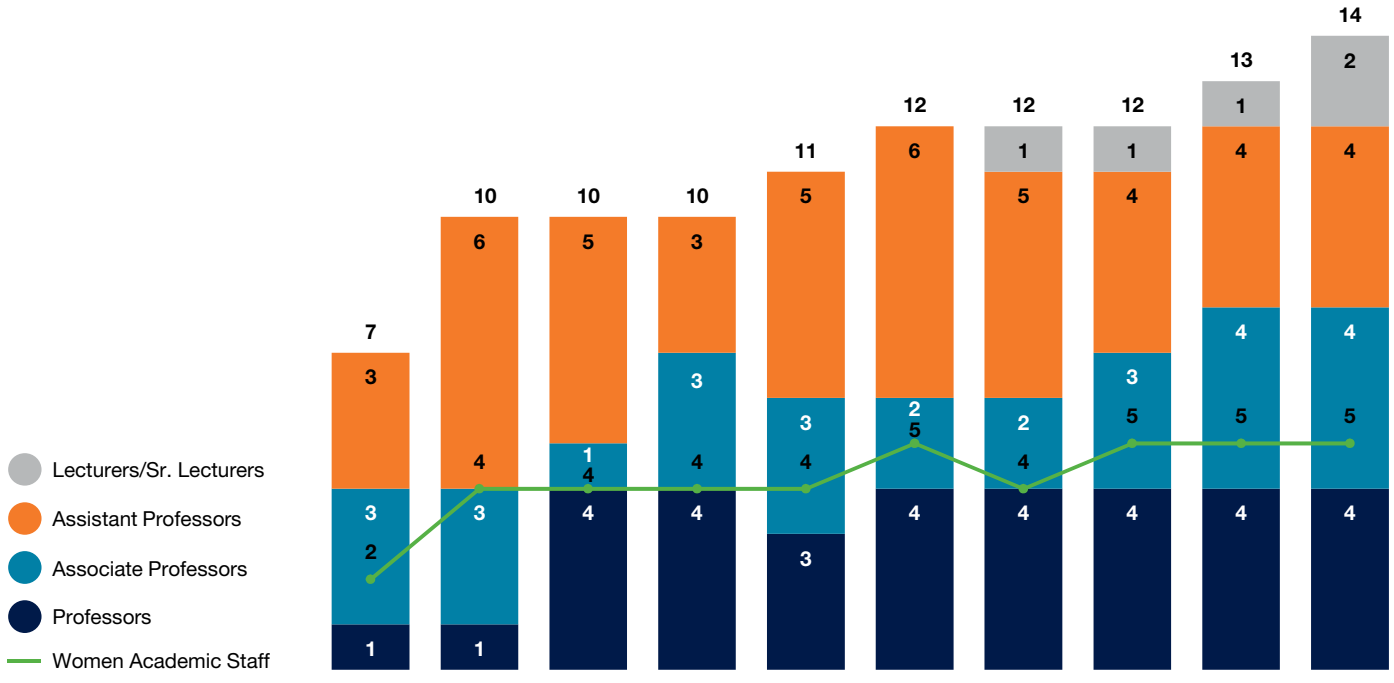
	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Assistant Professors	54	46	41	39	42	46	38	38	31	36
Women Assistant Professors	12	17	17	15	14	16	10	12	8	13
% Women Assistant Professors	**22.2%**	**37.0%**	**41.5%**	**38.5%**	**33.3%**	**34.8%**	**26.3%**	**31.6%**	**25.8%**	**36.1%**
Associate Professors	52	58	60	62	63	60	62	56	61	54
Women Associate Professors	6	8	10	13	13	13	17	14	17	16
% Women Associate Professors	**11.5%**	**13.8%**	**16.7%**	**21.0%**	**20.6%**	**21.7%**	**27.4%**	**25.0%**	**27.9%**	**29.6%**
Professors	103	105	108	114	113	119	122	130	136	144
Women Professors	6	5	5	5	6	8	9	13	16	18
% Women Professors	**5.8%**	**4.8%**	**4.6%**	**4.4%**	**5.3%**	**6.7%**	**7.4%**	**10.0%**	**11.8%**	**12.5%**
Lecturers/ Sr. Lecturers	17	22	22	19	20	20	21	21	21	27
Women Lecturers/ Sr. Lecturers	3	6	6	4	4	4	5	5	5	8
% Women Lecturers/ Sr. Lecturers	**17.6%**	**27.3%**	**27.3%**	**21.1%**	**20.0%**	**20.0%**	**23.8%**	**23.8%**	**23.8%**	**29.6%**
Total Tenured and Tenure Stream	209	209	209	215	218	225	222	224	228	234
Women Tenured and Tenure Stream	24	30	32	33	33	37	36	39	41	47
% Women Tenured and Tenure Stream	**11.5%**	**14.4%**	**15.3%**	**15.3%**	**15.1%**	**16.4%**	**16.2%**	**17.4%**	**18.0%**	**20.1%**
Total Academic Staff	226	231	231	234	238	245	243	245	249	261
Women Academic Staff	27	36	38	37	37	41	41	44	46	55
% Women Academic Staff	**11.9%**	**15.6%**	**16.5%**	**15.8%**	**15.5%**	**16.7%**	**16.9%**	**18.0%**	**18.5%**	**21.1%**

Figure H.2 **University of Toronto Institute for Aerospace Studies: Academic Staff by Position with Percentage of Women, 2007–2008 to 2016–2017**



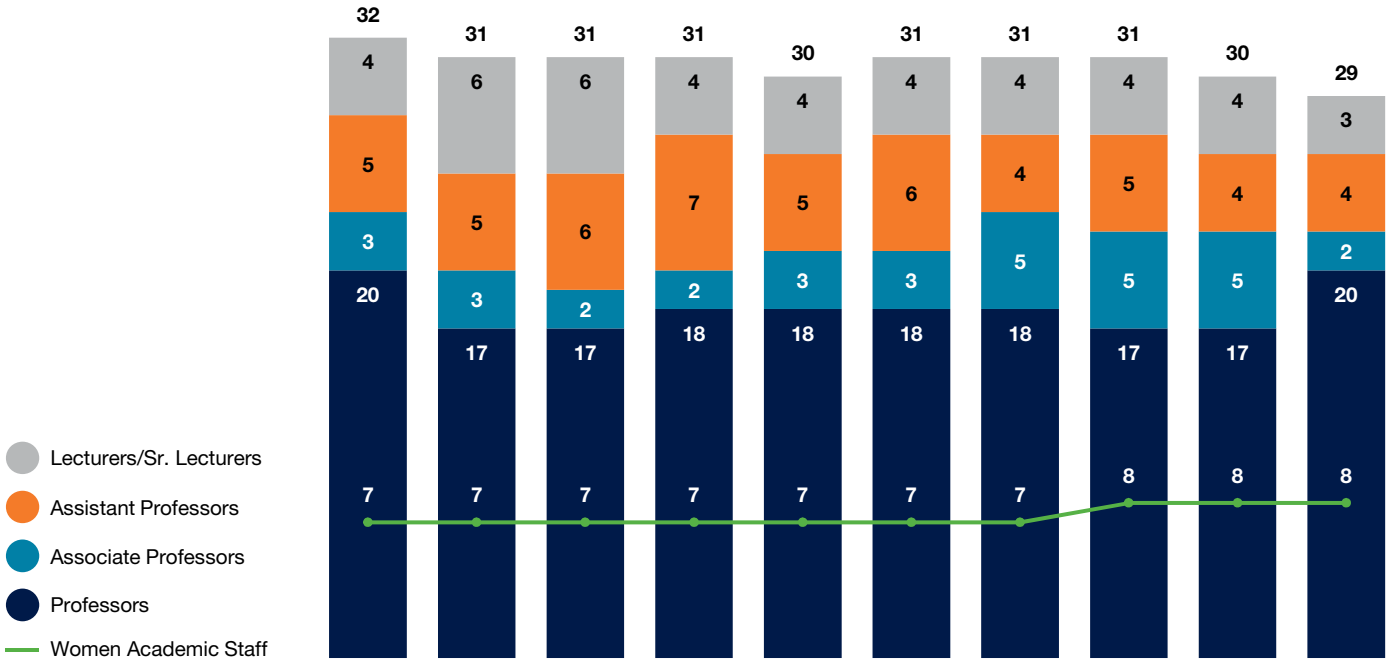
	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Assistant Professors	4	4	4	4	5	6	5	5	4	3
Women Assistant Professors	1	1	1	1	1	2	2	2	1	1
% Women Assistant Professors	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**20.0%**	**33.3%**	**40.0%**	**40.0%**	**25.0%**	**33.3%**
Associate Professors	3	5	4	3	3	4	4	4	6	6
Women Associate Professors	0	0	0	0	0	0	0	0	1	1
% Women Associate Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**16.7%**	**16.7%**
Professors	9	6	6	7	5	5	6	6	6	7
Women Professors	0	0	0	0	0	0	0	0	0	0
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Lecturers/ Sr. Lecturers	2	2	2	2	2	2	2	2	2	2
Women Lecturers/ Sr. Lecturers	0	0	0	0	0	0	0	0	0	0
% Women Lecturers/ Sr. Lecturers	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Total Tenured and Tenure Stream	16	15	14	14	13	15	15	15	16	16
Women Tenured and Tenure Stream	1	1	1	1	1	2	2	2	2	2
% Women Tenured and Tenure Stream	**6.3%**	**6.7%**	**7.1%**	**7.1%**	**7.7%**	**13.3%**	**13.3%**	**13.3%**	**12.5%**	**12.5%**
Total Academic Staff	18	17	16	16	15	17	17	17	18	18
Women Academic Staff	1	1	1	1	1	2	2	2	2	2
% Women Academic Staff	**5.6%**	**5.9%**	**6.3%**	**6.3%**	**6.7%**	**11.8%**	**11.8%**	**11.8%**	**11.1%**	**11.1%**

