UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Annual Report 2015
Performance Indicators

Pictured on the front cover:

Centre: More than 200 U of T Engineering alumni, faculty, students and staff gathered on June 24, 2015 to celebrate the groundbreaking for the Centre for Engineering Innovation & Entrepreneurship (CEIE). Opening in 2017, this state-of-the-art building will set a new standard for engineering education and research.

Top left: Professor Molly Shoichet (ChemE, IBBME) is the 2015 L'Oréal-UNESCO "For Women in Science" Laureate for North America, only the third Canadian to achieve this honour in its 17-year history.

Top right: Female high school students with offers of admission to the Faculty participate in a workshop at Girls' Leadership in Engineering Experience (GLEE), part of the Faculty's strategy to attract more women to engineering.

Bottom right: U of T Engineering graduates celebrate their achievements at convocation. In 2014–2015, the Faculty conferred the largest number of degrees in its history.

Bottom left: Students collaborate on a project in a Technology Enhanced Active Learning (TEAL) room in the Sandford Fleming Building, which is serving as a prototype for active and collaborative learning spaces in the CEIE.

Message from the Dean

I am delighted to present the *2015 Annual Report of Performance Indicators*. This document highlights our achievements over the past year and provides data and information that show our Faculty's progress toward the ambitious goals in our *Academic Plan, 2011–2016*. Continuous evaluation against benchmarks and measurable targets is critical to assessing our performance and identifying new priorities that will strengthen our Faculty's position as the premier engineering school in Canada and our place among the world's best.

In 2014–2015, we achieved significant milestones that reflect the extraordinary learning environment, innovative research and rich student experience at U of T Engineering. We received a record number of applications for our undergraduate programs and admitted the most diverse and accomplished first-year class in our history. Women comprised nearly one-third of entering students — the highest proportion of any first-year engineering class in Canada — and the average entering grade of Ontario secondary school students increased to a record 92.4 per cent. To continue our progress in selectivity and give prospective students an opportunity to demonstrate key engineering qualities, we developed a new, broad-based applications process for those seeking admission for fall 2015. This pilot project — the first of its kind in Canada for engineering schools — uses videos and timed, written responses to give our admissions committee more comprehensive knowledge of each applicant. We also experienced continued growth in our graduate programs in 2014–2015 after surpassing our enrolment goal two years ahead of schedule. This increase brings us closer to our longer-term objective of enrolling three undergraduates for every two graduate students.

Our innovative and leading research attracted record government and industry support, including our highest-ever amount of Tri-Council funding. At the same time, our professors won one-quarter of major honours bestowed on engineering faculty across Canada, three times as many as the next most successful Canadian engineering school. Like our students, our faculty cohort is also becoming more diverse; women comprise nearly one-third of assistant professors, one-quarter of associate professors and 18 per cent of overall faculty. We also conferred the largest number of degrees in our history, preparing more U of T engineers than ever to enter our rewarding profession and join our vibrant global alumni network.

We continue to develop programs that prepare new generations of engineering leaders to address complex and emerging global challenges. In 2014–2015, we enhanced opportunities for undergraduate students to customize their education and develop technical and professional competencies through experiential learning. Examples include the launch of a new Engineering Science major in Robotics, a minor in Nanoengineering and certificates in Communication and Engineering Leadership, as well as more international placements as part of our Professional Experience Year internship program and co-curricular initiatives such as The Entrepreneurship Hatchery. We broadened our graduate programs by developing an MEng in Biomedical Engineering and launching a collaborative graduate program in Engineering Education. We also pursued cross-Faculty and University opportunities to promote multidisciplinary research excellence, foster collaboration and accelerate innovation by establishing the Translational Biology and Engineering Program (TBEP) — part of the Ted Rogers Centre for Heart Research — and the Ontario Centre for Characterization of Advanced Materials (OCCAM). In addition, we ramped up the Toronto Institute of Advanced Manufacturing (TIAM) and the University of Toronto Transportation Research Institute (UTTRI).

I am proud of the vibrancy of our engineering community, including our alumni, industry partners, faculty, staff, students and friends. Nowhere has that strength been more evident than in the tremendous support for the Centre for Engineering Innovation & Entrepreneurship (CEIE), which started construction in June 2015 after years of intense planning and fundraising. The CEIE will inspire a new era in engineering education and research at the University of Toronto by providing a dynamic, creative and multidisciplinary environment that will prepare future U of T engineers to create, innovate and lead.

While this report provides a wealth of metrics to assess performance, our tremendous progress is due to something that is not easy to quantify: the commitment, passion and creativity of our faculty and students, supported by dedicated staff and global alumni. I am grateful to all members of our engineering community for their contributions in our pursuit of excellence, and for their outstanding dedication to our Faculty and our students.

Cristina Amon, Dean
September 2015

Faculty Leadership, 2014–2015

Dean
Cristina Amon

Vice-Dean, Graduate Studies
Markus Bussmann

Vice-Dean, Research
Edward (Ted) H. Sargent

Vice-Dean, Undergraduate
Susan McCahan (until April 1, 2015)
Thomas Coyle (as of April 1, 2015)

Associate Dean, Cross-Disciplinary Programs
Bryan Karney

Chair, First Year
Micah Stickel

Director, University of Toronto Institute for Aerospace Studies
David Zingg

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

Chair, Department of Materials Science & Engineering
Jun Nogami

Chair, Department of Mechanical & Industrial Engineering
Jean Zu

Assistant Dean, Administration
Lisa Camilleri

Chief Financial Officer
Brian Coates

Executive Director, Advancement
Gillian Sneddon

Executive Director, Communications
Catherine Riddell

Faculty Registrar
Tom Nault

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Selected Achievements Under the Academic Plan

The Faculty of Applied Science & Engineering's five-year *Academic Plan, 2011–2016* provides a framework that guides us in our vision to be a leader among the world's very best engineering schools. Approved by Faculty Council in October 2011, the Academic Plan was developed through a highly consultative planning process involving faculty, staff, students, alumni and University stakeholders.

As we enter the final year of the Academic Plan, we have already made tremendous progress in achieving, and in many cases exceeding, the ambitious goals we set out in this pivotal document. This section highlights our accomplishments in 2014–2015 in seven key areas: positioning; culture of excellence; educating future engineers; student experience; research foci; outreach, collaboration and influence; and resource allocation.

The full Academic Plan is available at: uoft.me/engacademicplan. Our *Year Three: Progress and Achievements* report is available at: uoft.me/yearthreeprogress.

Positioning

Effectively sharing U of T Engineering's success stories, research advances and education innovations is crucial to increasing our profile and reputation as a leader among the top global engineering schools. In 2014–2015, we focused and refined our communication strategies to support the Faculty's priorities and seize emerging opportunities. We also enhanced and upgraded the channels we use to implement our communication strategies, including our family of websites and social media presence.

Progress Highlights

- Distinguished ourselves as the top engineering school in Canada and among the top 10 among North American public universities across all international rankings.
- Launched a "Women in Engineering" media campaign, which yielded 120 media stories across Canada and around the world and reached more than 653,000 people through social media.
- Unveiled our new Faculty website in May 2015 with a more responsive, mobile-friendly design and improved navigation, content and marketing.
- Grew media coverage to 12,985 stories, an increase of 38 per cent from 2013–2014, with more than half in international media outlets.
- Expanded use of social media, increasing average monthly Twitter impressions by 14 per cent to 50,000 (from 44,000 in 2013–2014) and doubling engagement to 2 per cent (from 1.1 per cent in 2013–2014). We also increased our Facebook followers by 105 per cent to 2,043 (from 999 in 2013–2014) and launched an Instagram account managed by Engineering Strategic Communications to reach a broader audience.
- Published our second external *Year in Review*, a strategic piece for key donors, industry partners and secondary external audiences, such as parents, media and the general public.

Culture of Excellence

Promoting and nurturing a culture of excellence is central to our Faculty's vision. Our outstanding reputation attracts the brightest faculty, researchers and students from Canada and around the world. The increasing international recognition of our faculty, students and alumni reflects the high calibre of our knowledge creation and transfer, education, research innovation and impact.

Progress Highlights

- Earned 25.0 per cent of major awards received by Canadian engineering Faculties in 2014 — three times as many as any other Canadian engineering school — with only 5.5 per cent of overall faculty members. In 2013, we won 21.3 per cent of major awards with 5.6 per cent of faculty members.

- Received major international recognition for excellence, including:
  - the 2015 L'Oréal-UNESCO "For Women in Science" Laureate for North America;
  - the American Society for Engineering Education's Top 20 under 40;
  - the Alexander von Humboldt Fellowship for Experienced Researchers; and
  - a fellowship from the Institute of Medicine of the U.S. National Academies.
- Garnered early career awards from the Ontario Professional Engineers Young Engineer Award and the Natural Sciences and Engineering Research Council's E.W.R. Steacie Fellowship.
- Recognized for excellence within the University of Toronto, including:
  - Mark Fox (MIE): Distinguished Professor of Urban Systems Engineering;
  - Frank Kschischang (ECE): Distinguished Professor of Digital Communications;
  - Chul Park (MIE): Distinguished Professor of Microcellular Engineered Plastics; and
  - Ted Sargent (ECE): University Professor.
- Increased diversity among our student body, with women comprising nearly one-third of the first-year undergraduate class in 2014–2015, the highest percentage of any entering engineering class in Canada.
- Attracted students from 109 countries representing every continent except Antarctica. We reached 27.1 per cent international enrolment at the graduate level, exceeding our goal of 25.0 per cent.
- More than doubled the number of female faculty members to 44 since 2005–2006, increasing the overall proportion of women professors to 18.0 per cent. Women now comprise 31.6 per cent of the Faculty's assistant professors and 25.0 per cent of associate professors.
- Strengthened admission selectivity, with the entering average of Ontario high school students in our first-year class rising to 92.4 per cent, from 91.7 per cent in 2013 and 85.1 per cent in 2005.
- Enhanced the undergraduate admissions process by introducing a personal video profile to gain a more complete understanding of each applicant's strengths and potential.
- Published the seventh *Annual Report of Performance Indicators* to assess the progress we have made against our Academic Plan goals.

Educating Future Engineers

Building on the success of our innovative undergraduate and graduate programs, we attracted a diverse and high-achieving cohort of students from across Canada and internationally. We have reviewed and enhanced our leading-edge offerings to ensure our students graduate with the technical and professional competencies, entrepreneurial experience and multidisciplinary and cross-cultural outlook they need to become global engineering leaders.

Progress Highlights

- Increased graduate enrolment to 2,194 students after surpassing in 2013–2014 our Academic Plan goal of 2,000 graduate students, two years ahead of schedule. This growth drove our undergraduate-to-graduate ratio closer to our goal of 3 to 2 by 2030.
- Developed a new MEng in Biomedical Engineering and emphases in the cutting-edge areas of Sustainable Energy and Advanced Manufacturing.
- Launched collaborative program for master's and doctoral students in Engineering Education with the Ontario Institute for Studies in Education.
- Received recommendations from the Dean's Task Force for Core Curriculum Review in December 2014 and appointed a working group to guide and oversee the implementation of these recommendations to improve our first-year curriculum and overall student experience.
- Increased undergraduate recruitment efforts in South and Central America, with events in Peru, Colombia, Costa Rica, Guatemala and Brazil, to ensure a geographically diverse student body with a global outlook.
- Experienced tremendous growth in minor enrolment and completion. For example, nearly one-third of all graduating students in 2014–2015 completing a minor or certificate in Engineering Business.
- Launched several undergraduate cross-disciplinary programs in 2014 to enhance opportunities for students to customize their degrees, including:
  - a minor in Biomedical Engineering;
  - a certificate in Engineering Leadership; and
  - a certificate in Renewable Resources Engineering.
- Developed and received governance approval for several new programs to begin in 2015, including:
  - a minor in Nanoengineering;
  - a certificate in Engineering Communication; and
  - an EngSci major in Robotics.
- Enhanced experiential learning opportunities with team-based, industry-sponsored multidisciplinary design project course. More than 150 students participated in 37 projects sponsored by 23 clients.

Student Experience

In addition to academic excellence, one of the differentiating features of our Faculty is our commitment to provide a superb student experience. This extends beyond what happens in the classroom to the diverse co- and extra-curricular opportunities our students have to develop professional and leadership competencies, gain international experience and nurture their interests and passions.

Progress Highlights

- Increased Professional Experience Year (PEY) placements to 724, from 705 in 2013–2014 and 374 in 2005–2006, with more than 60 of these students completing their work terms outside Canada.
- Enhanced teaching and design facilities, upgraded undergraduate laboratory space, provided more study space and streamlined the process for student club funding.
- Increased the first-to-second-year retention rate to 96.3 per cent by enhancing student success programs, including Success 101, First-Year Foundations and Peer-Assisted Study Sessions (PASS).
- Added online versions of select courses to provide more flexibility to students.
- Supported 42 student entrepreneurs through The Entrepreneurship Hatchery's summer program, culminating in investor pitches in September 2014 at Demo Day.
- Launched a new Coursera course called Wind, Waves and Tides: Alternative Energy Systems in October 2014, which enrolled more than 11,000 people.
- Supported initiatives through our Engineering Instructional Innovation Program (EIIP) to:
  - create parallel classrooms that will enable UTIAS and MIE to offer integrated and complementary courses to MEng students; and
  - enhance engineering education and re-energize engineering mathematics instruction through improved and focused teaching techniques.

Research Foci

With a reputation for excellence and innovation in research and more intensive efforts in fundraising, the Faculty garnered record research funding in 2013–2014 from industry, government, international funders and other sources. We also enhanced multidisciplinary collaborations within our community, supported undergraduate- and graduate-student research, built external partnerships, increased our funding base and encouraged donor support to further enable research priorities.

Progress Highlights

- Attracted $81.6 million in research funding in 2013–2014, our highest annual total to date and a 21 per cent increase from the previous year.
- Achieved a new record of $27.4 million in Tri-Council funding, putting the Faculty on track to meet our revised goal of $32 million by 2015–2016. We set this new target after reaching our previous goal of $25 million in 2012–2013, three years earlier than anticipated.
- Succeeded in major provincial and federal research grant competitions, including two new NSERC CREATE grants in 2014–2015, bringing the total number of CREATE grants our Faculty leads to nine.
- Earned four new Canada Research Chairs.
- Enhanced multidisciplinary research by establishing the Ontario Centre for Characterization of Advanced Materials (OCCAM) in summer 2014 and the Translational Biology and Engineering Program (TBEP) in 2015, and ramping up the Toronto Institute of Advanced Manufacturing (TIAM) and University of Toronto Transportation Research Institute (UTTRI).
- Created meaningful opportunities for faculty to learn best practices in research, build relationships with industry partners and prepare successful proposals through forums such as lunch-time panels.
- Joined researchers and clinicians from U of T and partner hospitals in Medicine by Design. Funded by a $114-million grant from the Canada First Research Excellence Fund, this groundbreaking initiative will enhance U of T's position as a leader in regenerative medicine.

Outreach, Collaboration & Influence

The Faculty's activities, collaborations and impact extend across institutions, sectors and borders. They help us attract academically successful students and internationally renowned scholars, build strong industry partnerships and enhance relationships with alumni and prospective donors.