Figure H.3 **Institute of Biomaterials & Biomedical Engineering: Academic Staff by Position with Percentage of Women, 2007–2008 to 2016–2017**



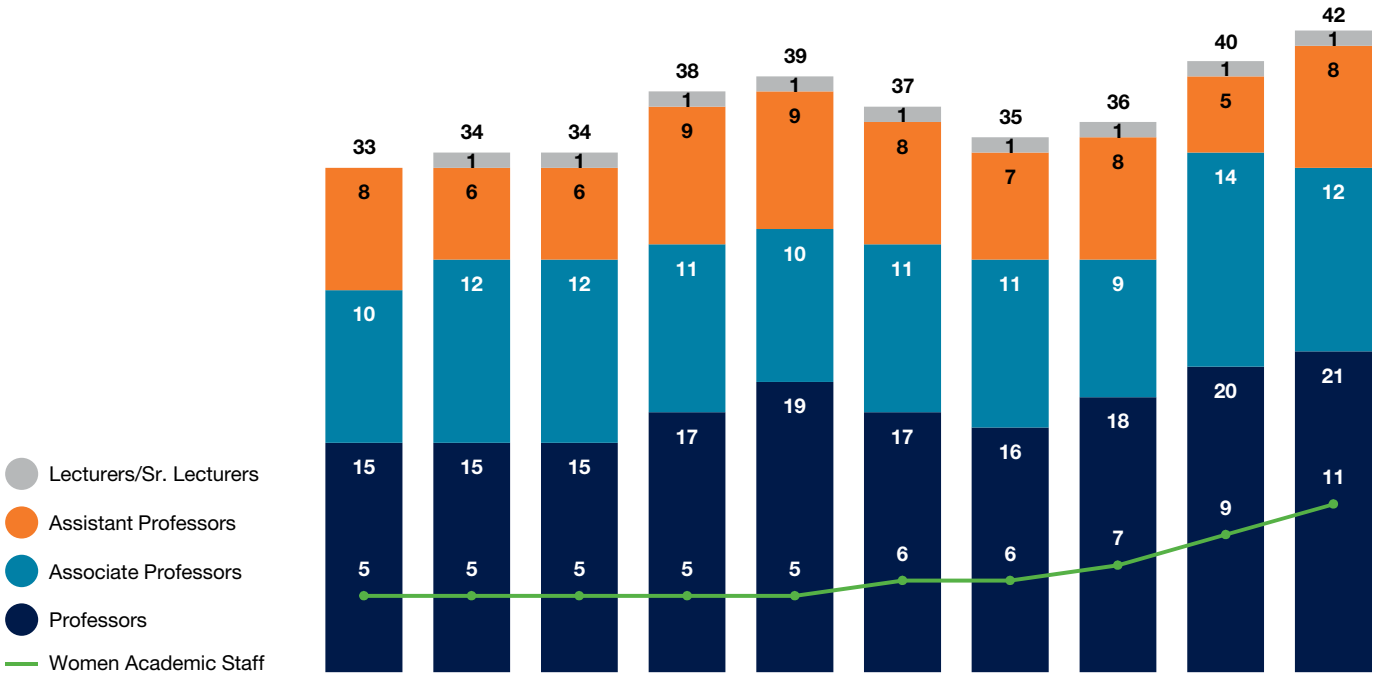
	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Assistant Professors	3	6	5	3	5	6	5	4	4	4
Women Assistant Professors	2	4	4	2	2	3	1	2	2	2
% Women Assistant Professors	**66.7%**	**66.7%**	**80.0%**	**66.7%**	**40.0%**	**50.0%**	**20.0%**	**50.0%**	**50.0%**	**50.0%**
Associate Professors	3	3	1	3	3	2	2	3	4	4
Women Associate Professors	0	0	0	2	2	2	2	1	1	1
% Women Associate Professors	**0.0%**	**0.0%**	**0.0%**	**66.7%**	**66.7%**	**100.0%**	**100.0%**	**33.3%**	**25.0%**	**25.0%**
Professors	1	1	4	4	3	4	4	4	4	4
Women Professors	0	0	0	0	0	0	0	1	1	1
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**25.0%**	**25.0%**	**25.0%**
Lecturers/ Sr. Lecturers	0	0	0	0	0	0	1	1	1	2
Women Lecturers/ Sr. Lecturers	0	0	0	0	0	0	1	1	1	1
% Women Lecturers/ Sr. Lecturers	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	**100.0%**	**100.0%**	**50.0%**
Total Tenured and Tenure Stream	7	10	10	10	11	12	11	11	12	12
Women Tenured and Tenure Stream	2	4	4	4	4	5	3	4	4	4
% Women Tenured and Tenure Stream	**28.6%**	**40.0%**	**40.0%**	**40.0%**	**36.4%**	**41.7%**	**27.3%**	**36.4%**	**33.3%**	**33.3%**
Total Academic Staff	7	10	10	10	11	12	12	12	13	14
Women Academic Staff	2	4	4	4	4	5	4	5	5	5
% Women Academic Staff	**28.6%**	**40.0%**	**40.0%**	**40.0%**	**36.4%**	**41.7%**	**33.3%**	**41.7%**	**38.5%**	**35.7%**

Figure H.4 **Department of Chemical Engineering & Applied Chemistry: Academic Staff by Position with Percentage of Women, 2007–2008 to 2016–2017**



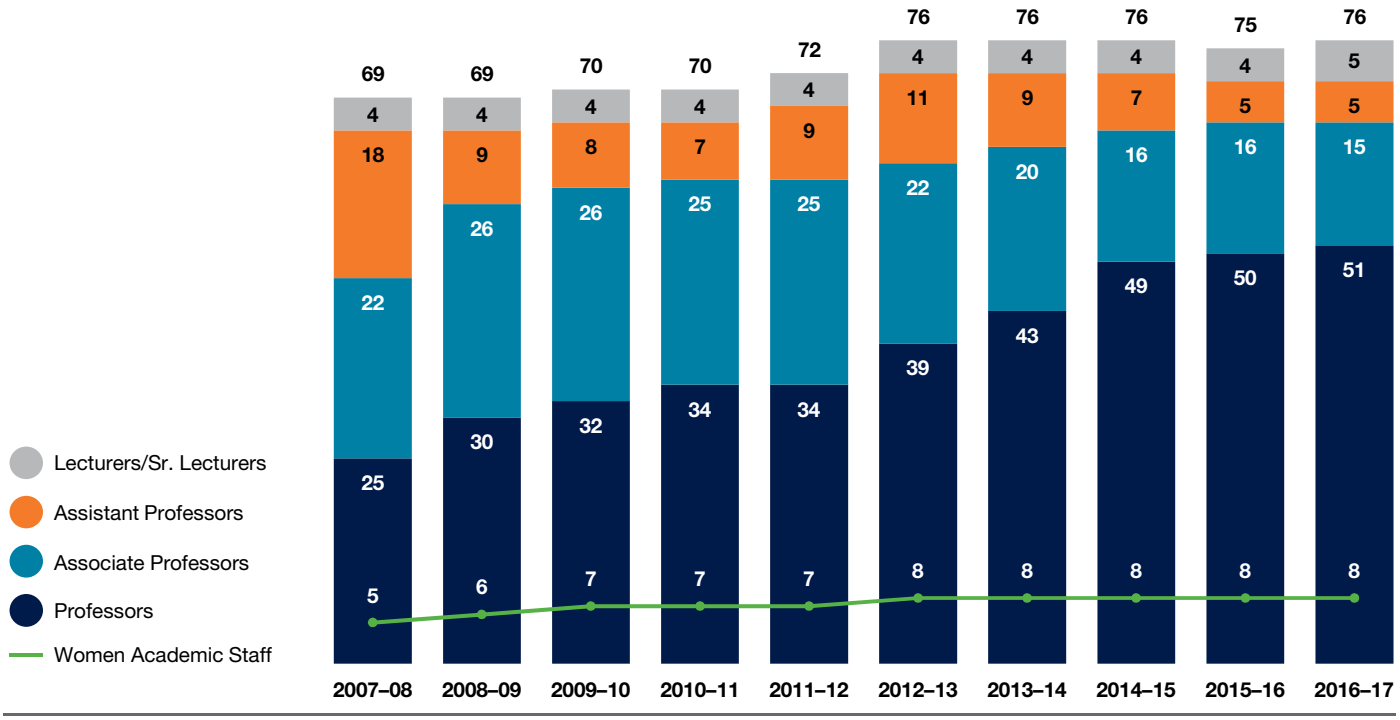
	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Assistant Professors	5	5	6	7	5	6	4	5	4	4
Women Assistant Professors	2	2	2	3	2	2	2	3	2	2
% Women Assistant Professors	**40.0%**	**40.0%**	**33.3%**	**42.9%**	**40.0%**	**33.3%**	**50.0%**	**60.0%**	**50.0%**	**50.0%**
Associate Professors	3	3	2	2	3	3	5	5	5	2
Women Associate Professors	0	0	0	0	1	1	1	1	2	1
% Women Associate Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**33.3%**	**33.3%**	**20.0%**	**20.0%**	**40.0%**	**50.0%**
Professors	20	17	17	18	18	18	18	17	17	20
Women Professors	4	3	3	3	3	3	3	3	3	4
% Women Professors	**20.0%**	**17.6%**	**17.6%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**17.6%**	**17.6%**	**20.0%**
Lecturers/ Sr. Lecturers	4	6	6	4	4	4	4	4	4	3
Women Lecturers/ Sr. Lecturers	1	2	2	1	1	1	1	1	1	1
% Women Lecturers/ Sr. Lecturers	**25.0%**	**33.3%**	**33.3%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**33.3%**
Total Tenured and Tenure Stream	28	25	25	27	26	27	27	27	26	26
Women Tenured and Tenure Stream	6	5	5	6	6	6	6	7	7	7
% Women Tenured and Tenure Stream	**21.4%**	**20.0%**	**20.0%**	**22.2%**	**23.1%**	**22.2%**	**22.2%**	**25.9%**	**26.9%**	**26.9%**
Total Academic Staff	32	31	31	31	30	31	31	31	30	29
Women Academic Staff	7	7	7	7	7	7	7	8	8	8
% Women Academic Staff	**21.9%**	**22.6%**	**22.6%**	**22.6%**	**23.3%**	**22.6%**	**22.6%**	**25.8%**	**26.7%**	**27.6%**