Progress Highlights

- Added value to alumni communities around the world through strategic events and topical seminars in Asia-Pacific, the Middle East, the United States and across Canada, and through a new program that connects professors emeriti with recent graduates.
- Expanded our popular BizSkule speaker series to Calgary, increasing opportunities to connect successful, business-savvy engineering alumni at different stages of career development. BizSkule topics ranged from the future of wearable technology to leadership for challenging times.
- Hosted in Dubai the first Dean's reception for parents and alumni, which will serve as a model for future events to engage parents of current international students in strategic regions.
- Enhanced focused recruitment efforts and events, such as the Girls' Leadership in Engineering Experience (GLEE) and the new Young Women in Engineering Symposium (YWIES), which offer admitted and prospective female students important opportunities to interact with our extraordinary students, faculty and alumni.
- Inspired more than 7,000 pre-university students through DEEP Summer Academy, Saturday workshops, March Break programs, in-school workshops and special events.
- Increased efforts to attract excellent Canadian master's and doctoral students through cross-country graduate fairs and a Faculty-wide recruitment weekend.
- Gained momentum in our $200 million fundraising campaign for Boundless: The Campaign for the University of Toronto by adding another $27.9 million in donations in 2014–2015.
- Increased undergraduate student engagement in the Graditude campaign to 42 per cent, up from 33 per cent in 2014.
- Published our second external annual report, *Innovation Lives Here — Year in Review 2015,* in summer 2015 to share key achievements with industry partners, alumni and prospective donors.

Resource Allocation

Our resources have a direct impact on our ability to achieve the ambitious goals in our Academic Plan. In 2014–2015, we creatively and strategically used all our resources, including budget, space, infrastructure and personnel, to support progress toward achieving our Academic Plan goals.

Progress Highlights

- Maintained a strong financial position, with total revenue increasing by 7.5 per cent to $197.6 million, from $183.8 million in the 2013–2014 fiscal year.
- Awarded $4.9 million in 2014 and more than $4.5 million in 2015 from the Dean's Strategic Fund (DSF) for projects and collaborations that have a broad impact within the Faculty.
- Began construction on the Centre for Engineering Innovation & Entrepreneurship (CEIE) in June 2015.
- Maximized our spaces and strategically renovated and repurposed select facilities. Examples include a Technology Enhanced Active Learning (TEAL) room in the Sandford Fleming Building that serves as a prototype for active and collaborative learning spaces in the CEIE, and new study seating and studying spaces in the Bahen Centre and the Wallberg Building.

Comparison of U of T Engineering with Ontario and Canada, 2014–2015

The table below compares U of T Engineering metrics against those of engineering Faculties in Ontario and Canada for 2014–2015. Within Canada, we awarded 6.8 per cent of all undergraduate engineering degrees, 9.0 per cent of engineering master's degrees and 7.9 per cent of all engineering PhD degrees this past year.

While our provincial and national percentage of faculty members remains relatively low, our internationally renowned scholars have garnered the single largest portion of Natural Sciences and Engineering Research Council (NSERC) engineering funding in 2014–2015.

	U of T Engineering	Ontario	U of T % of Ontario	Canada	U of T % of Canada
Undergraduate					
Enrolment (FTE)	4,672	32,719	14.3%	75,602	6.2%
Degrees Awarded	938	5,996	15.6%	13,876	6.8%
% Women	25.3%	19.3%		19.0%	
Master's (MEng, MASc and MHSc)					
Enrolment (FTE)	1,027	6,592	15.6%	13,911	7.4%
Degrees Awarded	540	2,905	18.6%	5,978	9.0%
% Women	27.0%	25.2%		24.3%	
Doctoral (PhD)					
Enrolment (FTE)	838	3,822	21.9%	9,312	9.0%
Degrees Awarded	110	520	21.2%	1,389	7.9%
% Women	20.9%	19.8%		20.7%	
Faculty					
Tenured and Tenure-Stream	221	1,573	14.1%	3,771	5.9%
Major Awards					
Major Awards Received	15	31	48.4%	60	25.0%
Research Funding					
NSERC Funding for Engineering	$27.9M	$120.8M	23.1%	$293.4M	9.5%

Note: Unlike the data contained in the rest of this report, enrolment (Full-Time Equivalent, or FTE) and degrees awarded statistics are based on the 2014 calendar year and come from Engineers Canada (www.engineerscanada.ca). Faculty data (tenured and tenure-stream) are based on November 2014 counts by Engineers Canada. Major awards are based on the 2014 calendar year and research funding statistics are based on the 2014–2015 grant year (April 2014 to March 2015).

Comparison of U of T Engineering with St. George Campus and University of Toronto, 2014–2015

The following table compares U of T Engineering with the University of Toronto based on key metrics for 2014–2015. Since our activities are concentrated on the St. George campus, we also present our relative metrics where possible.

	U of T Engineering	St. George Campus	Engineering % of Campus	University of Toronto	Engineering % of U of T
Student Enrolment					
Undergraduate	5,489	37,633	14.6%	62,662	8.8%
Professional Master's (MEng and MHSc)	712	6,825	10.4%	7,265	9.8%
Research Master's (MASc)	606	2,781	21.8%	2,888	21.0%
Doctoral (PhD)	876	5,831	15.0%	6,131	14.3%
All Students	7,683	53,070	14.5%	78,946	9.7%
Degrees Awarded					
Undergraduate	1,020	8,289	12.3%	12,385	8.2%
Professional Master's (MEng and MHSc)	343	2,992	11.5%	3,225	10.6%
Research Master's (MASc)	236	1,325	17.8%	1,379	17.1%
Doctoral (PhD)	143	888	16.1%	918	15.6%
Total Degrees	1,742	13,494	12.9%	17,907	9.7%
Faculty and Staff					
Professoriate	245			2,844	8.6%
Administrative and Technical Staff	301			6,470	4.7%
Research Funding					
Sponsored Research Funding	$81.6M			$398.0M	20.5%
Industry Research Funding	$7.7M			$21.3M	36.3%
Space					
Space (NASMs)	63,423	622,570	10.2%	797,025	8.0%
Revenue					
University-wide Costs	$59.4M			$485.6M	12.2%
Total Revenue	$197.6M			$1,718.3M	11.5%

Note: Student enrolment is shown as of November 1, 2014. Degrees awarded are based on the 2014–2015 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 2013–2014 grant year (April to March). Space is measured in Net Assignable Square Metres (NASMs). Revenue is based on the 2014–2015 U of T fiscal year (May to April).

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The record number of applications to our programs and highest-ever mean entrance average are a testament to our position as Canada's top engineering school and our place among the very best schools in the world. These metrics demonstrate a strong demand for the quality of the experience that U of T Engineering provides: a top-tier education, a rich body of co-curricular activities and unique opportunities for personal and professional development.

In 2014, women comprised 30.6 per cent of our first-year students, the highest proportion of any entering engineering class in Canada. Our focused recruitment efforts and events such as the Girls' Leadership in Engineering Experience (GLEE) and the new Young Women in Engineering Symposium (YWIES) offer admitted and prospective students important opportunities to interact with our extraordinary students, faculty and alumni. Such encounters inspire the next generation of female engineers while fostering an enhanced sense of community within the Faculty.

International students also play an important role at U of T Engineering. This past year, we achieved our international enrolment goal two years ahead of schedule: one in four of our undergraduates now comes from outside of Canada. Through strategic recruitment efforts in select regions worldwide, we continue to attract some of the best students in the world. Diversity in all its forms — in people, interests and backgrounds — enriches the educational experience for everyone by bringing different perspectives to the classroom. It also expands our international alumni network.

Our Faculty leads the way in 21st-century engineering education by incorporating innovative learning pedagogies and techniques. In 2014–2015, we initiated a pilot project for a Technology Enhanced Active Learning (TEAL) classroom equipped with modular furniture, reconfigurable settings and 360-degree video screens. Feedback from the professors and students using this classroom will be analyzed to optimize the final design of the TEAL rooms in the Centre for Engineering Innovation & Entrepreneurship (CEIE).

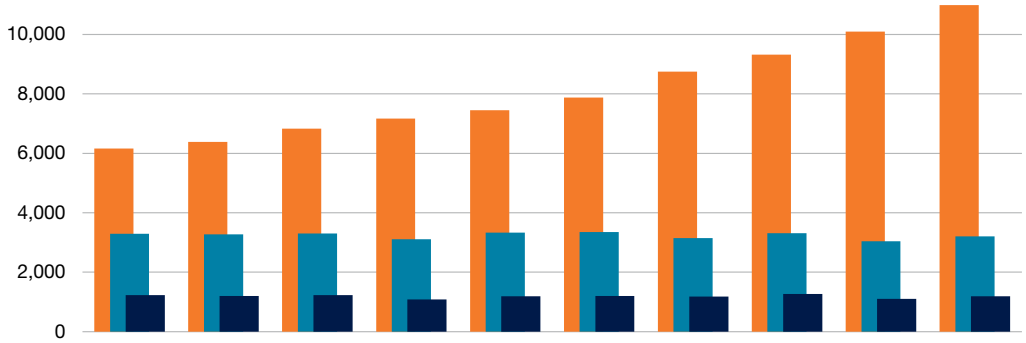
We also deliver increasing numbers of our courses in blended or non-traditional formats. For example, in the inverted classroom, students watch their lectures as online videos previously recorded by our professors and spend their class time reinforcing concepts through experiential and collaborative assignments. This approach allows students to engage actively with the material, and provides key opportunities to develop competencies in teamwork, life-long learning and multidisciplinary collaboration.

Admissions and First-Year Students

Demand for our programs grew by 9 per cent in 2014, with a record-setting 10,989 applications. While domestic applications have grown by 60 per cent over the last 10 years (Figure 1.1b), applications from outside of Canada have more than doubled in the same time period (Figure 1.1c). This speaks to our strong international reputation, our ongoing strategic recruitment initiatives abroad and our growing global visibility.

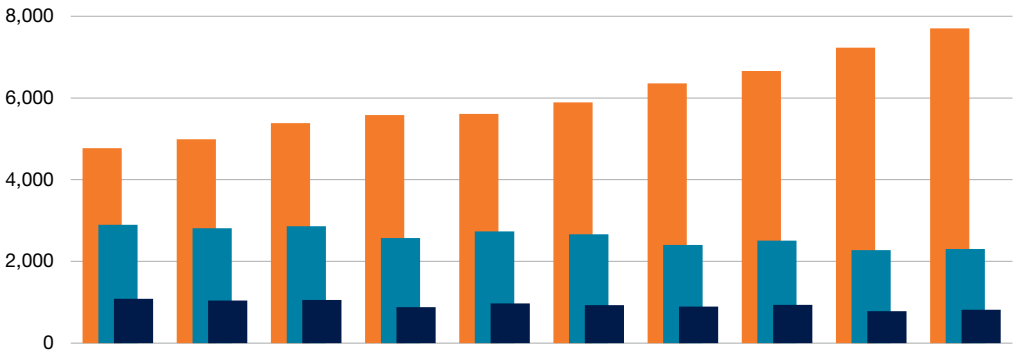
The high demand allows for greater selectivity: fewer than 30 per cent of applicants receive offers of admission. Selectivity for domestic students has increased significantly over the last decade. Ten years ago, the ratio of domestic to international students admitted was more than 7 to 1. Today it is approximately 3 to 1. This change is in response to a surge in highly qualified international students. It reflects the fact that in an increasingly competitive environment, greater numbers of these students are choosing U of T Engineering due to our solid reputation as a globally significant engineering school.

Figure 1.1a **Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2005 to 2014**



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Applications	6,163	6,383	6,829	7,173	7,446	7,881	8,745	9,326	10,095	10,989
Offers	3,290	3,276	3,300	3,107	3,329	3,347	3,149	3,309	3,042	3,205
Registrations	1,230	1,200	1,229	1,081	1,188	1,203	1,180	1,265	1,106	1,192
Selectivity	0.53	0.51	0.48	0.43	0.45	0.42	0.36	0.35	0.30	0.29
Yield	0.37	0.37	0.37	0.35	0.36	0.36	0.37	0.38	0.36	0.37

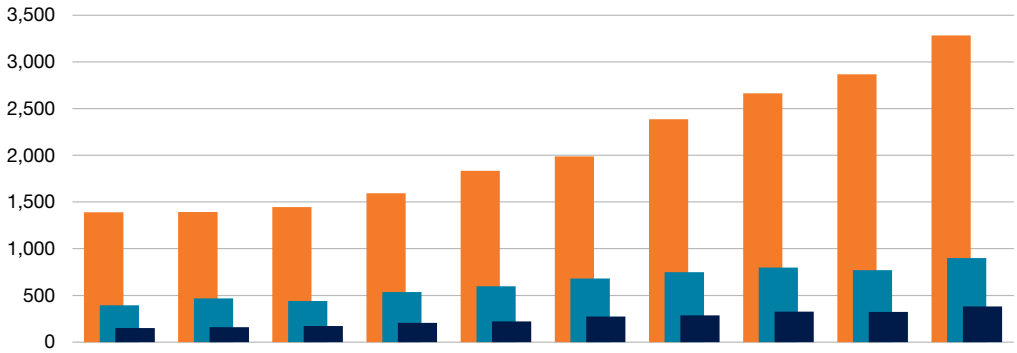
Figure 1.1b **Domestic Students: Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2005 to 2014**



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Applications	4,773	4,991	5,383	5,581	5,612	5,892	6,359	6,662	7,229	7,705
Offers	2,896	2,809	2,860	2,572	2,733	2,665	2,400	2,510	2,272	2,304
Registrations	1,081	1,040	1,056	876	967	931	894	938	782	812
Selectivity	0.61	0.56	0.53	0.46	0.49	0.45	0.38	0.38	0.31	0.30
Yield	0.37	0.37	0.37	0.34	0.35	0.35	0.37	0.37	0.34	0.35

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; the proportion of applicants who were offered admission. Yield = registrations / offers. Domestic students are defined as citizens (living in Canada or abroad) or permanent residents of Canada.