Figure H.5 **Department of Civil Engineering: Academic Staff by Position with Percentage of Women, 2007–2008 to 2016–2017**



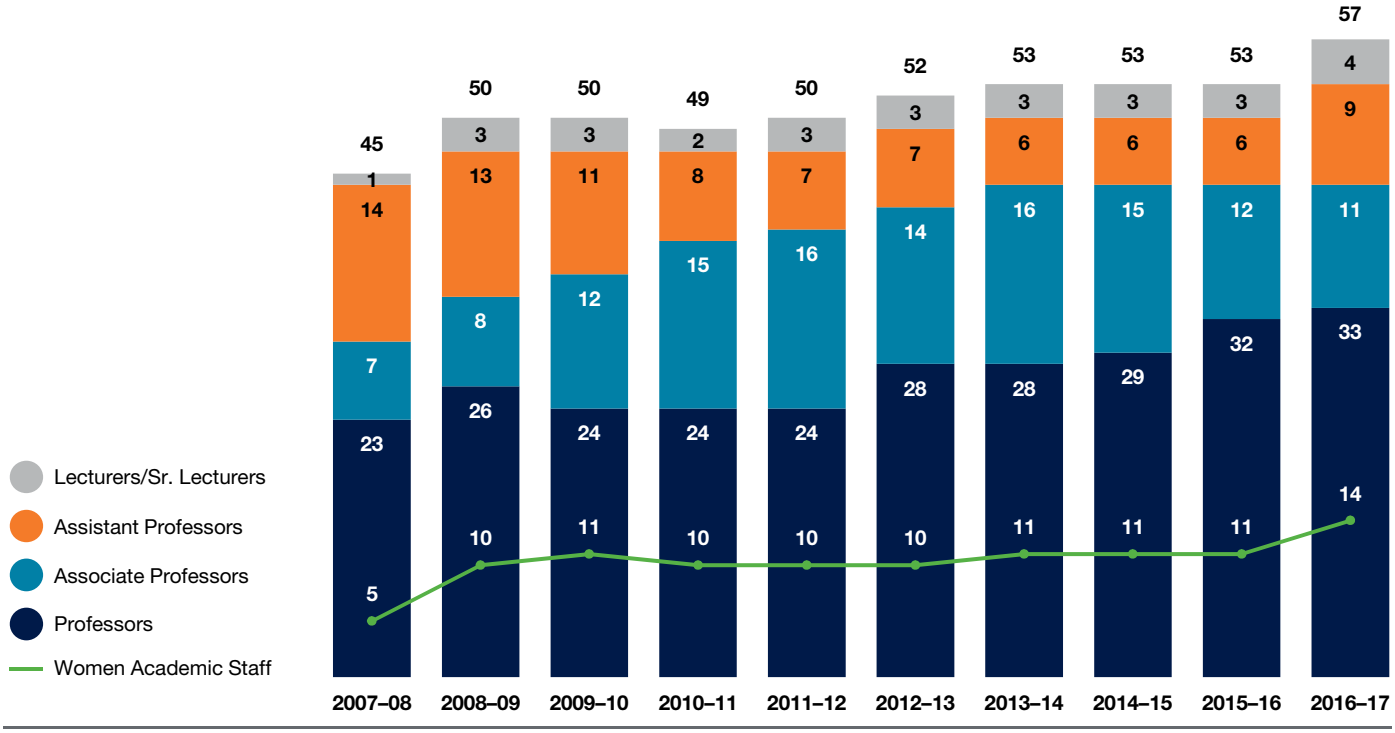
	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Assistant Professors	8	6	6	9	9	8	7	8	5	8
Women Assistant Professors	3	2	2	2	2	3	2	3	2	4
% Women Assistant Professors	**37.5%**	**33.3%**	**33.3%**	**22.2%**	**22.2%**	**37.5%**	**28.6%**	**37.5%**	**40.0%**	**50.0%**
Associate Professors	10	12	12	11	10	11	11	9	14	12
Women Associate Professors	2	3	3	3	2	2	3	2	4	4
% Women Associate Professors	**20.0%**	**25.0%**	**25.0%**	**27.3%**	**20.0%**	**18.2%**	**27.3%**	**22.2%**	**28.6%**	**33.3%**
Professors	15	15	15	17	19	17	16	18	20	21
Women Professors	0	0	0	0	1	1	1	2	3	3
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**5.3%**	**5.9%**	**6.3%**	**11.1%**	**15.0%**	**14.3%**
Lecturers/ Sr. Lecturers	1	1	1	1	1	1	1	1	1	1
Women Lecturers/ Sr. Lecturers	0	0	0	0	0	0	0	0	0	0
% Women Lecturers/ Sr. Lecturers	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Total Tenured and Tenure Stream	33	33	33	37	38	36	34	35	39	41
Women Tenured and Tenure Stream	5	5	5	5	5	6	6	7	9	11
% Women Tenured and Tenure Stream	**15.2%**	**15.2%**	**15.2%**	**13.5%**	**13.2%**	**16.7%**	**17.6%**	**20.0%**	**23.1%**	**26.8%**
Total Academic Staff	34	34	34	38	39	37	35	36	40	42
Women Academic Staff	5	5	5	5	5	6	6	7	9	11
% Women Academic Staff	**14.7%**	**14.7%**	**14.7%**	**13.2%**	**12.8%**	**16.2%**	**17.1%**	**19.4%**	**22.5%**	**26.2%**

Figure H.6 **The Edward S. Rogers Sr. Department of Electrical & Computer Engineering: Academic Staff by Position with Percentage of Women, 2007–2008 to 2016–2017**



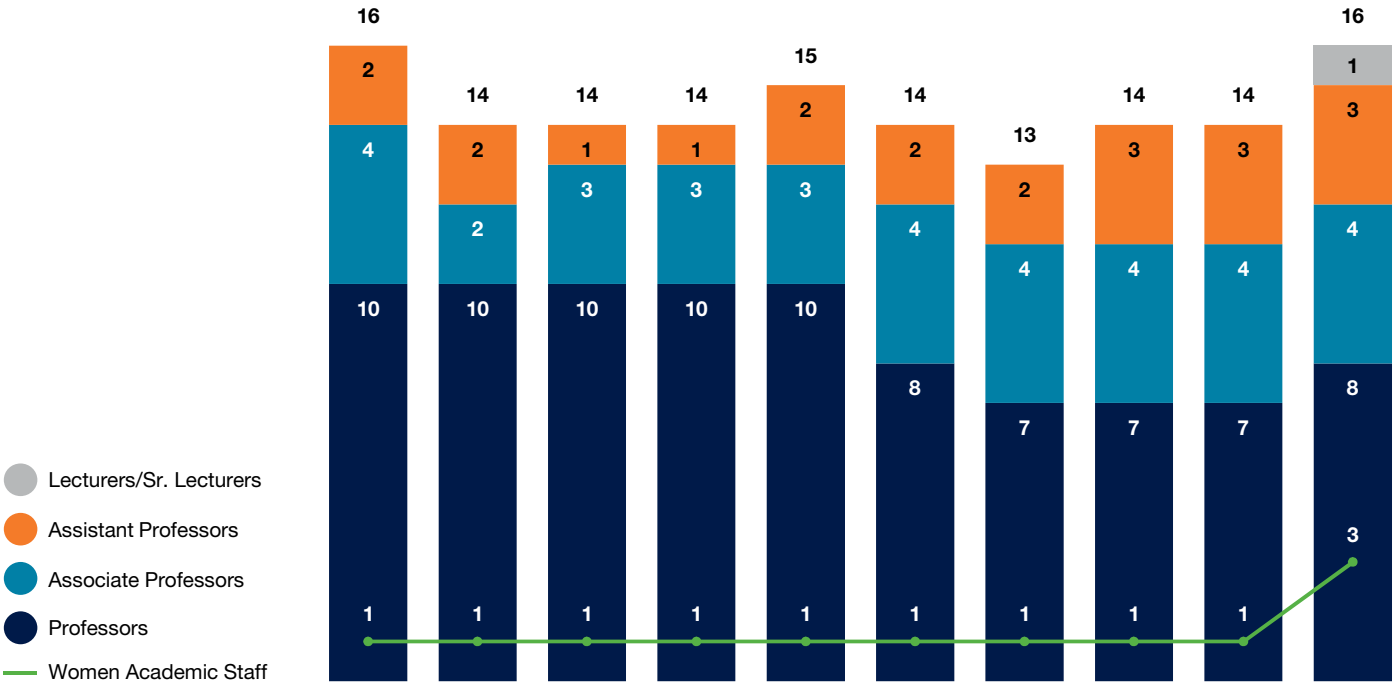
	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Assistant Professors	18	9	8	7	9	11	9	7	5	5
Women Assistant Professors	3	2	2	2	2	2	1	0	0	0
% Women Assistant Professors	**16.7%**	**22.2%**	**25.0%**	**28.6%**	**22.2%**	**18.2%**	**11.1%**	**0.0%**	**0.0%**	**0.0%**
Associate Professors	22	26	26	25	25	22	20	16	16	15
Women Associate Professors	1	3	4	4	4	4	4	4	3	3
% Women Associate Professors	**4.5%**	**11.5%**	**15.4%**	**16.0%**	**16.0%**	**18.2%**	**20.0%**	**25.0%**	**18.8%**	**20.0%**
Professors	25	30	32	34	34	39	43	49	50	51
Women Professors	0	0	0	0	0	1	2	3	4	4
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.6%**	**4.7%**	**6.1%**	**8.0%**	**7.8%**
Lecturers/ Sr. Lecturers	4	4	4	4	4	4	4	4	4	5
Women Lecturers/ Sr. Lecturers	1	1	1	1	1	1	1	1	1	1
% Women Lecturers/ Sr. Lecturers	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**20.0%**
Total Tenured and Tenure Stream	65	65	66	66	68	72	72	72	71	71
Women Tenured and Tenure Stream	4	5	6	6	6	7	7	7	7	7
% Women Tenured and Tenure Stream	**6.2%**	**7.7%**	**9.1%**	**9.1%**	**8.8%**	**9.7%**	**9.7%**	**9.7%**	**9.9%**	**9.9%**
Total Academic Staff	69	69	70	70	72	76	76	76	75	76
Women Academic Staff	5	6	7	7	7	8	8	8	8	8
% Women Academic Staff	**7.2%**	**8.7%**	**10.0%**	**10.0%**	**9.7%**	**10.5%**	**10.5%**	**10.5%**	**10.7%**	**10.5%**

Figure H.7 **Department of Mechanical & Industrial Engineering: Academic Staff by Position with Percentage of Women, 2007–2008 to 2016–2017**



	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Assistant Professors	14	13	11	8	7	7	6	6	6	9
Women Assistant Professors	1	5	6	5	5	4	2	2	1	3
% Women Assistant Professors	**7.1%**	**38.5%**	**54.5%**	**62.5%**	**71.4%**	**57.1%**	**33.3%**	**33.3%**	**16.7%**	**33.3%**
Associate Professors	7	8	12	15	16	14	16	15	12	11
Women Associate Professors	2	2	2	3	3	3	6	5	5	5
% Women Associate Professors	**28.6%**	**25.0%**	**16.7%**	**20.0%**	**18.8%**	**21.4%**	**37.5%**	**33.3%**	**41.7%**	**45.5%**
Professors	23	26	24	24	24	28	28	29	32	33
Women Professors	2	2	2	2	2	3	3	4	5	5
% Women Professors	**8.7%**	**7.7%**	**8.3%**	**8.3%**	**8.3%**	**10.7%**	**10.7%**	**13.8%**	**15.6%**	**15.2%**
Lecturers/ Sr. Lecturers	1	3	3	2	3	3	3	3	3	4
Women Lecturers/ Sr. Lecturers	0	1	1	0	0	0	0	0	0	1
% Women Lecturers/ Sr. Lecturers	**0.0%**	**33.3%**	**33.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**25.0%**
Total Tenured and Tenure Stream	44	47	47	47	47	49	50	50	50	53
Women Tenured and Tenure Stream	5	9	10	10	10	10	11	11	11	13
% Women Tenured and Tenure Stream	**11.4%**	**19.1%**	**21.3%**	**21.3%**	**21.3%**	**20.4%**	**22.0%**	**22.0%**	**22.0%**	**24.5%**
Total Academic Staff	45	50	50	49	50	52	53	53	53	57
Women Academic Staff	5	10	11	10	10	10	11	11	11	14
% Women Academic Staff	**11.1%**	**20.0%**	**22.0%**	**20.4%**	**20.0%**	**19.2%**	**20.8%**	**20.8%**	**20.8%**	**24.6%**

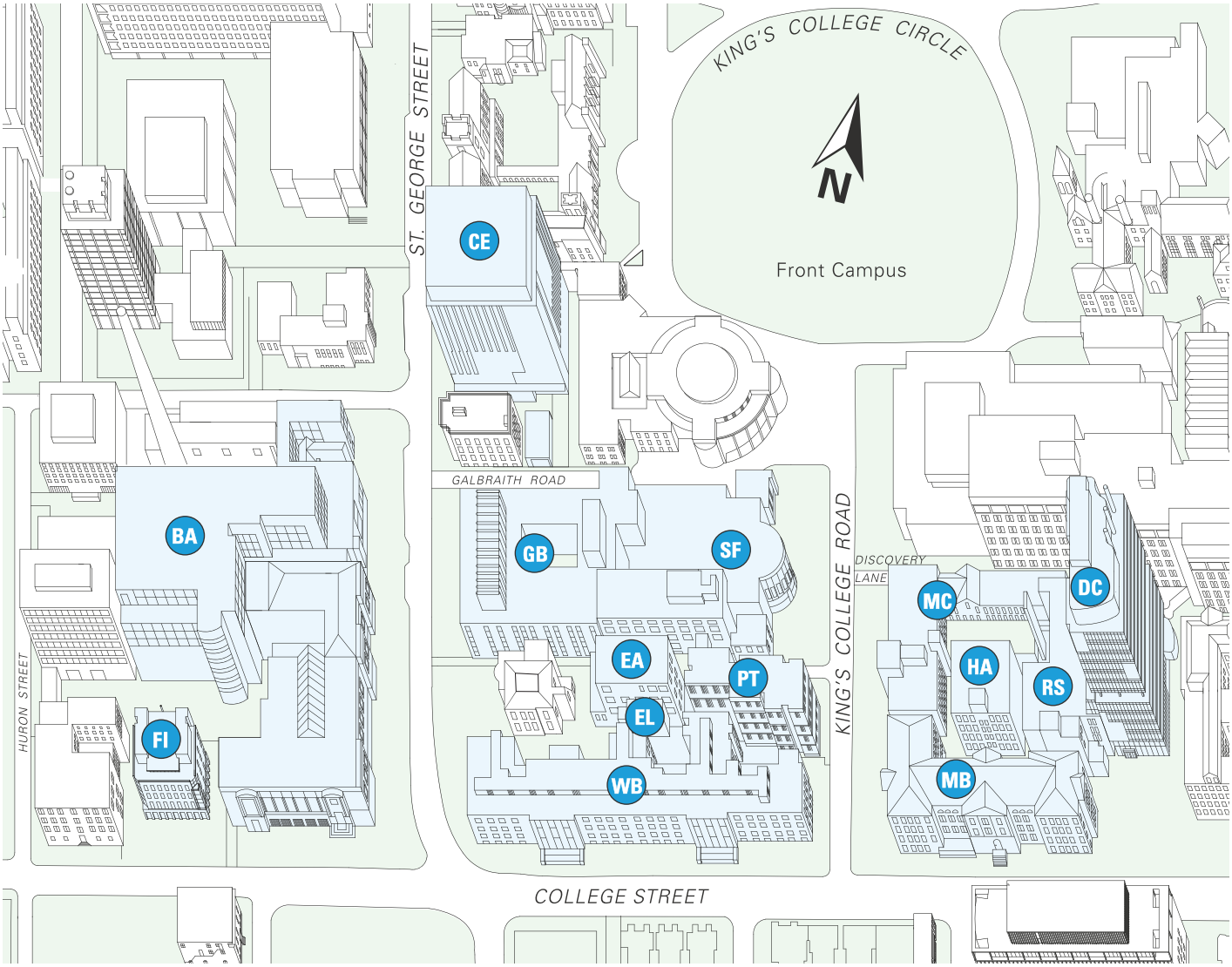
Figure H.8 **Department of Materials Science & Engineering: Academic Staff by Position with Percentage of Women, 2007–2008 to 2016–2017**



	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17
Assistant Professors	2	2	1	1	2	2	2	3	3	3
Women Assistant Professors	0	0	0	0	0	0	0	0	0	1
% Women Assistant Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**33.3%**
Associate Professors	4	2	3	3	3	4	4	4	4	4
Women Associate Professors	1	1	1	1	1	1	1	1	1	1
% Women Associate Professors	**25.0%**	**50.0%**	**33.3%**	**33.3%**	**33.3%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**
Professors	10	10	10	10	10	8	7	7	7	8
Women Professors	0	0	0	0	0	0	0	0	0	1
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**12.5%**
Lecturers/ Sr. Lecturers	0	0	0	0	0	0	0	0	0	1
Women Lecturers/ Sr. Lecturers	0	0	0	0	0	0	0	0	0	0
% Women Lecturers/ Sr. Lecturers	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Total Tenured and Tenure Stream	16	14	14	14	15	14	13	14	14	15
Women Tenured and Tenure Stream	1	1	1	1	1	1	1	1	1	3
% Women Tenured and Tenure Stream	**6.3%**	**7.1%**	**7.1%**	**7.1%**	**6.7%**	**7.1%**	**7.7%**	**7.1%**	**7.1%**	**20.0%**
Total Academic Staff	16	14	14	14	15	14	13	14	14	16
Women Academic Staff	1	1	1	1	1	1	1	1	1	3
% Women Academic Staff	**6.3%**	**7.1%**	**7.1%**	**7.1%**	**6.7%**	**7.1%**	**7.7%**	**7.1%**	**7.1%**	**18.8%**

Appendix I: The Engineering Precinct

The map below highlights buildings on the St. George campus that form the Engineering precinct. Most of our buildings reside on the southern-most part of campus. Along with UTIAS in Downsview, our offices at 256 McCaul Street, 704 Spadina Ave and the West Tower of MaRS Discovery District, these buildings house our students, faculty, staff, research and teaching spaces. For details on the buildings we occupy, please see *Chapter 11: Financial and Physical Resources*.



BA	Bahen Centre for Information Technology
DC	Donnelly Centre for Cellular and Biomolecular Research (CCBR)
EA	Engineering Annex / Electro-Metallurgy Lab Building (South Side)
EL	Electrometallurgy Lab
FI	Fields Institute
GB	Galbraith Building
HA	Haultain Building
MB	Lassonde Mining Building
MC	Mechanical Engineering Building
PT	D.L. Pratt Building
RS	Rosebrugh Building
SF	Sandford Fleming Building
WB	Wallberg Building
–	256 McCaul Street [not pictured]
–	704 Spadina Avenue [not pictured]
–	MaRS Discover District West Tower [not pictured]
–	UTIAS (Downsview) [not pictured]
CE	Centre for Engineering Innovation & Entrepreneurship (coming in 2017)

Data Sources

This section indicates the sources for data and information presented throughout this report. Sources are organized in order of appearance by figure number and title.