Figure 1.1c International Students: Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2005 to 2014

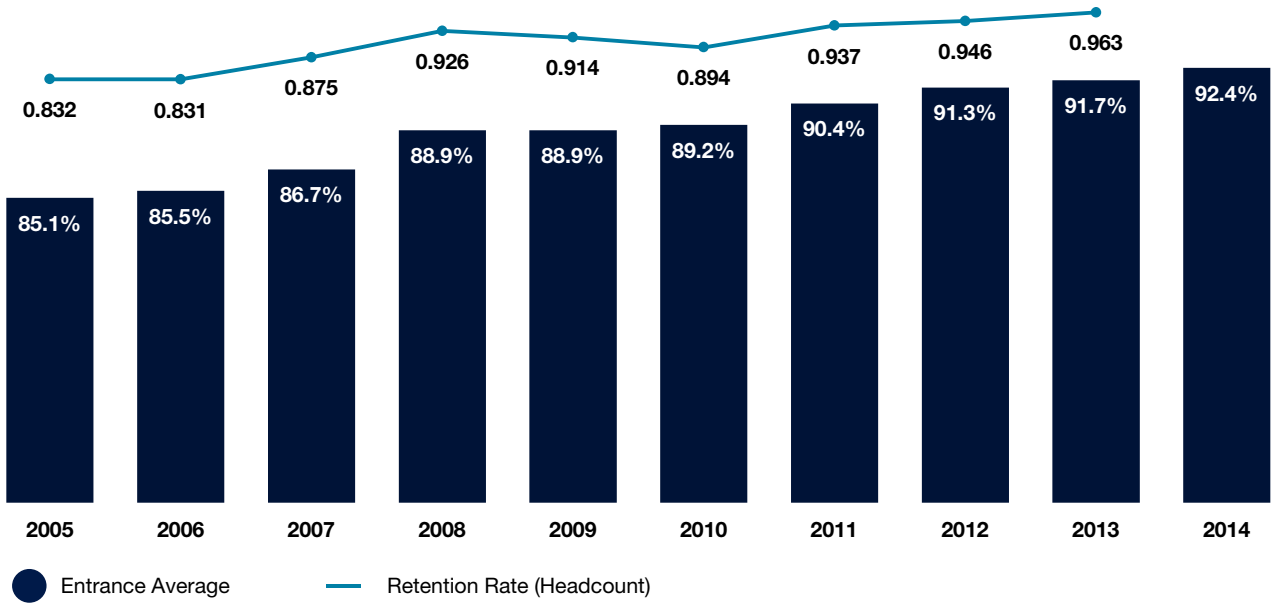


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Applications	1,390	1,392	1,446	1,592	1,834	1,989	2,386	2,664	2,866	3,284
Offers	394	467	440	535	596	682	749	799	770	901
Registrations	149	160	173	205	221	272	286	327	324	380
Selectivity	0.28	0.34	0.30	0.34	0.32	0.34	0.31	0.30	0.27	0.27
Yield	0.38	0.34	0.39	0.38	0.37	0.40	0.38	0.41	0.42	0.42

The academic performance of our incoming students continues to strengthen; the mean entering average of Ontario secondary school students rose from 91.7 per cent in 2013 to its highest-ever value of 92.4 per cent in 2014.

To continue admitting the most talented students, we implemented a new, broad-based process for applicants seeking admission for fall 2015. This pilot project — the first of its kind in Canada for engineering schools — uses videos and timed written responses to give our admissions committee a more comprehensive picture of the students' candidacy. These tools allow applicants to demonstrate key engineering qualities, such as logical thinking, adaptability and perseverance, which can be difficult to measure by grades and written essays alone. A trained group of alumni assessors view and score the submissions using a rubric we tested and established in collaboration with the Ontario Institute for Studies in Education (OISE). We are working with OISE researchers to determine how these enhanced measures map to student performance in our undergraduate programs.

Figure 1.2 Ontario Secondary School Averages of Incoming First-Year Undergraduates and Retention Rate Between First and Second Year, 2005 to 2014



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. It is calculated as of November 1.

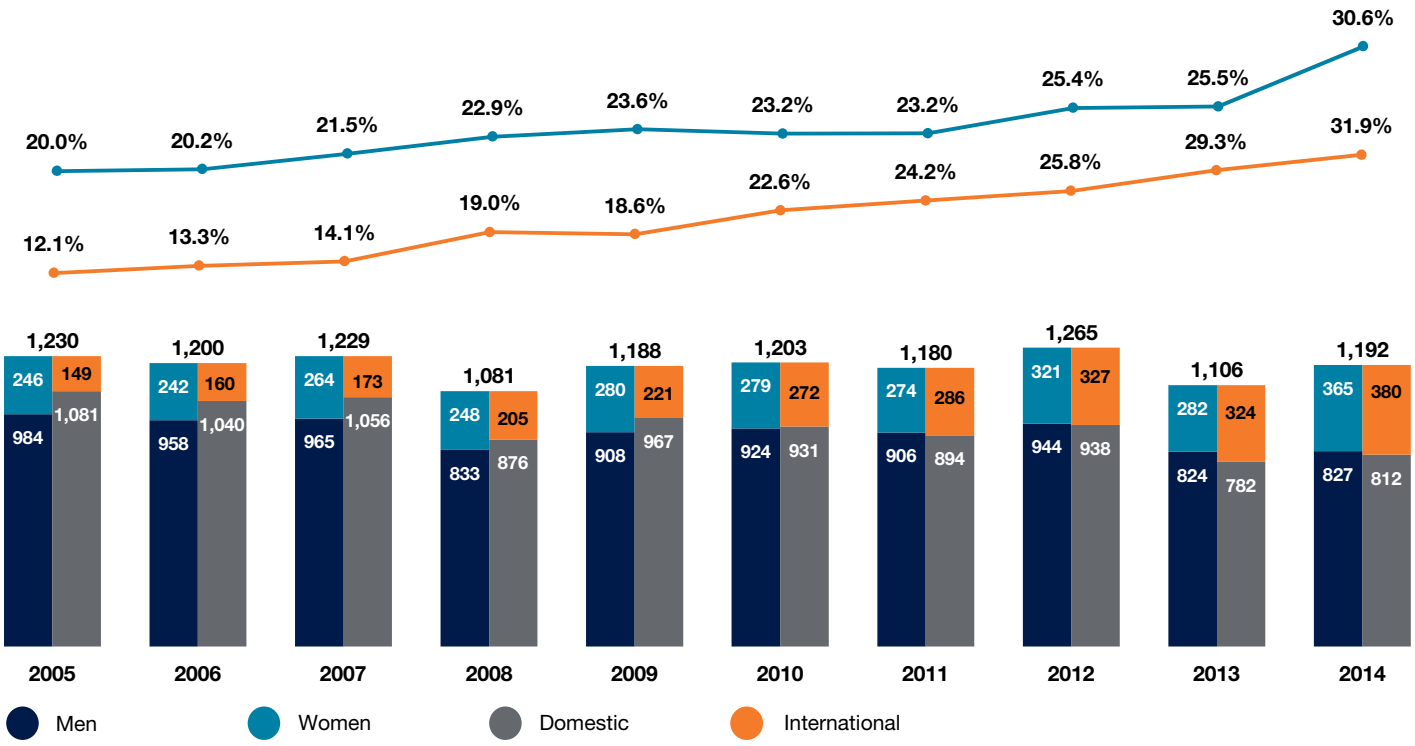
In 2014, our first- to second-year retention rate rose to 96.3 per cent. Programs such as Success 101, First-Year Foundations and Peer-Assisted Study Sessions (PASS) demonstrate our ongoing commitment to student success. More detail about these initiatives can be found later in this chapter under "Enriching Undergraduate Engineering Education."

Strategic recruitment of highly qualified female and international students led to much greater diversity in the incoming class. The proportion of women and international students are both at all-time highs (Figure 1.3).

Several of our recruitment initiatives are particularly tailored to broaden the diversity of applicants and increase our offer yields among under-represented groups. One of these recruitment initiatives is the Young Women in Engineering Symposium (YWIES), which was held for the first time in fall 2014. Under the theme of "Design a Better World," YWIES brought together 84 top grade 12 female science students from the Greater Toronto Area, identified with the help of the Ontario Association of Physics Teachers (OAPT). A keynote address by Professor Yu-Ling Cheng (ChemE), director of the Centre for Global Engineering, helped these high-achieving young women learn about the hugely positive impact that engineers can have in addressing global challenges. They experienced the engineering process through interactive workshops facilitated by current undergraduate students as well.

We also invited top women applicants to the Girls' Leadership in Engineering Experience (GLEE), which was held for the fourth consecutive year in May 2015. Eighty-eight young women with offers of admission came to U of T from across Canada to meet with current students, professors and alumni who share their passion for improving lives through engineering. Seventy-eight of these applicants (89 per cent) accepted our admission offers. In addition, our 2014 and 2015 March Break Applicant Events included a panel session called Engineering Mythbusters. Participants submitted questions to female undergraduates from all academic areas and years of study. Their answers helped break down stereotypes about the daily experience of women studying engineering. Attendance at this panel grew from 234 in 2014 to 263 in 2015.

Figure 1.3 **Incoming First-Year Undergraduates with Percentage of Women and International Students, 2005 to 2014**



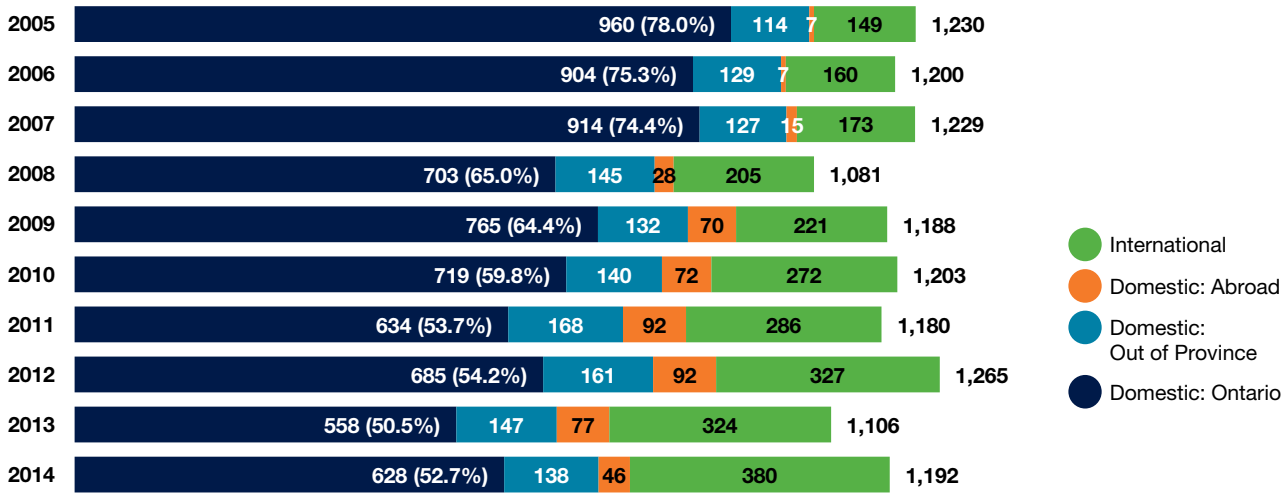
Note 1.3: Student counts are shows as of November 1. Domestic students are defined as citizens or permanent residents of Canada.

Our ability to attract the brightest students from around the world is due in part to our academic excellence, international reputation and targeted recruitment strategies. Each year, U of T Engineering recruiters travel extensively to meet with high-performing students and their families, both individually and at receptions hosted by the Faculty. These encounters offer opportunities to learn more about our programs and co-curricular activities. In 2013–2014, international recruitment targets included India, Southeast Asia, Turkey, the United Arab Emirates and Ecuador, yielding higher applicant numbers from those regions this past year. In 2014–2015, we bolstered our efforts in South and Central America with trips to Peru, Colombia, Costa Rica, Guatemala and Brazil.

We also admitted 33 top students through the International Foundation Program (IFP). Now in its fifth year, the IFP allows academically strong students who do not meet the University's minimum English proficiency requirements to receive a conditional offer of admission as non-degree students. After completing an intensive eight-month English-language program as well as the Engineering Strategies & Practice course series, these students can continue in a program of study in our Faculty.

Figure 1.4 shows that the number of students from outside Ontario — including domestic students from other provinces and abroad, and international students — has grown significantly over the last 10 years. The ratio of students from Ontario to students from other regions is nearly 1 to 1. Our highly regarded engineering education appeals to students from our local community, from across Canada and from around the world. Bringing diverse perspectives to the classroom enriches the experiences of all our students. It also has an impact on the profession beyond our walls, enhancing the international reputation and outlook of Ontario professional engineers.

Figure 1.4 **Incoming First-Year Domestic and International Undergraduates, 2005 to 2014**

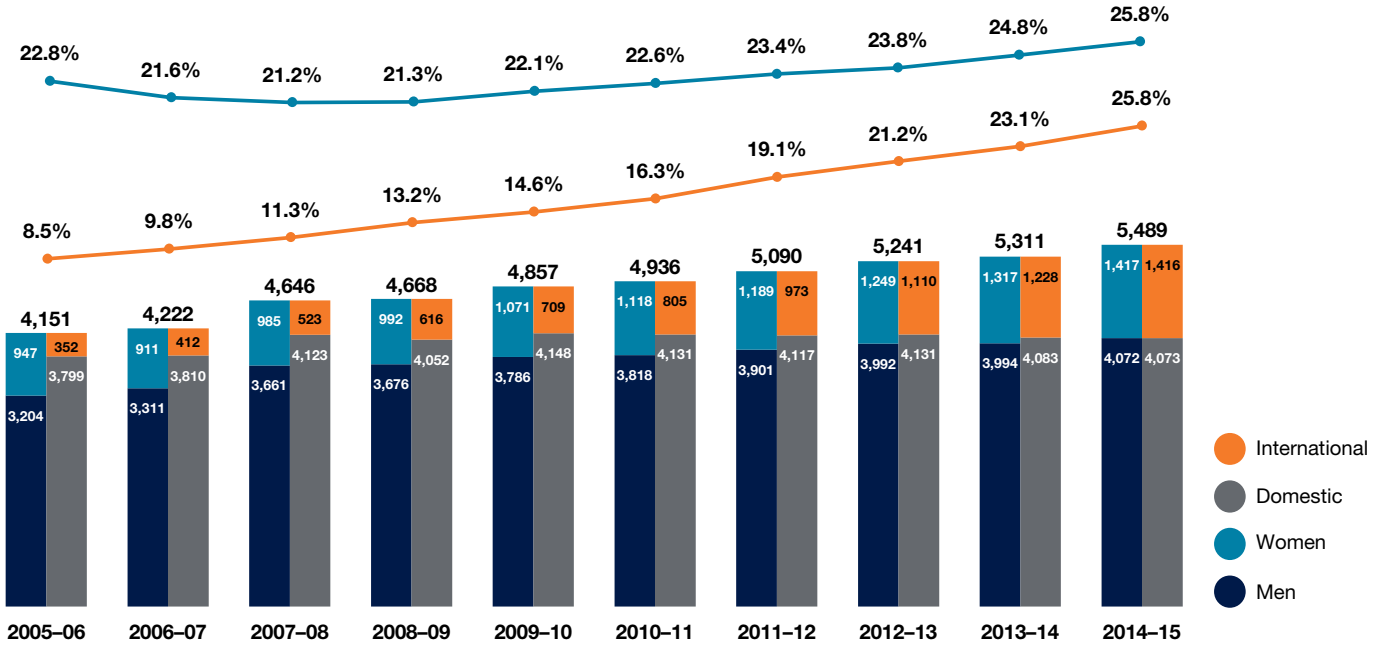


Note 1.4: Student counts are shown as of November 1. Domestic students are defined as citizens or permanent residents of Canada.

Enrolment

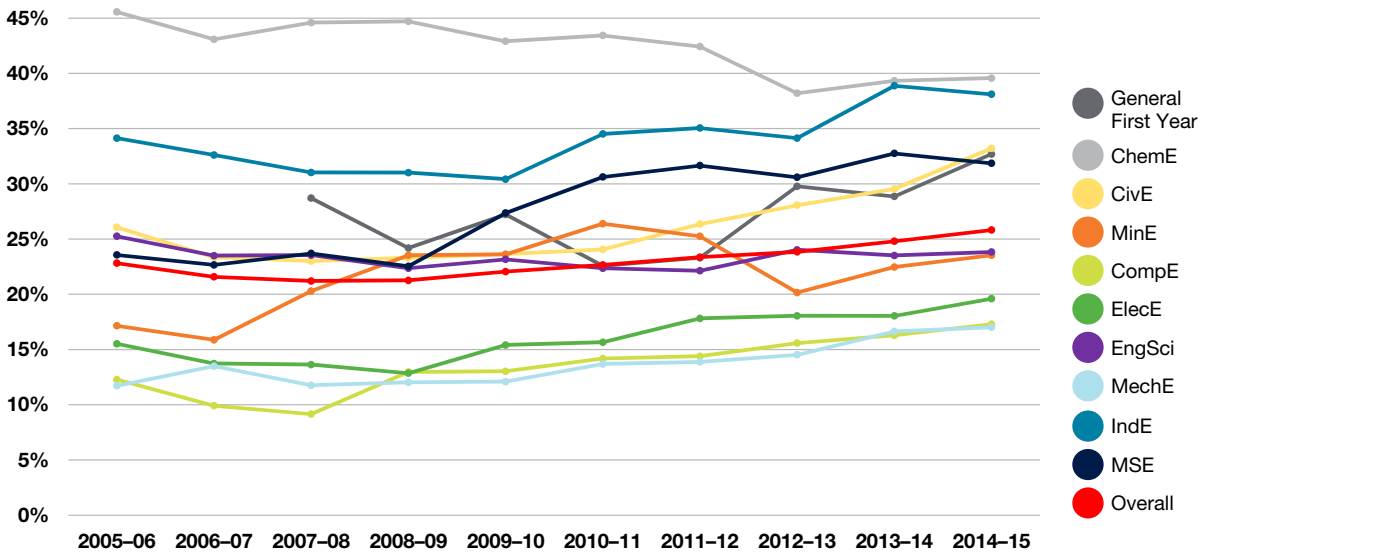
The proportion of international students across the entire undergraduate population is now 25.8 per cent, in line with our Academic Plan goal of 25 per cent by 2015. We achieved this by growing our international student body while keeping domestic numbers relatively constant.

Figure 1.5a **Undergraduate Enrolment with Proportion of Women and International Students, 2005–2006 to 2014–2015**



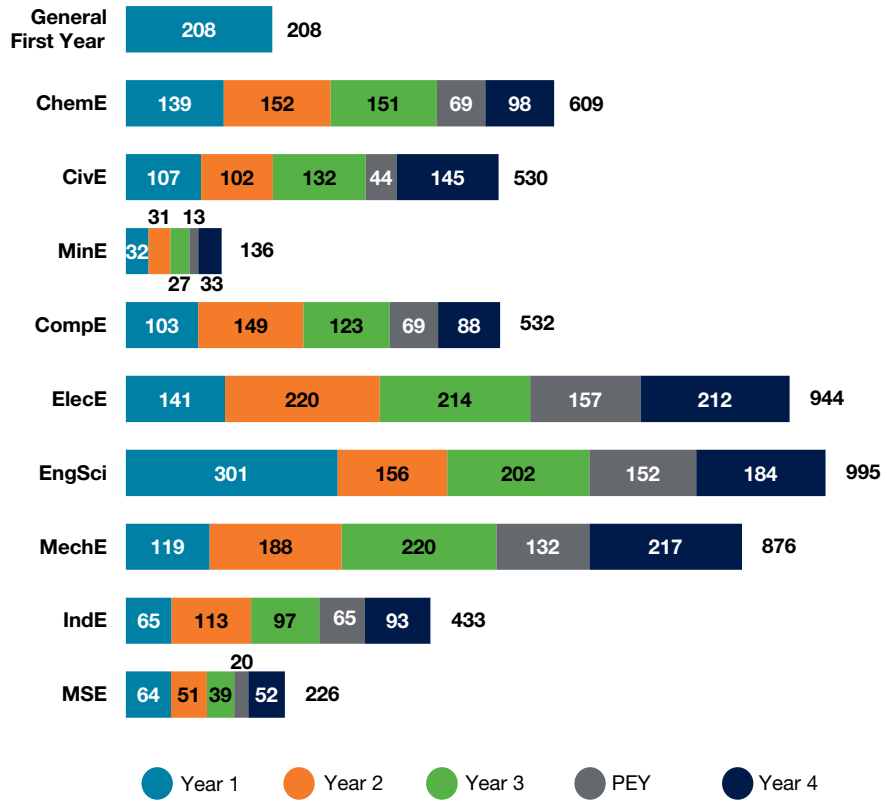
Women now make up more than 25 per cent of our overall undergraduate population. This is well above the national average of 18.9 per cent for Canada and 19.9 per cent in the U.S. While some academic programs traditionally attract a higher proportion of women than others, Figure 1.5b shows that the overall increase is a result of growing numbers of women across most disciplines.

Figure 1.5b **Women as a Proportion of Total Enrolment by Program, 2005–2006 to 2014–2015**



Note 1.5: Includes full-time and part-time students and those on PEY internship. 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. For more information on our international student enrolment goals, please see the Academic Plan, Chapter 4, Goal 12.

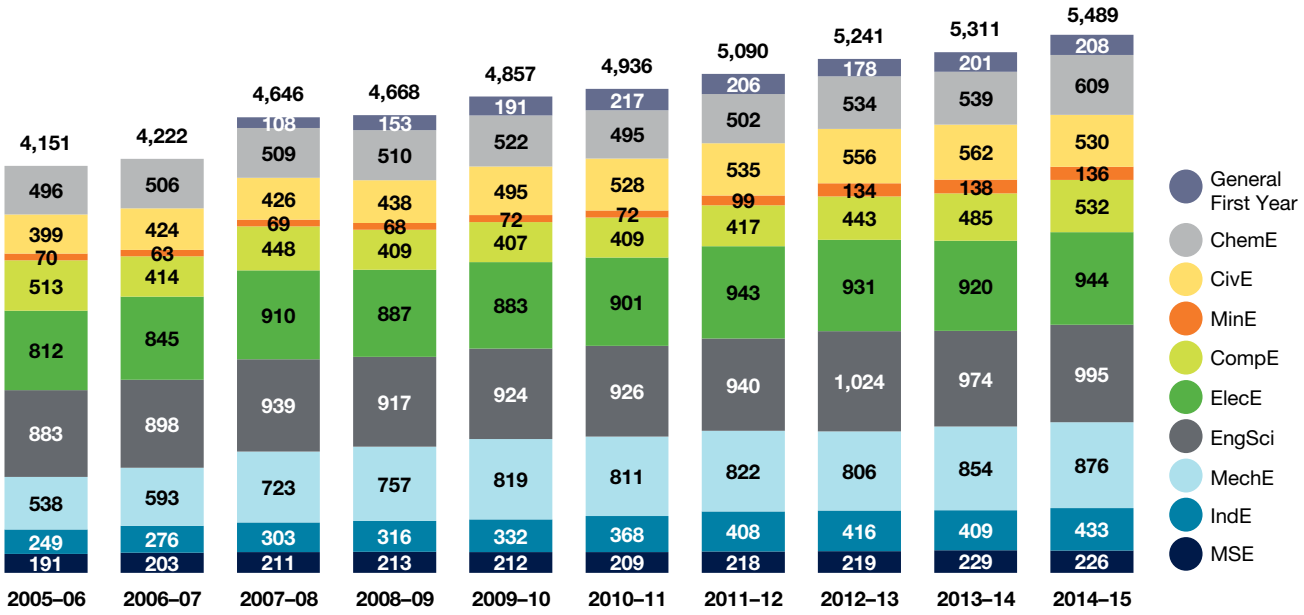
Figure 1.6 Undergraduates by Program, Year of Study and Professional Experience Year (PEY), 2014–2015



Engineering Science Majors	Enrolment
Aerospace Engineering	54
Biomedical Systems Engineering	62
Electrical and Computer Engineering	120
Energy Systems	48
Infrastructure Engineering	32
Mathematics, Statistics and Finance	35
Nanoengineering	10
Physics	25
Total	**386**

Enrolment was strong across all our undergraduate programs (Figure 1.7), with notable increases in ChemE and CompE.

Figure 1.7 Undergraduates by Program, 2005–2006 to 2014–2015



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 show students on PEY internship.
Note 1.7: Student counts are shown as of November 1.

Need-Based Funding

We remain committed to ensuring that 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 from a variety of sources, including from individual donors and from the University of Toronto Advanced Planning for Students (UTAPS) program.

The number of undergraduate students receiving need-based awards rose slightly from 1,630 in 2013–2014 to 1,679 in 2014–2015. The total amount of student support increased to its highest-ever value of $10.2 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, 2005–2006 to 2014–2015

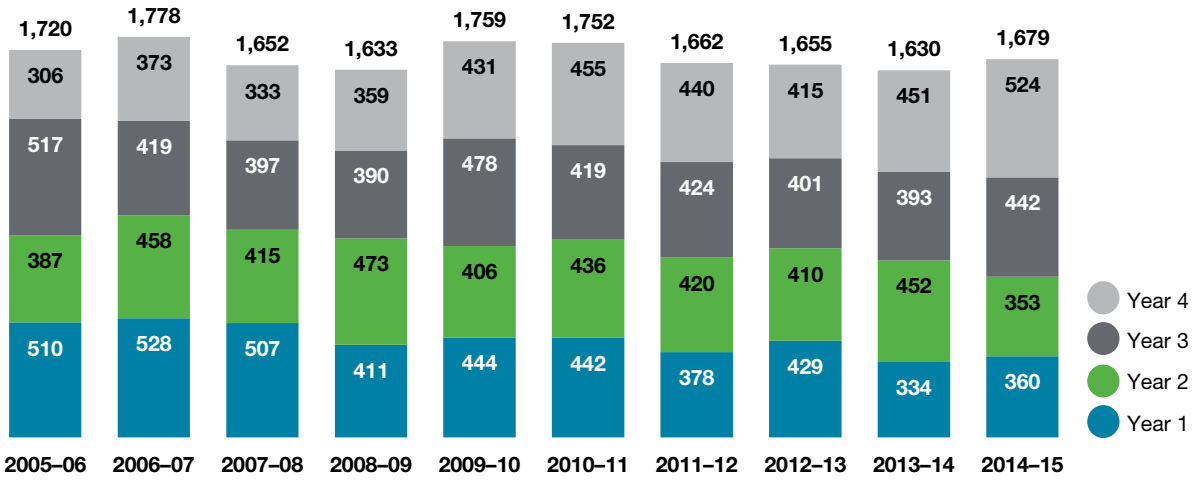
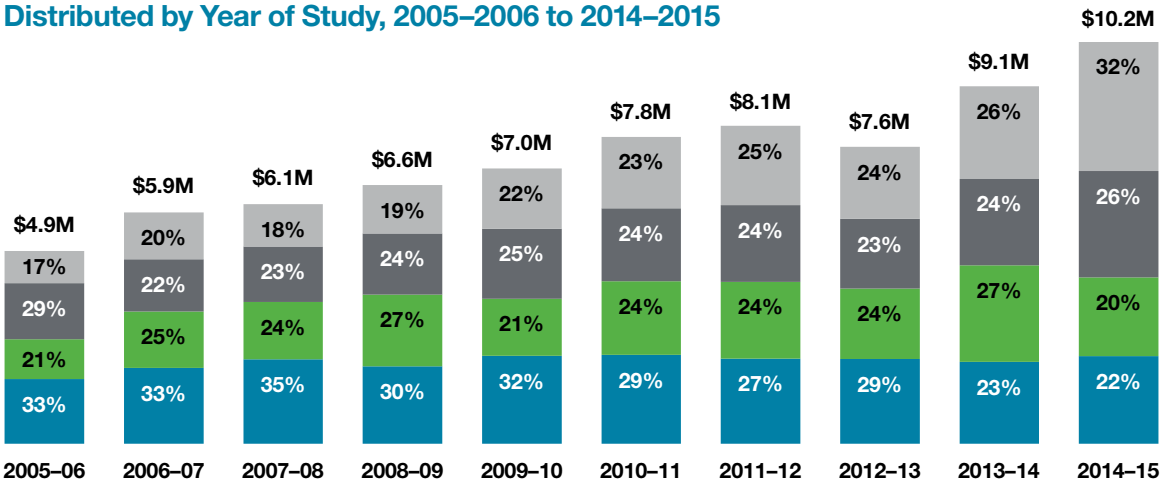


Figure 1.8b Total Value of Undergraduate Financial Assistance and Percentage Distributed by Year of Study, 2005–2006 to 2014–2015



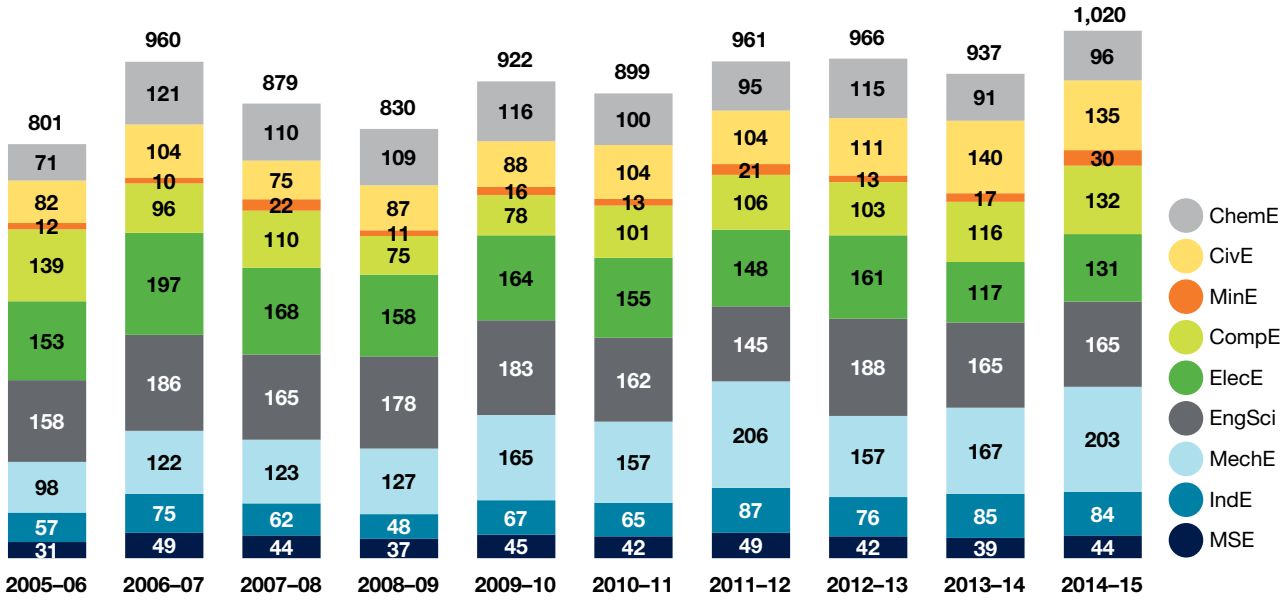
	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Year 4	$754,720	$816,316	$1,197,276	$1,073,536	$1,228,910	$1,531,968	$1,821,597	$2,015,187	$1,833,231	$3,284,967
Year 3	$1,264,981	$1,426,552	$1,325,499	$1,415,723	$1,560,064	$1,776,940	$1,853,184	$1,954,694	$1,775,729	$2,706,828
Year 2	$1,468,644	$1,013,770	$1,439,972	$1,457,171	$1,818,818	$1,456,683	$1,878,336	$1,955,606	$1,789,788	$2,008,555
Year 1	$1,261,554	$1,649,482	$1,929,947	$2,153,035	$1,977,494	$2,240,004	$2,262,988	$2,167,486	$2,159,980	$2,230,545
Total	$4,749,898	$4,906,119	$5,892,694	$6,099,465	$6,585,285	$7,005,595	$7,816,104	$8,092,973	$7,558,729	$10,230,895

Note 1.8a and 1.8b: Data reported by academic year (September to August).