Figure	Data Source
	Faculty Leadership, 2016–2017 Information provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering. A current organizational chart is also available online at www.engineering.utoronto.ca/about/office-of-the-dean/#academiclead
	Comparison of U of T Engineering with Ontario and Canada, 2016–2017 Enrolment, degrees granted and faculty data are based on the 2016 calendar year and come from the National Council of Deans of Engineering and Applied Science (NCDEAS) 2016 Resources Report, prepared by Engineers Canada and circulated to Canadian engineering deans in July 2017. Undergraduate enrolment figures exclude non-degree students and those doing a Professional Experience Year (PEY). Full-time equivalent (FTE) enrolment statistics represent averages that take into account all three terms of the year (winter, summer and fall). Undergraduate FTE shows the three-term total divided by two; Graduate FTE shows the three-term total divided by three. Research funding data comes from the Natural Sciences and Engineering Research Council (NSERC) search engine (www.nserc-crsng.gc.ca/ase-oro/index_eng.asp) with the following parameters: Selection Committees = Discovery Grants + Research Partnerships (excl CRCs & NCEs); Research Subjects = all engineering-related; Universities only; Fiscal Year = 2016–2017 (April to March). Major awards data comes from the Director, Awards and Honours, Faculty of Applied Science & Engineering, based on press releases and websites of individual awards for the 2016–2017 grant year (April to March).
	Comparison of U of T Engineering with St. George Campus and University of Toronto, 2016–2017 All student enrolment statistics are based on headcount for Fall 2016 from the U of T Enrolment Reporting Cube (St. George and U of T statistics do not include Toronto School of Theology). All degrees awarded statistics come from ROSI and reflect September 2016 to June 2017 dates (St. George and U of T statistics do not include Toronto School of Theology). All sponsored-research funding statistics come from the U of T Research Reporting Cube, based on 2015–2016 grant year and exclude partner hospitals; includes all program types; data current as of May 2017. Engineering academic staff statistics provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering (based on HRIS and published lists of faculty members). Engineering administrative and technical staff statistic from 2016 Resources Survey prepared by Engineers Canada for NCDEAS (based on calendar year). U of T academic and administrative staff statistics come from U of T Facts and Figures 2016. Engineering total revenue provided by Chief Financial Officer, Faculty of Applied Science & Engineering. U of T total revenue provided by the Office of the Vice-Provost, Planning & Budget. Engineering space statistic from U of T Office of Space Management data, January 2017. U of T and St. George space statistics from U of T Facts and Figures 2016, which is available online at: https://www.utoronto.ca/sites/default/files/Facts Figures 2016 online.pdf
	Chapter 1: Undergraduate Studies
1.1a	**Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2007 to 2016** All years data for applications and offers are based on annual Admissions Committee reports to Faculty Council (November), counting new admissions only, FT and PT, all years of study. Excludes students with special status. Registrations only are from U of T Undergraduate Enrolment Reporting Cube. Cube Parameters: Faculty = Faculty of Applied Science & Engineering, All Fall Terms for 2007–2016, Degree Type = Undergraduate; Stage of Study (SESLEV) = Year 1, New Intake (NEWINTK) = Yes, Measure = Headcount.
1.1b	**Applications, Offers, Registrations, Selectivity and Yield of International First-Year Undergraduates, 2007 to 2016** All years data for applications and offers are based on annual Admissions Committee reports to Faculty Council (November), counting new admissions only, FT and PT, all years of study. Excludes students with special status. Registrations only are from U of T Undergraduate Enrolment Reporting Cube. Cube Parameters: Faculty = Faculty of Applied Science & Engineering, All Fall Terms for 2007–2016, Degree Type = Undergraduate; Stage of Study (SESLEV) = Year 1, New Intake (NEWINTK) = Yes, Domestic / International (DOM_INTL) = Domestic; Measure = Headcount.
1.1c	**Applications, Offers, Registrations, Selectivity and Yield of International First-Year Undergraduates, 2007 to 2016** All years data for applications and offers are based on annual Admissions Committee reports to Faculty Council (November), counting new admissions only, FT and PT, all years of study. Excludes students with special status. Registrations only are from U of T Undergraduate Enrolment Reporting Cube. Cube Parameters: Faculty = Faculty of Applied Science & Engineering, All Fall Terms for 2007–2016, Degree Type = Undergraduate; Stage of Study (SESLEV) = Year 1, New Intake (NEWINTK) = Yes, Domestic / International (DOM_INTL) = International; Measure = Headcount.

1.2 Ontario Secondary School Averages of Incoming First-Year Undergraduates and Retention Rate Between First and Second Year, 2007 to 2016

Averages of incoming first-year students from Admissions Committee Report to Faculty Council (November). Retention rates based on successful transition of first year students in each entering cohort into second year within two years.

1.3 Incoming First-Year Undergraduates with Percentage of Women and International Students, 2007 to 2016

Headcount from U of T Undergraduate Enrolment Cube. Excludes students with special status. Cube Parameters: All Fall Terms for 2007–2016; Degree Type = Undergraduate; New Intake (NEWINTK) = Yes; Measure = Headcount; [Gender] and [DOM_INTL] parameters used to calculate percentages of women and international students, respectively.

1.4 Incoming First-Year Domestic and International Undergraduates, 2007 to 2016

Headcount from University of Toronto Enrolment Master Files, the source of U of T Reporting Cube. Includes new and returning students. Excludes students with special status. Cube Parameters: All Fall Terms for 2007–2016; Stage of Study (SESLEV) = Year 1; New Intake (NEWINTK) = Yes; Degree Type = Undergraduate; Measure = Headcount

1.5a Undergraduate Enrolment with Proportion of Women and International Students, 2007–2008 to 2016–2017

Headcount from U of T Undergraduate Enrolment Reporting Cube. Excludes students with special status. Cube Parameters: All Fall Terms for 2007–2016; Degree Type = Undergraduate; Measure = Headcount; [Gender] and [DOM_INTL] parameters used to calculate percentages of women and international students, respectively.

1.5b Women as a Proportion of Total Enrolment by Program, 2007–2008 to 2016–2017

Headcount from U of T Undergraduate Enrolment Reporting Cube. Excludes students with special status. Cube Parameters: Fall Terms for 2007–2016; Degree Type = Undergraduate; Gender = Female; Departments based on [Programs] field

1.6 Undergraduates by Program, Year of Study and Professional Experience Year (PEY), 2016–2017

Headcount from U of T Undergraduate Enrolment Reporting Cube. Includes full-time students, part-time students and students on PEY internship. Excludes students with special status. Cube Parameters: Stage of Study (SESLEV) = Years 1–4; Fall 2016; Departments based on [Programs] field; Degree Type = Undergraduate.

1.7 Undergraduates by Program, 2007–2008 to 2016–2017

Headcount from U of T Undergraduate Enrolment Reporting Cube. Includes full-time students, part-time students and students on PEY internship. Excludes students with special status. Cube Parameters: All Fall Terms for 2007–2016; Stage of Study (SESLEV) = Years 1–4; Degree Type = Undergraduate; Measure = Headcount; Departments based on [Programs] field.

1.8a Number of Awards Received by Cohort with Total Number of Undergraduate Need-Based Award Recipients, 2009–2010 to 2016–2017

Award data from U of T Student Accounts Cube. Parameters: Transaction Type = Income / Awards – Undergrad; Need-based; Level of Instruction = Undergrad; Enrolment Status = All (e.g. FINCA, CANC, etc.); Stage of Study (SESLEV) = Years 1–4 (exclude any N/A); Sessions: include most recent (current) academic year (even without Summer; summer = mostly CIE exchange funding); Measure = Dollar amount

1.8b Total Value of Undergraduate Financial Assistance and Percentage Distributed by Year of Study, 2009–2010 to 2016–2017

Award data from U of T Student Accounts Cube. Parameters: Transaction Type = Income / Awards – Undergrad; Need-based; Level of Instruction = Undergrad; Enrolment Status = All (e.g. FINCA, CANC, etc.); Year of Study = 1-4 (exclude any N/A); Sessions: include most recent (current) academic year (even without Summer; summer = mostly CIE exchange funding); Measure = Distinct student count

1.9a Undergraduate Degrees Awarded by Program, 2007–2008 to 2016–2017

All data from ROSI download: 5EA (Graduated Students); Faculty = Faculty of Applied Science & Engineering.

1.9b Undergraduate Degrees Awarded by Gender, 2007–2008 to 2016–2017

All data from ROSI download: 5EA (Graduated Students); Faculty = Faculty of Applied Science & Engineering.

1.9c **U of T Engineering Degrees Awarded by Academic Area Compared with Canadian, and North American Degree Totals, 2015**

U of T and Canadian statistics are based on the 2015 calendar year and come from Engineers Canada Report of Enrolment & Degrees Granted *(Canadian Engineers for Tomorrow, Trends in Engineering Enrolment and Degrees Awarded 2011-2015),* released November 2016, and available online at: https://engineerscanada.ca/reports/canadian-engineers-for-tomorrow. American statistics used to calculate North American percentages are based on the 2015–2016 academic year and come from the 2016 American Society of Engineering Educators (ASEE) Report, available online at: www.asee.org/papers-and-publications/publications/college-profiles

1.10 **Undergraduate Students per Faculty Member by Academic Area, 2016–2017**

Number of undergraduates from U of T Undergraduate Enrolment Reporting Cube. Excludes students on PEY internship and students with special status. Cube Parameters: Fall 2016, Degree Type = Undergraduate; AssocOrg = blank (to exclude PEYs); Measure = Headcount. Faculty Total does not include teaching done for Engineering by extra-divisional units (especially Arts & Science departments). Results are not adjusted for departmental contributions to shared first-year curriculum, Engineering Science or Engineering minors. Faculty counts provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering and used on a slip-year basis: totals from July 2016 are used to compare with 2016-16 student counts. Calculation includes tenured / tenure-stream and lecturers / teaching stream faculty.

1.11a **Number of Students and Percentage of Class Graduating with Honours, 2008 to 2017**

Data provided by the Office of the Faculty Registrar, Faculty of Applied Science & Engineering.

1.11b **Number of Students on the Dean's Honour List by Term and Academic Area, Fall 2012 to Winter 2017**

Data provided by the Office of the Faculty Registrar, Faculty of Applied Science & Engineering. Based on ROSI 4FF download; Academic Standing Code = H*

Text **Pre-University Engineering Outreach**

Information and statistics provided by the Associate Director, Engineering Student Outreach Office, Faculty of Applied Science & Engineering.

Chapter 2: **Graduate Studies**

2.1a **International and Domestic Graduate Students by Degree Type, with Percentage of International Students, 2007–2008 to 2016–2017**

Enrolment counts are from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: All Fall Terms for 2007–2016, Measure = Headcount. [DOM_INTL] parameter used to calculate percentage of international students.

2.1b **Graduate Students by Degree Type and Gender with Percentage of Women Students, 2007–2008 to 2016–2017**

Enrolment counts are from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: All Fall Terms for 2007–2016; Measure = Headcount. Gender parameter used to calculate percentage of women.

2.1c **Graduate Student Enrolment by Full-Time Equivalent (FTE) and Headcount (HC) by Academic Area, 2007–2008 to 2016–2017**

Enrolment counts are from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: Measure = Headcount or Total FTE (UAR). Headcounts are reported for all fall terms from 2007–2016. FTEs are counted by academic year as reported in the cube (May to April).

2.1d **Comparison of MASc and MEng/MHSc Full-Time Equivalent Enrolment Trends 2007–2008 to 2016–2017**

Enrolment counts are from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: All Fall Terms for 2007–2016; Measure = Total FTE (UAR).

2.2a **Undergraduate and Graduate Full-Time Equivalent Students per Faculty Member, 2007–2008 to 2016–2017**

Number of FTE undergraduates from U of T Undergraduate Enrolment Reporting Cube. Excludes students on PEY internship and students with special status. Cube Parameters: Fall terms 2007–2016; AssocOrg = blank (to exclude PEY); Degree Type = Undergraduate; Measure = Headcount. To calculate Undergraduate FTEs, part-time students are counted as 0.3 FTE. Number of FTE graduate students from U of T Graduate Enrolment Reporting Cube. Cube Parameters: Fall terms 2007–2016; Measure = Total FTE (UAR); excludes students with special status. Number of faculty included in the calculation provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering and used on a slip-year basis: totals from July 2016 are used to compare with 2016-16 student counts. Graduate ratios include only tenured and tenure-stream faculty; Undergraduate ratios also include lecturers / teaching stream faculty.

2.2b Ratio of Undergraduate to Graduate Full-Time Equivalent Students, 2007–2008 to 2016–2017
Number of FTE undergraduates from U of T Undergraduate Enrolment Reporting Cube. Excludes students on PEY internship and students with special status. Cube Parameters: Fall terms 2007–2016; AssocOrg = blank (to exclude PEY); Degree Type = Undergraduate; Measure = Headcount. To calculate Undergraduate FTEs, part-time students are counted as 0.3 FTE. Number of FTE graduate students from U of T Graduate Enrolment Reporting Cube. Cube Parameters: Fall terms 2007–2016; Measure = Total FTE (UAR); Includes all degree types but excludes students with special status.

2.2c Full-Time Equivalent Graduate Students per Faculty Member by Academic Area and Degree Type, 2016–2017
Number of FTE graduate students from U of T Graduate Enrolment Reporting Cube. Cube Parameters: Fall 2016; Measure = Total FTE (UAR). Includes all degree types but excludes students with special status. The number of graduate students per department is adjusted as per the budget calculation for inter-departmental graduate student supervision. Faculty counts are provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering, and are used on a slip-year basis: totals from July 2016 are used to compare with 2016-16 student counts. Includes tenured and tenure-stream faculty only.

2.3 Applications, Offers, Registrations, Selectivity and Yield of PhD Students, 2007–2008 to 2016–2017
All data from ROSI download: 4BEG (Admissions Statistics). Students who have fast-tracked from MASc programs into PhD programs are calculated separately (see Fig. 2.8a) but have been included in this figure as applications, offers and admissions in order to more accurately reflect total PhD student intake. This is a change from previous annual reports.

2.4 Applications, Offers, Registrations, Selectivity and Yield of MASc Students, 2007–2008 to 2016–2017
All data from ROSI download: 4BEG (Admissions Statistics)

2.5 Applications, Offers, Registrations, Selectivity and Yield of MEng and MHSc Students, 2007–2008 to 2016–2017
All data from ROSI download: 4BEG (Admissions Statistics).

2.6a Graduate Student Funding by Category, 2006–2007 to 2015–2016
Data from 2010–2011 onward were obtained from the new Student Accounts Reporting Cube. Parameters: include Awards-Grad, Stipend, UT Employment; exclude Awards-Undergrad, Waiver. Data for prior years (and for all years in previous annual reports) were obtained from the Graduate Student Income Reporting Cube. Parameters: include funding from all sources except work-study employment income. Student funding reported by academic year (September to August).

2.6b Graduate Student Funding by Category and Academic Area, 2015–2016
Data from 2010–2011 onward were obtained from the new Student Accounts Reporting Cube. Parameters: include Awards-Grad, Stipend, UT Employment; exclude Awards-Undergrad, Waiver. Data for prior years (and for all years in previous annual reports) were obtained from the Graduate Student Income Reporting Cube. Parameters: include funding from all sources except work-study employment income. Student funding reported by academic year (September to August).

2.7a Total External Graduate Student Scholarships by Source, 2006–2007 to 2015–2016
Data from 2010–2011 onward were obtained from the new Student Accounts Reporting Cube. Parameters: Transaction Type = Income / Awards – Grad; Award Income Source = External. Data for prior years (and for all years in previous annual reports) were obtained from the Graduate Student Income Reporting Cube. Parameters: Award Income only. Student funding reported by academic year (September to August).

2.7b Number of NSERC Graduate Student Award Recipients by Academic Area, 2006–2007 to 2015–2016
Data from 2010–2011 onward were obtained from the new Student Accounts Reporting Cube. Parameters: Transaction Type = Income / Awards – Grad; Award Income Source = Federal — Natural Sciences and Engineering Research Council. Data for prior years (and for all years in previous annual reports) were obtained from the Graduate Student Income Reporting Cube. Parameters: Award Income only. Source = Federal — Natural Sciences and Engineering Research Council. Measure = Student Count. Student funding reported by academic year (September to August).

2.8a Number of Students Fast-Tracked from MASc to PhD by Academic Area, 2007–2008 to 2016–2017
All data from ROSI download: 4FF (Student Registrations). Fast-tracked students are identified by POSt codes that end in 'PHD U' and are counted when prior session POSt code was a Masters degree (MASc or MEng). To reflect fast-tracking practice, an academic year is considered to be Summer-Fall-Winter (May to April).

2.8b Number of Direct-Entry PhD Students by Academic Area, 2009–2010 to 2016–2017
All data from ROSI download: 4FF (Student Registrations). Include all PhD students where prior session POSt code was blank or AE NDEGP (recently-complete UGrad). Reported by academic year defined as Summer-Fall-Winter (May to April).

2.9 **Time to Completion for PhD, MASc, MEng and MHSc Students, 2007–2008 to 2016–2017**
All data from ROSI download: 4BEA (Years to Graduate), originally created for Ontario Council of Graduate Studies (OCGS) reporting purposes. The data reflects median values based on the total number of terms in which a student is registered. Leaves, lapses and (in most cases) the term in which the convocation occurs are excluded. Where a student is fast-tracked from the MASc into a PhD, the total time for both programs is counted. Full-time, extended full-time and part-time MEng students are distinguished for greater clarity and accuracy.

2.10 **Graduate Degrees Awarded by Degree Type and Gender, 2007–2008 to 2016–2017**
All data from ROSI download: 5EA (Graduated Students); Faculty = Faculty of Applied Science & Engineering.

Text **Enriching the Graduate Student Experience**
Information provided by the Vice-Dean Graduate Studies, Faculty of Applied Science & Engineering.

2.11 **ELITE Emphases Awarded, 2009–2010 to 2016–2017**
ELITE eligibility based on year of graduation and successful completion of a minimum of 4 ELITE-designated courses. Eligibility criteria and course listing provided by the Vice-Dean Graduate Studies, Faculty of Applied Science & Engineering.

Chapter 3: **Research**

Text **Selected Research Highlights**
Information provided by Vice-Dean Research, Faculty of Applied Science & Engineering.

3.1a **Breakdown of Research Infrastructure Funding vs. Research Operating Funding, 2006–2007 to 2015–2016**
Data from the U of T Research Reporting Cube. Current as of May 2017. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Infrastructure funding includes the Canada Foundation for Innovation (except the CFI Career Award), the Ontario Research Fund (ORF) and the NSERC Research Tools and Instruments (RTI) Program.

3.1b **Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC) and Networks of Centres of Excellence (NCE) Funding, 2006–2007 to 2015–2016**
Data from the U of T Research Reporting Cube. Current as of May 2017. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016).