Degrees Awarded

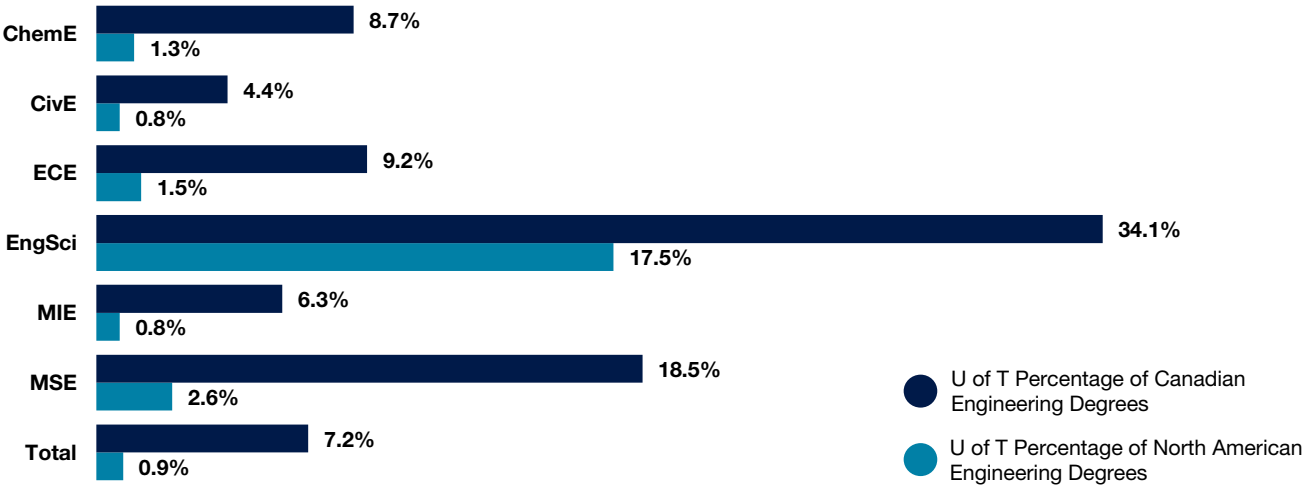
Students at U of T Engineering earn either a Bachelor of Applied Science (BASc) or Bachelor of Applied Science in Engineering Science (BASc EngSci). Both of these degrees can be completed in four years. However many of our second- and third-year students choose to augment their degrees by participating in our Professional Experience Year (PEY) internship program, which adds 12 to 16 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, 2005–2006 to 2014–2015**



U of T graduates represent 7.2 per cent of all the engineering graduates in Canada. Our EngSci and MSE programs are among a small number of elite programs in Canada and North America; as a result, our students represent a much greater proportion of the total students graduating from these programs (Figure 1.9b).

Figure 1.9b **U of T Engineering Degrees Awarded by Academic Area Compared with Canadian and North American Degree Totals, 2013**



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

Student-to-Faculty Ratios and Dean's Honour List

Figure 1.10 shows the number of undergraduates in each department relative to the number of teaching faculty in that department. Our EngSci and General First Year (formerly TrackOne) programs employ a collaborative and cross-Faculty teaching approach. In Figure 1.10 students in those programs have been included only in the calculation of the "Total" bar.

Figure 1.10 **Undergraduate Student-to-Faculty Ratios by Academic Area, 2014–2015**

In 2015, 39.3 per cent of graduating students achieved Honours or High Honours (Fig. 1.11a). To graduate with Honours, a full-time student must achieve a cumulative average of higher than 79.5 per cent across second, third and fourth years and a weighted sessional fourth-year average of 74.5 per cent or higher. Starting with convocation in June 2015, the designation of High Honours distinguishes students who obtain a cumulative average of 87.5 per cent or higher and a weighted sessional fourth-year average of 82.5 per cent or higher. This designation provides a new way to recognize outstanding student academic achievement.

The number of students who attained Dean's Honour List standing also remained strong in 2014–2015 (Fig. 1.11b). This trend reflects the excellence of our students and the effectiveness of the many support systems we have in place to ensure success, which are discussed in the next section.

Note 1.10: Student 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. Students in Engineering Science and General First Year and instructors for the Engineering Communication Program are included in the Faculty total only. Faculty counts include tenure-stream and teaching-stream faculty.

Figure 1.11a **Number of Students and Percentage of Class Graduating with Honours, 2006 to 2015**

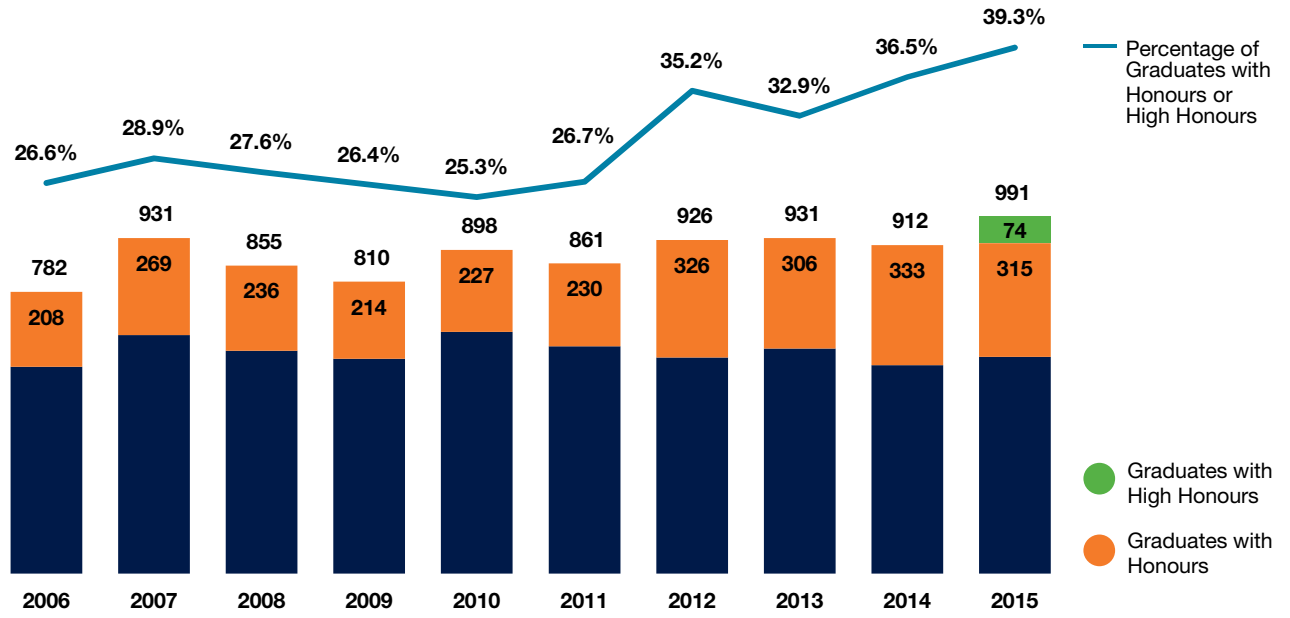
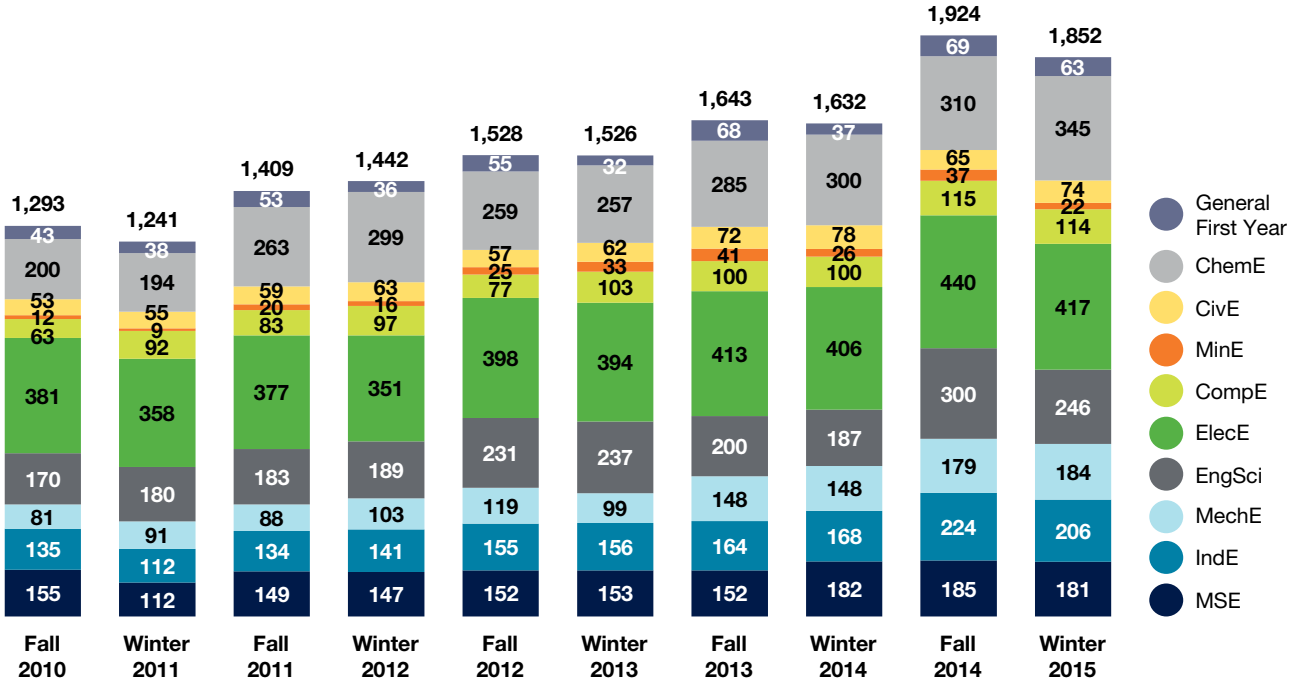


Figure 1.11b **Number of Students on the Dean's Honour List by Term and Academic Area, 2010–2011 to 2014–2015**



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.

Enriching the Undergraduate Engineering Experience

Our commitment to student success begins before students arrive in September. Success 101 — a summer workshop offered free-of-charge to newly admitted undergraduates — teaches diverse styles of learning, time management, studying and note-taking. Other summer courses offered through the First-Year Foundations program help students sharpen their technical skills, become familiar with the campus, meet future classmates and gain valuable advice from current students and professors.

Instructors of first-year students play a critical role during the transition from high school to university. Facilitating communication among first-year instructors helps ensure the uniform integration of fundamental concepts across core courses. It also encourages the spread of innovative teaching techniques and effective use of educational technology. To this end, the second annual First-Year Instructors Day was held in fall 2014. The event helped ensure consistency in the student experience and raised awareness of the various support systems that are in place. These include embedded counsellors who can provide guidance and identify students who will benefit from extra support, as well as Peer-Assisted Study Sessions (PASS) led by highly successful upper-year students.

Educational technology plays an important role in our commitment to enhancing engineering education. Courses such as ECE 221 – Electricity and Magnetism use an inverted classroom approach, in which students watch lectures online prior to class. During class, students collaborate on problem sets and hands-on assignments. Undergraduates who make the most of this learning environment demonstrate improved problem-solving skills, more confidence and better overall performance.

The forthcoming Centre for Engineering Innovation & Entrepreneurship (CEIE) will contain classrooms optimized for Technology Enhanced Active Learning (TEAL). As part of this project, an existing classroom (Sandford Fleming 3201) has been converted into a test version of the new TEAL classroom and contains hexagonal tables that encourage collaborative learning and multiple screens to make visual material easily accessible from all locations. Feedback from instructors who have used this room will inform decisions about the TEAL room designs for the CEIE.

The Faculty also offers other examples of technology-enhanced learning:

- The bi-annual Educational Technology Workshop, hosted by the Faculty in May 2015, helps instructors across U of T integrate the latest learning technology into their practice. About 250 participants from Engineering, the broader university and our hospital partners took part in sessions that included creating short educational videos, engaging students in lectures using electronic devices and maximizing accessibility to educational material.
- In fall 2014, we offered APS 160 – Mechanics online for the first time. It joined two existing online calculus courses, APS 162 and 163. These online courses allow students more choice in how they access educational material. For example, students can use online courses as support resources in addition to live lectures. Alternatively, online lectures can replace live ones, giving students more flexibility in their timetable.
- For the first time, incoming students in 2014 had the opportunity to take APS 162 – Calculus for Engineers I as an online, for-credit course over the summer. Forty-five students participated in this pilot project, freeing up time for other courses or co-curricular activities.
- Crowdmark is an innovative software program developed at U of T that allows teaching assistants to mark from anywhere, returning faster and more detailed feedback to their students. In 2014–2015, instructors of core mathematics courses greatly expanded their use of Crowdmark, which had previously been tested only on a pilot scale.

Now in its second year, the co-curricular record (CCR) is an official U of T document that provides students with recognition for the competencies they gain through their roles on athletic teams, student government, cultural clubs, design teams or other campus organizations. Students can also use the system to find activities and organizations that are in line with their personal development goals. In its pilot year (2013–2014) the CCR recognized 15 roles on selected student clubs and teams. In 2014–2015, this was expanded to 215 recognized roles. A full list of U of T Engineering student clubs and teams can be seen in Appendix A.

Selected Undergraduate Highlights

Supermileage Team Wins Shell Eco-Marathon

Imagine driving from the foot of Yonge Street in Toronto to Barrie, Ontario, on less than 5 tablespoons of gasoline. That is the extraordinary level of fuel efficiency the University of Toronto Supermileage team achieved in April 2015 to win the Shell Eco-Marathon Americas in Detroit, Michigan, a highly competitive international event that drew 113 teams from more than 1,000 universities and high schools across the Americas. U of T squeaked out a win in the very last run of the event with an efficiency of 3,421 miles per gallon — the equivalent of 6.82 millilitres of gasoline per 10 kilometres — upsetting Université Laval, which had won the previous two events. Founded in 2013, the Supermileage team is composed of 25 undergraduate and graduate students from U of T Engineering, and is supervised by Professor Kamran Behdinan (MIE).

Award-winning Chemical Engineering Student Puts Safety First

In spring 2014, Larissa Rodo (ChemE 1T3 + PEY) won second prize in the 2014 Minerva Canada James Ham Safe Design Engineering Student Awards. Her entry was a set of self-assessment tools, similar to a checklist, designed to help academic researchers manage safety risks in their labs. Because humans often have difficulty judging risk, safety managers in industrial labs have developed and codified safety cultures that prevent people from falling into a false sense of security. By adapting these industry best practices for the academic environment, Rodo created a critical tool to help lab workers measure and improve safety.

Undergraduate Students Invent $20 Intubation Solution

Qian (Linda) Liu (EngSci 1T3 + PEY) and Kaiyin (Cathy) Zhu (EngSci 1T3 + PEY) invented a new, inexpensive tracheal intubation guide system for hard-to-intubate patients. The project was originally part of BME 489 – Biodesign, an IBBME capstone course in which students work in teams to tackle real-world biomedical engineering problems submitted by industry. Made of 3D-printed plastic, a spring and a short length of string, the device can be produced for less than $20. It won this year's John W. Senders Award for Imaginative Design, which was created in 2010 to honour "the imaginative and successful application of the principles of human factors to the design of a medical device."

Pre-University Engineering Outreach

The Engineering Student Outreach Office (ESOO) designs and delivers pre-university programs that engage youth in science, technology, engineering and math (STEM). The graduate and undergraduate students who deliver these programs serve as ambassadors for the Faculty — often providing the first connection youth make with U of T Engineering — while gaining valuable experience in youth education and project management. By partnering with faculty members, departments and institutes, student groups and community organizations, ESOO aims to kindle interest in STEM studies, especially among underrepresented communities.

In 2014–2015, ESOO reached more than 7,000 students — nearly half of them girls — through DEEP Summer Academy, Saturday workshops, March Break programs, in-school workshops and special events. A full list of outreach programs and their reach can be found in Appendix A.

Here are some highlights:

- Go CODE Girl, held in February 2015 in partnership with the Ontario Network of Women in Engineering (ONWiE), invited 50 female high school students in grades 9 to 11 to learn about the exciting world of coding and software development. This marked U of T's first year hosting the event.
- In November 2014, U of T Engineering hosted 300 delegates of the Spanish-Speaking Educational Network for their 6th Congress of Education. We delivered hands-on STEM activities to 150 youth in grades one through 12 as part of this event.
- Another new initiative is a six-week workshop aimed at youth ages 12 and up. The program is run in partnership with ECE Professor David Johns, founder of the Icewire Makerspace, a midtown Toronto facility that provides youth with tools to experiment with technology. By the end of the workshop, participants create their own microcontroller that senses light and temperature, a 3D-printed model or even their own robot.

2

Graduate Studies

Our graduate enrolment has grown rapidly over the past decade and reached a record of nearly 2,200 students in 2014–2015. This impressive interest in our graduate programs builds on our success in 2013-2014, when we surpassed our Academic Plan goal of enrolling 2,000 graduate students two years early. It also positions us to achieve our longer-term goal of an undergraduate-to-graduate ratio of 1.5 to 1 by 2030. Our graduate students — the most diverse cohort in our Faculty's history — produce world-leading research and are developing cutting-edge technical and professional skills.

Over the past five years, we have grown our MEng program by 75 per cent and significantly increased the proportion of international students in this group. This achievement reflects an effective expansion of course offerings, attractive new areas of emphasis and renewed efforts to integrate professional students more fully into co-curricular activities. We are on track to meet our goal of increasing enrolment in our professional master's programs to 50 per cent of all full-time equivalent (FTE) master's students by 2015–2016.

We are focused on attracting the very best domestic PhD students from across Canada, and systematically encourage MASc students to fast-track into the PhD program to increase the impact of their work. We seek out the best and brightest candidates for our research-stream graduate programs. In February 2015, we hosted our first Faculty-wide Graduate Research Days, which built on events held in previous years at the department level. The Graduate Research Days event showcased the excellence of our Faculty to carefully selected prospective students from across Canada. We also expanded our nationwide recruitment tour, visiting many of Canada's major cities to discover new engineering talent interested in graduate studies.

In fall 2014, we welcomed our first cohort in the new collaborative program in Engineering Education (EngEd). The first of its kind in Canada, EngEd leverages design thinking and systems engineering approaches to develop new courses and curricula that reflect the latest research in effective teaching and learning. The program is one more example of our commitment to educational innovation and to preparing our graduates to be tomorrow's leaders.

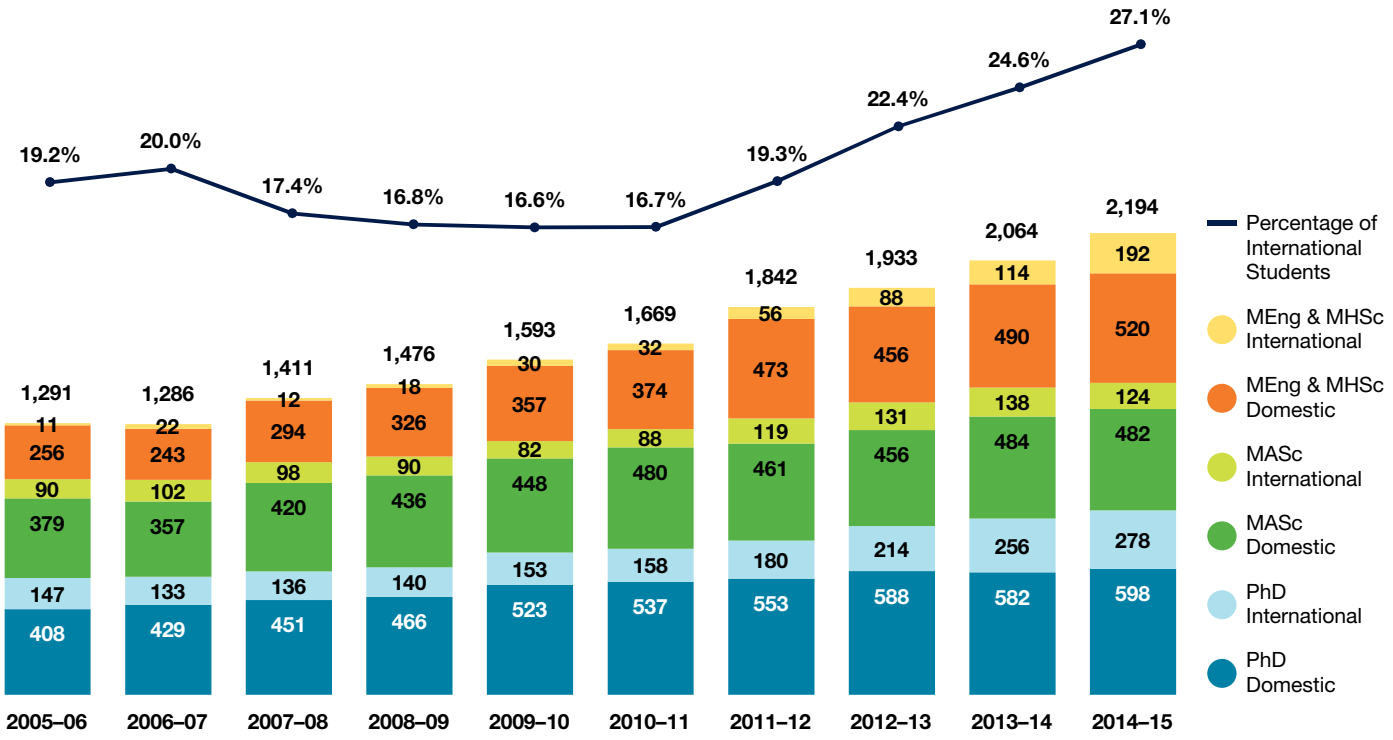
Enrolment

We continue to increase the size and diversity of our graduate student population. In 2014–2015, 2,194 graduate students from across Canada and around the world pursued research-intensive and professional degrees at U of T Engineering, an increase of 6 per cent from 2,064 in 2013–2014 and nearly 70 per cent from 1,291 in 2005–2006. This impressive enrolment allowed us to surpass, two years early, our goal of having 2,000 graduate students by 2015 (see Academic Plan, Chapter 4, Goal 12), with growth distributed evenly across all disciplines. More than one-quarter of our graduate students come from outside Canada and 26.7 per cent are women. The overall enrolment increase signals that students from Canada and around the world are attracted to U of T not only for our outstanding reputation in research, but also for the quality of our professional education. Our capacity to recruit outstanding international graduate students is a testament to continued growth in sponsored research (see Chapter 3: Research).

Domestic demand for PhD programs in engineering appears to have reached a plateau, yet our world-leading research activities require more PhD candidates to carry out investigations. In response, our Faculty has accepted higher numbers of talented international students, among whom demand for PhD programs remains high. Among MASc candidates, both domestic and international numbers have grown steadily over the past 10 years.

In the MEng program, enrolment growth is accelerating and is especially strong among students from outside of Canada. Today, 712 graduate students are pursuing professional master's degrees at U of T Engineering, 75 per cent more than five years ago. International students now account for 27 per cent of professional master's students, compared with 8 per cent five years ago. We accomplished this growth in part by expanding educational options and programs designed especially for MEng students. More detail on these initiatives can be found in the "Graduate Studies Initiatives" section later in this chapter.

Figure 2.1a **International and Domestic Graduate Students by Degree Type, with Percentage of International Students, 2005–2006 to 2014–2015**



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, 2005–2006 to 2014–2015**

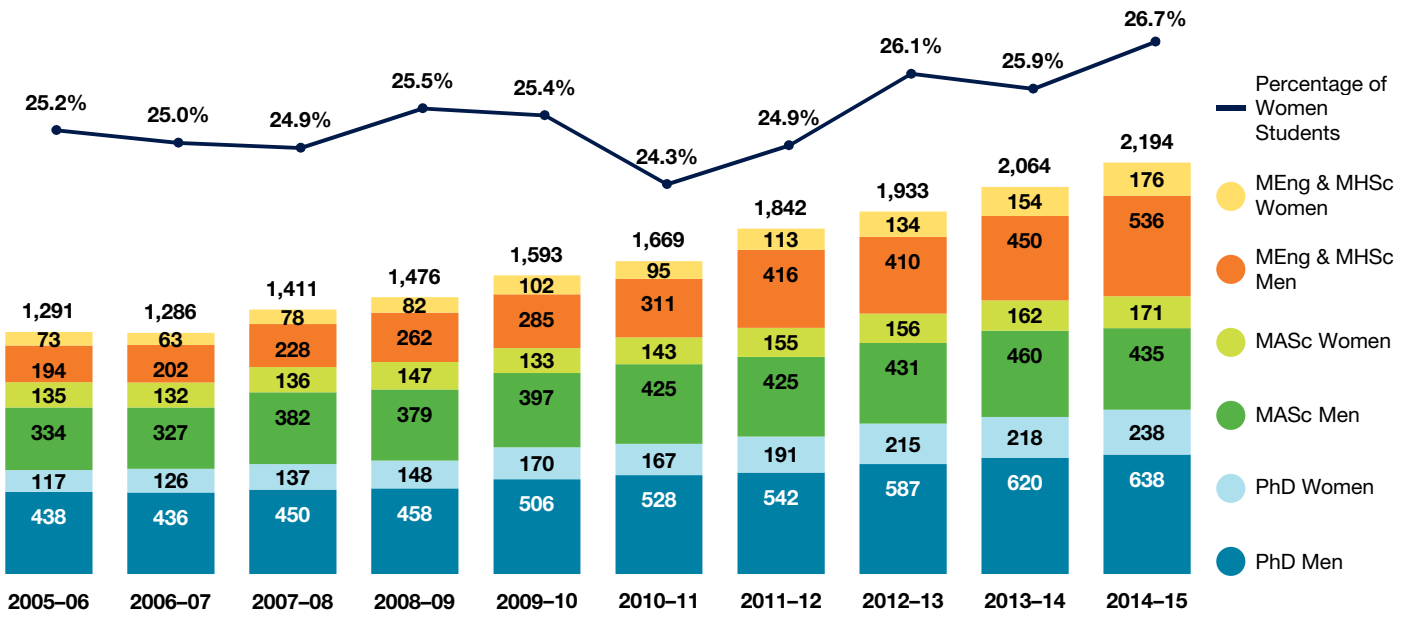


Figure 2.1c **Graduate Student Enrolment by Full-Time Equivalent (FTE) and Headcount (HC) by Academic Area, 2005–2006 to 2014–2015**

		UTIAS	IBBME	ChemE	CivE	ECE	MIE	MSE	Total
2005–2006	FTE	85.3	52.0	142.1	150.4	382.5	278.8	71.1	**1,162.2**
	HC	86	52	147	170	428	332	76	**1,291**
2006–2007	FTE	79.6	75.0	138.5	160.3	407.3	238.8	67.5	**1,167.0**
	HC	81	75	142	182	457	278	71	**1,286**
2007–2008	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**
2008–2009	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**
2009–2010	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**
2010–2011	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**
2011–2012	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**
2012–2013	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**
2013–2014	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**
2014–2015	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**

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.

As illustrated in Figure 2.1d, we are well positioned to meet our goal of increasing MEng and MHSc enrolment to 50 per cent of all full-time equivalent (FTE) master's students by 2015–2016 (see Academic Plan, Appendix: Action Plans & Metrics, Chapter 8: Resource Allocation, Item 12). Growth in these programs reflects a strategic realignment of resources to support the goals of our graduate students. Those interested in research are encouraged to move from the MASc program to the PhD program, increasing the impact of their work. At the same time, an expansion of the professional stream provides those interested in an industry career with opportunities to hone their competencies in preparation for technical and management leadership roles.

Figure 2.2a shows the current ratios of students to faculty members for our research stream (MASc and PhD), professional stream (MEng and MHSc) and undergraduates. A full accounting of professors and lecturers is available in Appendix H: Academic Staff by Academic Area.

The number of graduate students per faculty member is calculated by dividing the number of full-time equivalent (FTE) students by the number of tenure-stream professors. It does not include professors from outside U of T Engineering who contribute to and strengthen our programs.