3.1c **Research Operating Funding by Year, Source and Funding per Faculty Member, 2006–2007 to 2015–2016**
Data is from the U of T Research Reporting Cube, current as of May 2017, and is organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Research Operating Funding excludes the following infrastructure programs: Canada Foundation for Innovation (except the CFI Career Award), the Ontario Innovation Trust, the Ontario Research Fund (ORF) – Research Infrastructure and the NSERC Research Tools and Instruments (RTI) Program. Faculty data is provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering, and here includes tenured and tenure-stream faculty only, as reported each July. Faculty counts are used on a slip-year basis: e.g. those reported in July 2015 (for academic year 2014-14) are linked to Grant Year 2016 (Apr 2015 - Mar 2016).

3.2a **NSERC Funding, 2015–2016**
Data from the U of T Research Reporting Cube. Current as of May 2017. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Sponsor = Three Councils / Natural Sciences & Engineering. Year = 2016.

3.2b **NSERC Industrial Partnership Funding by Program, 2006–2007 to 2015–2016**
Data from the U of T Research Reporting Cube. Current as of May 2017. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Sponsor = Three Councils / Natural Sciences & Engineering / Research Partnerships Programs

3.2c **Industrial Partnerships as a Proportion of Total NSERC Funding, 2006–2007 to 2015–2016**
Data from the U of T Research Reporting Cube. Current as of May 2017. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Sponsor = Three Councils / Natural Sciences & Engineering.

3.2d **Industry Partners, 2016–2017**
Data from the U of T Research Reporting Cube. Current as of May 2017. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Sponsor = Corporate. Additional information gathered from selected websites (e.g. those of Industrial Research Chairs and major research consortia) and provided by individual departments within the Faculty of Applied Science & Engineering.

3.2e **NSERC Research Grant Funding by Program, 2006–2007 to 2015–2016**
Data from the U of T Research Reporting Cube. Current as of May 2017. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Sponsor = Three Councils / Natural Sciences & Engineering / Research Grants & Scholarships (Faculty)

3.3a **Canadian Peer Universities vs. University of Toronto Share of NSERC Funding for Engineering Cumulative Five-Year Share, 2011–2012 to 2015–2016**
All data from NSERC Award Search Engine: www.nserc-crsng.gc.ca/ase-oro/index_eng.asp. Based on Selection Committees for Discovery and Partnership Programs, but not Scholarships and Fellowships. Organized by grant year. Excludes Canada Research Chairs and Networks of Centres of Excellence and does not include Indirect Costs of Research. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016).

3.3b **U of T Annual Share of NSERC Funding in Engineering, 2006–2007 to 2015–2016**
All data from NSERC Award Search Engine: www.nserc-crsng.gc.ca/ase-oro/index_eng.asp. Based on Selection Committees for Discovery and Partnership Programs, but not Scholarships and Fellowships. Organized by grant year. Excludes Canada Research Chairs and Networks of Centres of Excellence and does not include Indirect Costs of Research. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016).

3.4a **Engineering Invention Disclosures by Academic Area, 2012–2013 to 2016–2017**
Report of U of T Commercialization Indicators, Annual Supplement for FY2017, provided by the Office of the Vice President, Research. Data current as of May 1, 2017.

3.4b **U of T Invention Disclosures by Faculty, 2016–2017**
Report of U of T Commercialization Indicators, Annual Supplement for FY2017, provided by the Office of the Vice President, Research. Data current as of May 1, 2017.

3.4c **U of T Patent Applications by Faculty, 2016–2017**
Report of U of T Commercialization Indicators, Annual Supplement for FY2017, provided by the Office of the Vice President, Research. Data current as of May 1, 2017.

3.5 **Distribution of Research Operating Funding by Academic Area, 2006–2007 to 2015–2016**
Data from the U of T Research Reporting Cube. Current as of May 2017. Organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Research Operating Funding excludes the following infrastructure programs: Canada Foundation for Innovation (except the CFI Career Award), the Ontario Innovation Trust, the Ontario Research Fund (ORF) – Research Infrastructure and the NSERC Research Tools and Instruments (RTI) Program.

Chapter 4: **Cross-Faculty Education and Experiential Learning**

Text **Undergraduate Engineering Minors and Certificates**
Information provided by the Cross-Disciplinary Programs Office, Faculty of Applied Science & Engineering.

4.1a **Number of Students and Percentage of Graduating Class Completing an Engineering Minor, 2007–2008 to 2016–2017**
Information provided by the Cross-Disciplinary Programs Office, Faculty of Applied Science & Engineering.

4.1b **Students Graduating with an Engineering Business Minor or Certificate, 2011–2012 to 2016–2017**
Information provided by the Cross-Disciplinary Programs Office, Faculty of Applied Science & Engineering.

4.2a **Undergraduate Participation in Summer Research Opportunities, 2010 to 2017**
Information regarding Canadian placements provided by the Associate Registrar & Director, Admissions, Faculty of Applied Science & Engineering. International placement statistics provided by the University of Toronto's Centre for International Experience.

4.2b **Undergraduate Participation in Summer Research Opportunities by Academic Area, 2017**
Information regarding Canadian placements provided by the Associate Registrar & Director, Admissions, Faculty of Applied Science & Engineering. International placement statistics provided by the University of Toronto's Centre for International Experience.

4.3a **PEY Internship Placements for Engineering Undergraduates with Percentage Participation from Previous Third-Year Class, 2007–2008 to 2016–2017**
Statistics provided by the Assistant Director, Engineering Career Centre, Faculty of Applied Science & Engineering.

4.3b **Canadian and International PEY Internship Placements for Engineering Undergraduates, 2007–2008 to 2016–2017**
Statistics provided by the Assistant Director, Engineering Career Centre, Faculty of Applied Science & Engineering.

4.3c **PEY Employers, 2008–2009 to 2016–2017**
Statistics provided by the Assistant Director, Engineering Career Centre, Faculty of Applied Science & Engineering.

Text **Engineering Communication**
Information provided by the Director, Engineering Communication Program.

Chapter 5: **Awards and Honours**

5.1 **Summary of Major International, National and Provincial Awards and Honours, 2007 to 2016**
Information provided by the Director, Awards and Honours, Faculty of Applied Science & Engineering.

5.2a **Number of Major National and International Awards Received by U of T Engineering Compared to Other Canadian Engineering Faculties, 2016**
Information provided by the Director, Awards and Honours, Faculty of Applied Science & Engineering.

5.2b **Percentage of Total Canadian Engineering Faculty Members and Percentage of Major Awards Received by Canadian Engineering Faculties, 2016**
Information provided by the Director, Awards and Honours, Faculty of Applied Science & Engineering. Faculty FTEs are based on the National Council of Deans of Engineering and Applied Science (NCDEAS) 2015 Resources Report prepared by Engineers Canada and circulated to Canadian engineering deans in July 2016.

5.3 **Number of Awards Received by U of T Engineering Faculty Compared to Other Canadian Engineering Faculties, 2012 to 2016**
Information provided by the Director, Awards and Honours, Faculty of Applied Science & Engineering.

Text **Selected Awards Received by Faculty Members and Alumni**
Information provided by the Director, Awards and Honours, Faculty of Applied Science & Engineering.

Text **Selected Awards Received by Staff, April 2016 to April 2017**
Information provided by the Director, Awards and Honours, Faculty of Applied Science & Engineering.

Text **University of Toronto Engineering Faculty Awards**
Information provided by the Director, Awards and Honours, Faculty of Applied Science & Engineering.

Text **Engineering Alumni Association Awards**
Information provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

Chapter 6: **World Recognition by Rankings**

Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) for Engineering/ Technology and Computer Sciences

6.1a **ARWU Top 50 World Universities, 2016**
Data from ARWU website: www.shanghairanking.com/FieldENG2016.html.

6.1b **ARWU Top North American Public Universities, 2016**
Data from ARWU website: www.shanghairanking.com/FieldENG2016.html.

6.1c **Canadian U15 Universities in ARWU Top 200, 2016**
Data from ARWU website: www.shanghairanking.com/FieldENG2016.html.

6.1d **Scoring Analysis of Canadian U15 Universities in ARWU Top 100, 2016**
Data from ARWU website: www.shanghairanking.com/FieldENG2016.html.

6.1e **Canadian Universities in ARWU Subject Ranking, 2016**
Data from ARWU website: www.shanghairanking.com/Shanghairanking-Subject-Rankings

Times Higher Education (THE)–Elsevier World University Ranking for Engineering and Information Technology

6.2a **THE Top 50 World Universities, 2016**
Data from THE World University Ranking website: www.timeshighereducation.co.uk/world-university-rankings/2016-17/subject-ranking/subject/engineering-and-IT

6.2b **THE Top North American Public Universities, 2016**
Data from THE World University Ranking website: www.timeshighereducation.co.uk/world-university-rankings/2016-17/subject-ranking/subject/engineering-and-IT

6.2c **Canadian U15 Universities in THE Top 100, 2016**
Data from THE World University Ranking website: www.timeshighereducation.co.uk/world-university-rankings/2016-17/subject-ranking/subject/engineering-and-IT

QS World University Rankings for Engineering and Technology

6.3a **QS Top 50 World Universities, 2017**
Data from QS World University Ranking website: www.topuniversities.com/university-rankings/university-subject-rankings/2017/engineering-technology

6.3b **QS Top North American Public Universities, 2017**
Data from QS World University Ranking website: www.topuniversities.com/university-rankings/university-subject-rankings/2017/engineering-technology

6.3c **Canadian U15 Universities in QS Top 200, 2017**
Data from QS World University Ranking website: www.topuniversities.com/university-rankings/university-subject-rankings/2017/engineering-technology

6.3d **Canadian Universities in QS by Subject, 2017**
Data from QS World University Ranking website: www.topuniversities.com/university-rankings/university-subject-rankings/2017/engineering-technology

National Taiwan University (NTU) Performance Ranking of Engineering Papers

6.4a **NTU Top 50 World Universities, 2016**
Data from National Taiwan University Performance Ranking of Scientific Papers for World Universities 2016 website: http://nturanking.lis.ntu.edu.tw/DataPage/TOP300.aspx?query=Engineering&y=2016. Data compiled from Thomson Reuters' science citation indexes.