Figure 2.1d **MEng and MHSc FTE Students as a Proportion of Total Master's FTE Students, 2005–2006 to 2014–2015**

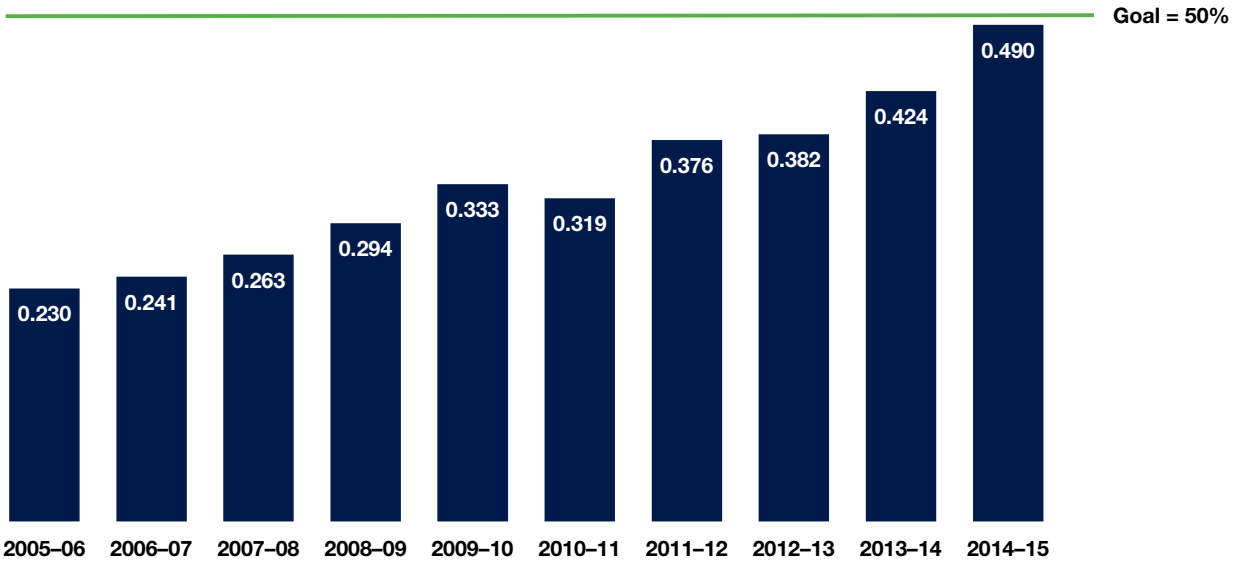
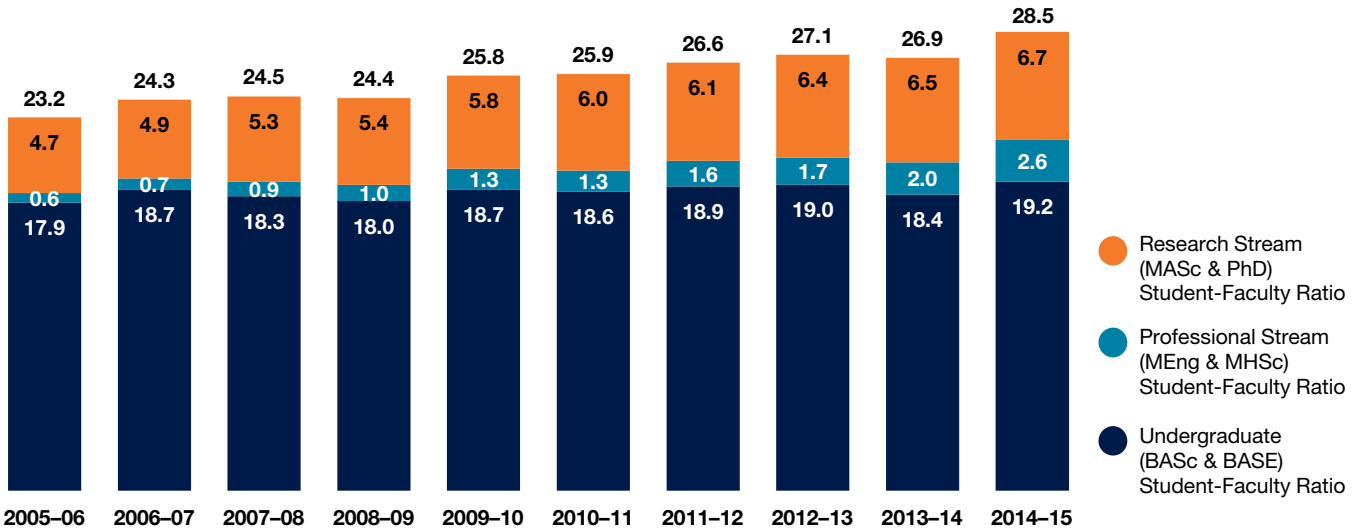


Figure 2.2a **Student-to-Faculty Ratios for FTE Undergraduate and Graduate Students, 2005–2006 to 2014–2015**



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

As illustrated in Figure 2.2b, we are making steady progress toward an undergraduate-to-graduate ratio of 1.5 to 1 by 2030 (see Academic Plan, Appendix: Action Plans & Metrics, Chapter 4: Educating Future Engineers, Item 18). This progress enhances the University of Toronto's position as an internationally significant research university. By growing our graduate student population, while continuing to raise our already exceptionally high standards for undergraduate admissions, we are allocating resources strategically to the focus areas of research and graduate students.

Figure 2.2b **Ratio of Undergraduate to Graduate FTE Students, 2005–2006 to 2014–2015**

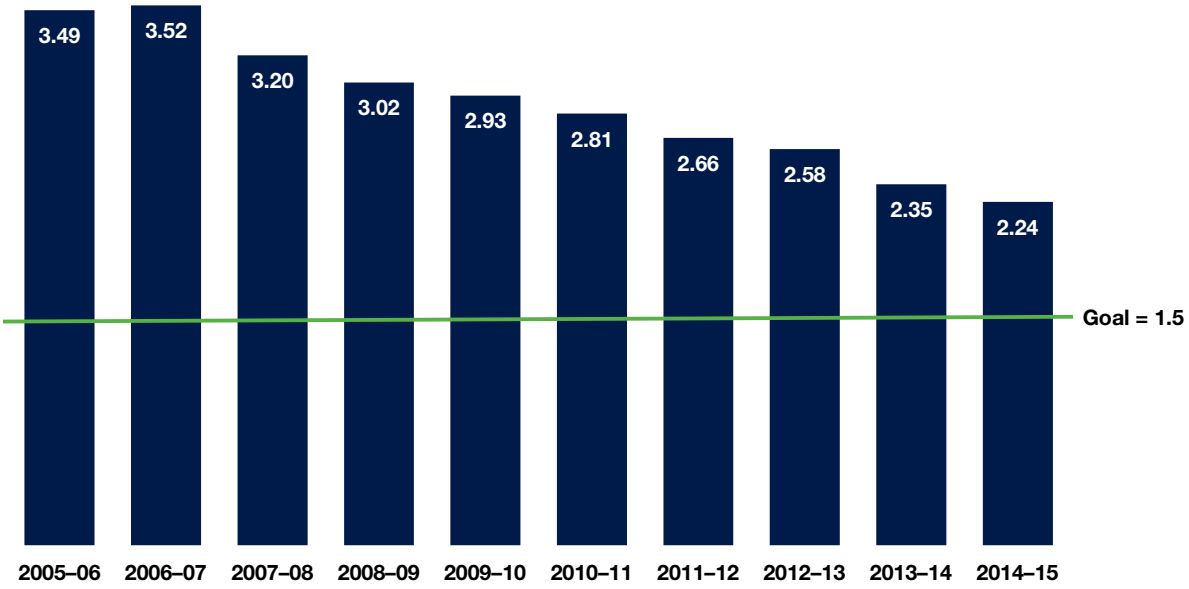
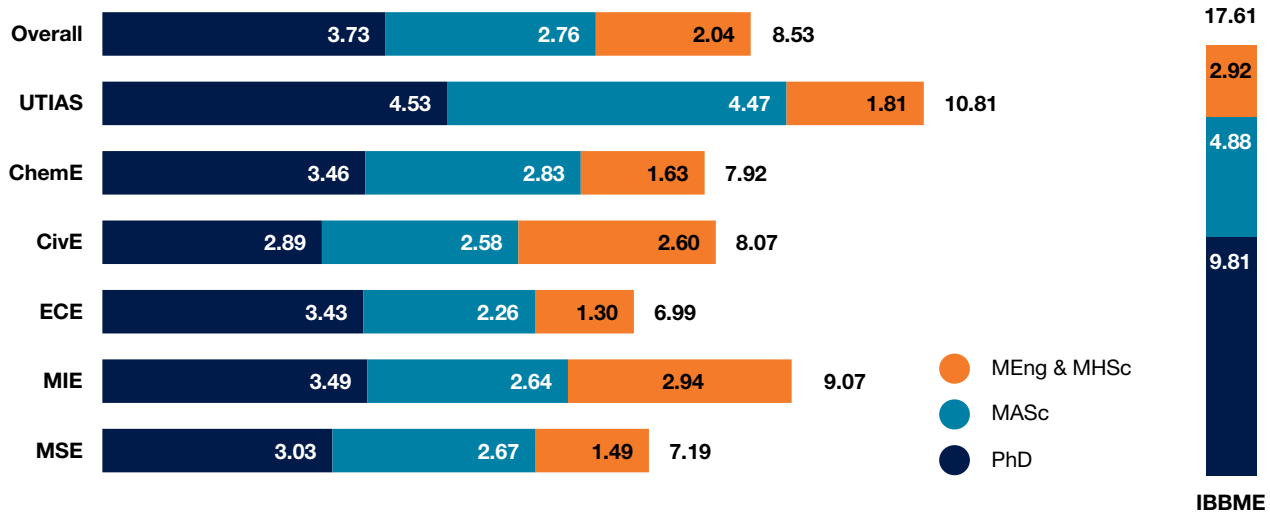


Figure 2.2c **FTE Graduate Student-to-Faculty Ratios by Academic Area and Degree Type, 2014–2015**



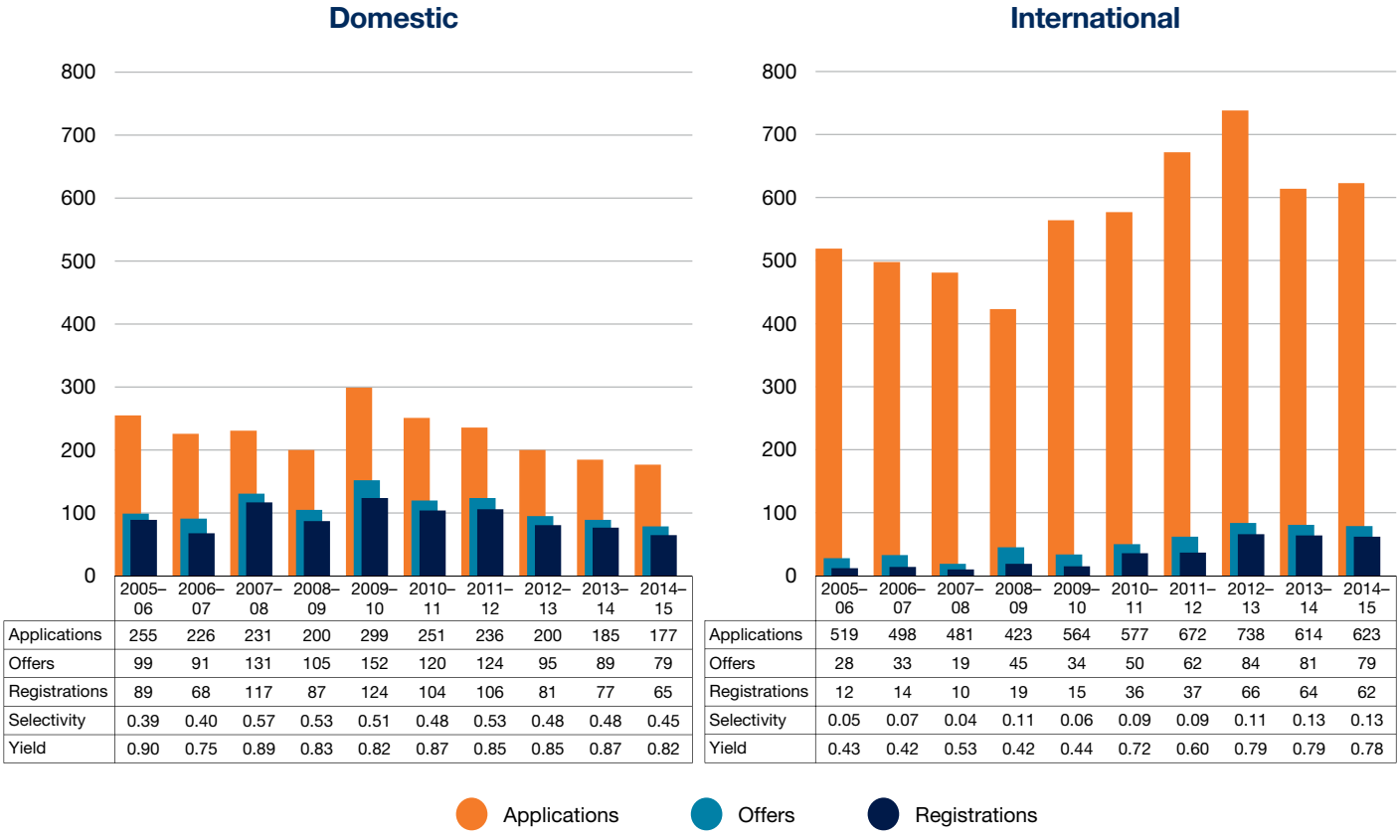
Note 2.2b: Students on Professional Experience Year (PEY) placements are not included in this count.
Note 2.2c: Data reported by academic year (September to August). Some students in IBBME are supervised by faculty members from Medicine, Dentistry and affiliated hospitals, as well as other departments within U of T Engineering. Because the ratio calculated here 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. Within the Faculty and for the purpose of this figure, in cases of inter-departmental supervision of PhDs and MAScs, students are assigned 100 per cent to their supervisors' departments.

Admissions and Recruitment

The trends highlighted in the previous section on enrolment can be explained by data for applications, offers of admission and registration.

Among domestic PhD students, applications have declined steadily over the past six years. Figure 2.3 illustrates the corresponding decreasing registration. By contrast, demand for PhD programs among international students remains strong. PhD students are critical to advancing our research mission and producing the high-impact work for which we have become known. We have admitted more international students in recent years; in 2014–2015, for the first time, the number of incoming PhD students from inside and outside of Canada was approximately equal. If this trend continues, the proportion of international students in the PhD program across all years will quickly grow above the current level of 32 per cent and could eventually exceed domestic enrolment, as is the case at most engineering schools in Canada.