6.4b NTU Top North American Public Universities, 2016
Data from National Taiwan University Performance Ranking of Scientific Papers for World Universities 2016 website: http://nturanking.lis.ntu.edu.tw/DataPage/TOP300.aspx?query=Engineering&y=2016. Data compiled from Thomson Reuters' science citation indexes.

6.4c Canadian U15 Universities in NTU Top 200, 2016
Data from National Taiwan University Performance Ranking of Scientific Papers for World Universities 2016 website: http://nturanking.lis.ntu.edu.tw/DataPage/TOP300.aspx?query=Engineering&y=2016. Data compiled from Thomson Reuters' science citation indexes.

6.4d Canadian Universities in NTU by Subject, 2016
Data from National Taiwan University Performance Ranking of Scientific Papers for World Universities 2016 website: http://nturanking.lis.ntu.edu.tw/DataPage/TOP300.aspx?query=Engineering&y=2016. Data compiled from Thomson Reuters' science citation indexes.

Rankings Based on Publications and Citations / Summary of Ranking Results

6.5a Number of Engineering Publications Indexed by Thomson Reuters for Association of American Universities (AAU) Public and Canadian Peer Institutions, 2011 to 2015
Data from Thomson Reuters InCites™ covering 2011 to 2015. Includes public peer institutions in Canada (U15) and U.S. (AAU plus University of California at San Francisco). Schema = Essential Science Indicators (Engineering, Materials Science).

6.5b Summary of U15 Bibliometrics for Publications
Data from Thomson Reuters InCites™ covering 2011 to 2015. Includes public peer institutions in Canada (U15) and U.S. (AAU plus University of California at San Francisco). Schema = Essential Science Indicators (Engineering, Materials Science). Faculty counts for analysis of U15 citations per faculty member are from the Engineers Canada 2015 Resources Report.

6.6a Number of Engineering Citations Indexed by Thomson Reuters for Association of American Universities (AAU) Public and Canadian Peer Institutions, 2011 to 2015
Data from Thomson Reuters InCites™ covering 2011 to 2015. Includes public peer institutions in Canada (U15) and U.S. (AAU plus University of California at San Francisco). Schema = Essential Science Indicators (Engineering, Materials Science).

6.6b Summary of U15 Bibliometrics for Citations
Data from Thomson Reuters InCites™ covering 2011 to 2015. Includes public peer institutions in Canada (U15) and U.S. (AAU plus University of California at San Francisco). Schema = Essential Science Indicators (Engineering, Materials Science). Faculty counts for analysis of U15 citations per faculty member are from the Engineers Canada 2015 Resources Report.

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7.1b Philanthropic Support, 2007–2008 to 2016–2017
Statistics provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

7.1c Gift Designations, 2016–2017
Statistics provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

7.1d Graditude Participation, 2009–2010 to 2016–2017
Statistics provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

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8.1c **Proportion of U of T Engineering Impressions by Academic Area, 2016–2017**
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8.2 **Top Stories on the Engineering News and U of T News Websites, 2016–2017**
Statistics provided by University of Toronto Strategic Communications. Data represents information collected between May 2016 and April 2017.

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8.3a **Summary of Analytics for engineering.utoronto.ca and news.engineering.utoronto.ca, 2016–2017**
Websites: engineering.utoronto.ca and news.engineering.utoronto.ca. Website statistics sourced from Google Analytics.

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Website: www.admit.engineering.utoronto.ca/next-steps. Website statistics sourced from Google Analytics.

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Chapter 10: **Diversity**

10.1 **Continent of Origin: Undergraduate and Graduate Students, Fall 2016**
Student counts from U of T Enrolment Reporting Cube. Excludes students with special status. Cube Parameters: Year = Fall 2016; Degree Type = Undergraduate or one of 3 Graduate programs; Measure = Headcount; Calculations based on Continent/ Country of Citizenship (CUNCIT) parameter.

10.2 **Percentage of Women Students and Faculty, 2007–2008 to 2016–2017**
Graduate, undergraduate and first-year headcount from U of T Enrolment Reporting Cube. Enrolment excludes students with special status. Number of faculty provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering.

10.3 **Total Number of Faculty with Percentage of Women, 2007–2008 to 2016–2017**
Information provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering.

10.4 **Percentage of Women Faculty at U of T Engineering compared with Women Faculty in Ontario and Canadian Engineering Faculties, Fall 2016**
Information from 2016 Resources Survey prepared by Engineers Canada for the National Council of Deans of Engineering and Applied Science (NCDEAS) and circulated to Canadian engineering deans in July 2017. Data represents November 15, 2016 counts.

10.5 **Canada Research Chairs with Number and Percentage of Women Chairholders, 2008–2017**
Information provided by the Divisional Reporting and Information Analyst, Faculty of Applied Science & Engineering. Includes data sourced from the Office of the Vice-President, Research & Innovation and from the Canada Research Chairs Program website: www.chairs-chaires.gc.ca/home-accueil-eng.aspx

Chapter 11: **Financial and Physical Resources**

11.1 **Total Revenue, 2007–2008 to 2016–2017**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

11.2 **Total Central Costs, 2007–2008 to 2016–2017**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

11.3 **Budget Data, 2007–2008 to 2016–2017**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

11.4 **Revenue Sources, 2016–2017**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

11.5 **Revenue Distribution, 2016–2017**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

11.6 **Total Operating Budget: Breakdown by Expense, 2016–2017 (net of central university costs)**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

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11.7 **Summary of Buildings Occupied by the Faculty of Applied Science & Engineering, 2016–2017**
Data provided by Director, Facilities & Infrastructure Planning, Faculty of Applied Science & Engineering.

Text **Projects Completed — By Building**
Information provided by Director, Facilities & Infrastructure Planning, Faculty of Applied Science & Engineering.

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Information provided by Director, Facilities & Infrastructure Planning, Faculty of Applied Science & Engineering.

Appendices

A Engineering Student Clubs and Teams

Information from the Engineering Society: www.skule.ca.

B Outreach Programs

Information provided by Engineering Student Outreach Office, Faculty of Applied Science & Engineering.

C Time to Completion for Graduate Students

All data from ROSI 4BEA downloads (Years to Graduate), originally created for Ontario Council of Graduate Studies (OCGS) reporting purposes. The data reflects median values based on the total number of terms in which a student is registered. Leaves, lapses and (in most cases) the term in which the convocation occurs are excluded. Where a student is fast-tracked from the MASc into a PhD, the total time for both programs is counted. Full-time, extended full-time and part-time MEng students are distinguished for greater clarity and accuracy.

D Research Chairs

Chairholders are reported as of the HR turnover date at the end of the reporting cycle, in this case, July 1, 2017, except in cases where new allocations (e.g. CRCs) have not yet been made public.List compiled from the following sources:

- Canada Research Chairs website: www.chairs-chaires.gc.ca/home-accueil-eng.aspx
- Industrial Research Chairs website: www.nserc-crsng.gc.ca/Professors-Professeurs/CFS-PCP/IRC-PCI_eng.asp
- Office of Advancement, Faculty of Applied Science & Engineering
- Office of the Vice-Dean, Research, Faculty of Applied Science & Engineering
- Assistant Dean, Administration, Faculty of Applied Science & Engineering
- Distinguished Professors and University Professors from the Office of the Vice-President & Provost websites: www.provost.utoronto.ca/awards/Distinguished_Professors.htm and www.provost.utoronto.ca/Awards/uprofessors.htm

E Research Funding by Academic Area

Data is from the U of T Research Reporting Cube, current as of May 2017, and is organized by grant year (e.g., 2015–2016 = April 2015 to March 2016 = Grant Year 2016). Research Operating Funding excludes the following infrastructure programs: Canada Foundation for Innovation (except the CFI Career Award), the Ontario Innovation Trust, the Ontario Research Fund (ORF) – Research Infrastructure and the NSERC Research Tools and Instruments (RTI) Program. Faculty data is provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering, and here includes tenured and tenure-stream faculty only, as reported each July. Faculty counts are used on a slip-year basis: e.g. those reported in July 2015 (for academic year 2014-14) are linked to Grant Year 2016 (Apr 2015 - Mar 2016).

F Spinoff Companies

Information provided by the Office of the Vice President, Research & Innovation (OVPRI).

G Descriptions of Major Awards

Information from the Director, Awards and Honours, Faculty of Applied Science & Engineering.

H Academic Staff by Academic Area

Information provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering. Women academic staff include all ranks of professor plus lecturers/senior lecturers.

I The Engineering Precinct

Information from Office of Space Management. Visit map.utoronto.ca for a full campus map.

We wish to acknowledge this land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and most recently, the Mississaugas of the Credit River. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

Pictured on the front cover (top to bottom):

In June 2016, U of T Engineering students, staff, faculty and Dean Cristina Amon united to display their pride by forming the Pride flag, a symbol of inclusivity, out of 24 colourful balloons.

Professor Angela Schoellig and her graduate students demonstrate their unpiloted aerial vehicles (UAVs). An assistant professor at UTIAS, Schoellig was awarded a 2017 Sloan Research Fellowship to advance her research into using drones for environmental monitoring, health-care delivery and many other applications.

On May 12, 2017, Dean Cristina Amon and representatives from Bird Construction, along with a small group of faculty and staff, enjoyed a site tour of the forthcoming Centre for Engineering Innovation & Entrepreneurship (CEIE).

In August 2016, 50 students from Grades 3 to 6 participated in our Pop-up Coding Camp, one of the more than two-dozen U of T Engineering outreach programs that reached over 5,300 students from across Ontario, Canada and the world in 2016–2017.

Two engineering students hard at work during their Professional Experience Year (PEY) internships at Intel. In 2016-2017, more than 730 U of T Engineering students took part in PEY, the largest paid internship of its kind in Canada.

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