Figure 2.3 **Domestic and International PhD Students: Applications, Offers, Registrations, Selectivity and Yield, 2005–2006 to 2014–2015**



Domestic	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Applications	255	226	231	200	299	251	236	200	185	177
Offers	99	91	131	105	152	120	124	95	89	79
Registrations	89	68	117	87	124	104	106	81	77	65
Selectivity	0.39	0.40	0.57	0.53	0.51	0.48	0.53	0.48	0.48	0.45
Yield	0.90	0.75	0.89	0.83	0.82	0.87	0.85	0.85	0.87	0.82

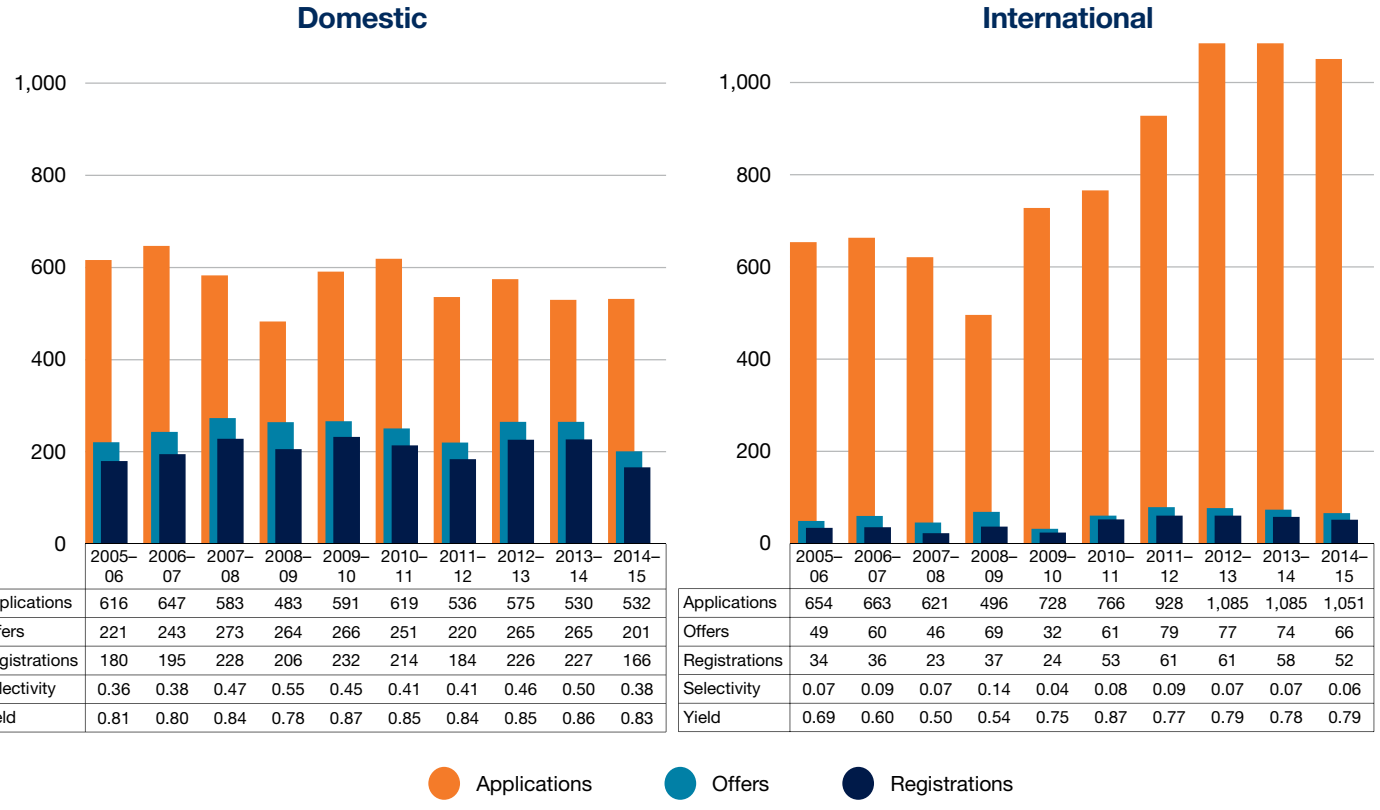
International	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Applications	519	498	481	423	564	577	672	738	614	623
Offers	28	33	19	45	34	50	62	84	81	79
Registrations	12	14	10	19	15	36	37	66	64	62
Selectivity	0.05	0.07	0.04	0.11	0.06	0.09	0.09	0.11	0.13	0.13
Yield	0.43	0.42	0.53	0.42	0.44	0.72	0.60	0.79	0.79	0.78

In response to this challenge, we significantly expanded our efforts to recruit highly qualified graduate students in 2014–2015. In February 2015, we launched a new Faculty-wide initiative called Graduate Research Days, inviting more than 120 candidates to U of T (expenses paid) from across Canada. The event provided opportunities for these candidates to meet with prospective supervisors and learn more about the innovative research carried out at U of T Engineering. It also included a social event on arrival and a Friday evening dinner at Hart House, providing a collegial atmosphere in which to interact with current students and learn more about life in the Faculty. The initiative built on the success of similar events held within individual departments in previous years.

For the second year, we partnered with a consortium of four other top Canadian engineering schools (McGill University, University of Alberta, University of British Columbia and University of Waterloo) to seek out the best candidates for our research-stream programs. We held engineering recruitment events in Montreal, Edmonton, Vancouver and Toronto. We also added Calgary as a new stop in 2014, tapping into the talent base of one of Canada's fastest growing cities. Locally, we included Ryerson University and McMaster University in the Toronto event. Additional promotion by these two schools to undergraduate students helped increase attendance.

Among MASc students, both domestic applications and international applications remain strong (Figure 2.4). International students made up one-quarter of the incoming MASc cohort. We continue to encourage MASc students to fast-track or transfer into the PhD program.

Figure 2.4 Domestic and International MASc Students: Applications, Offers, Registrations, Selectivity and Yield, 2005–2006 to 2014–2015



Domestic	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Applications	616	647	583	483	591	619	536	575	530	532
Offers	221	243	273	264	266	251	220	265	265	201
Registrations	180	195	228	206	232	214	184	226	227	166
Selectivity	0.36	0.38	0.47	0.55	0.45	0.41	0.41	0.46	0.50	0.38
Yield	0.81	0.80	0.84	0.78	0.87	0.85	0.84	0.85	0.86	0.83

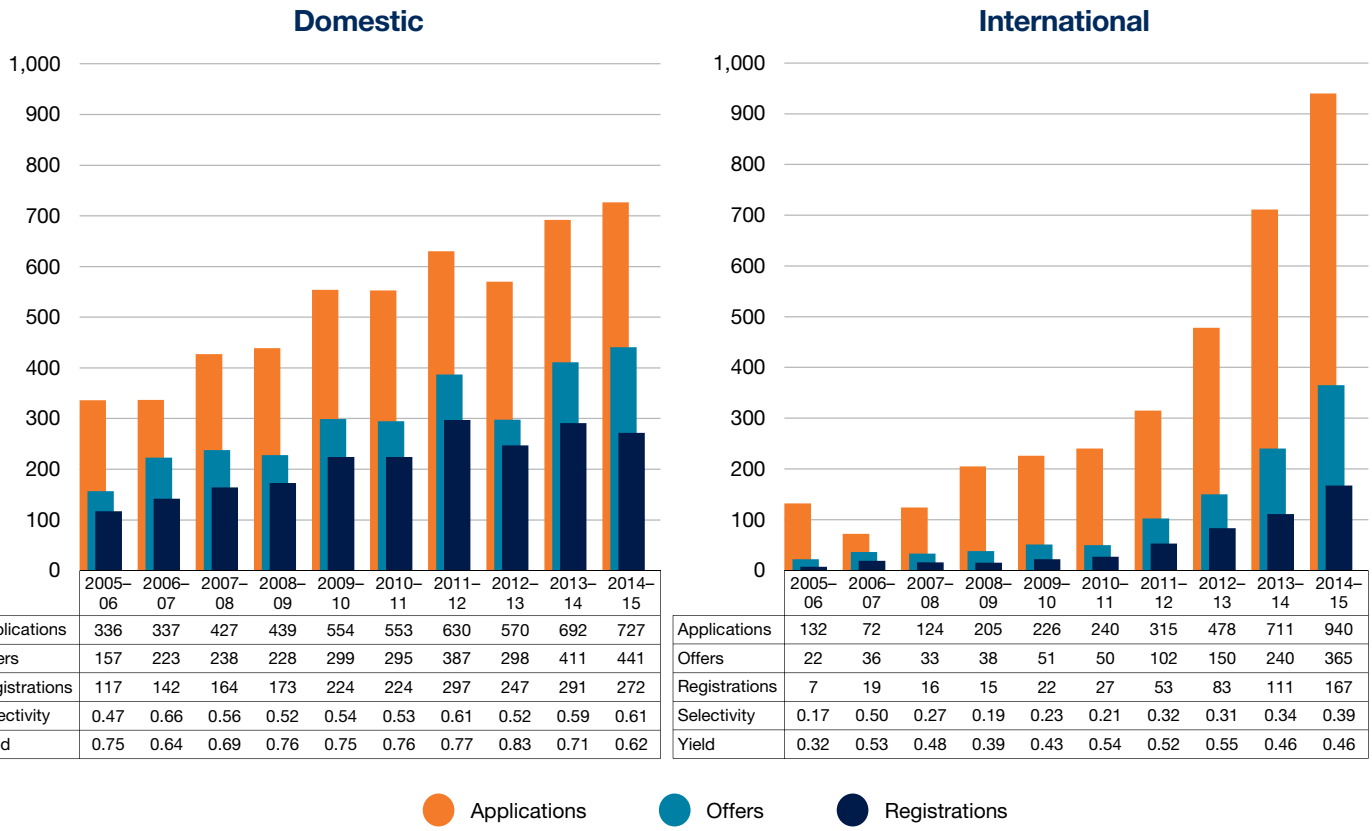
International	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Applications	654	663	621	496	728	766	928	1,085	1,085	1,051
Offers	49	60	46	69	32	61	79	77	74	66
Registrations	34	36	23	37	24	53	61	61	58	52
Selectivity	0.07	0.09	0.07	0.14	0.04	0.08	0.09	0.07	0.07	0.06
Yield	0.69	0.60	0.50	0.54	0.75	0.87	0.77	0.79	0.78	0.79

Our professional master's programs (MEng and MHSc) allow students to gain specialized technical knowledge in a particular field, while at the same time developing their leadership and project management competencies. Over the past decade, we have redesigned and enriched these programs, attracting many more students. Domestic registrations have more than doubled while international registrations — almost non-existent 10 years ago — now make up 38 per cent of new professional master's students (Figure 2.5).

The growth in this program is due in part to innovative programming and recruitment strategies. For example, the Graduate International Foundation Program (G-IFP) offers an alternative admissions path for international students whose English proficiency does not meet the Faculty's requirements. G-IFP students enrol in English classes and take APS 1012 – Management of Innovation in Engineering — part of the Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE) program — during the fall term. If successful, they move into the MEng program in the winter term. In fall 2014, we admitted 16 students through G-IFP, our largest cohort to date.

More detail on the Faculty's initiatives to welcome more professional master's students can be found in the "Graduate Studies Initiatives" section later in this chapter.

Figure 2.5 **Domestic and International MEng and MHSc Students: Applications, Offers, Registrations, Selectivity and Yield of Domestic, 2005–2006 to 2014–2015**



Domestic	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Applications	336	337	427	439	554	553	630	570	692	727
Offers	157	223	238	228	299	295	387	298	411	441
Registrations	117	142	164	173	224	224	297	247	291	272
Selectivity	0.47	0.66	0.56	0.52	0.54	0.53	0.61	0.52	0.59	0.61
Yield	0.75	0.64	0.69	0.76	0.75	0.76	0.77	0.83	0.71	0.62

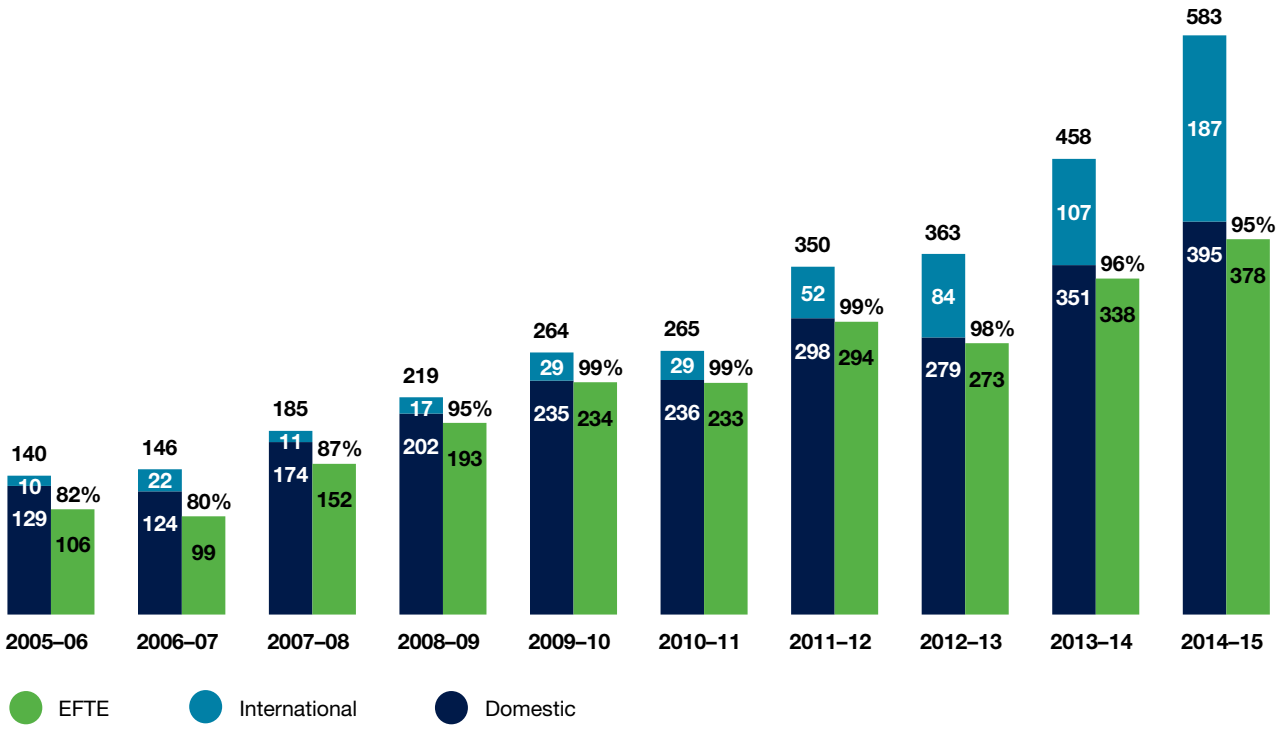
International	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Applications	132	72	124	205	226	240	315	478	711	940
Offers	22	36	33	38	51	50	102	150	240	365
Registrations	7	19	16	15	22	27	53	83	111	167
Selectivity	0.17	0.50	0.27	0.19	0.23	0.21	0.32	0.31	0.34	0.39
Yield	0.32	0.53	0.48	0.39	0.43	0.54	0.52	0.55	0.46	0.46

Funding

Ontario government funding guidelines define the number of years for which domestic students in each degree stream are grant-eligible. The following three figures show that virtually all domestic students in the professional master's stream (more than 95 per cent) and most research master's students (86 per cent) are grant-eligible. Roughly three-quarters of our domestic PhD students are within the government-defined period of funding eligibility. While it may not be reasonable to expect most PhD students to finish within the 3.5 or so years of government funding, we are actively encouraging PhD students and their supervisors to complete programs in a timely fashion.

International students are not eligible for grants from the provincial government. The following three figures show that international numbers are increasing for all streams. International MEng and MHSc students pay higher tuition, which covers the portion of costs subsidized by government for domestic students. However, MASc and PhD students receive funding packages from supervisors and departments that cover the cost of tuition and derive from a combination of research grant funding and department operating funds. The impact of international students on operating funds is much more significant than for domestic students.

Figure 2.6a **MEng and MHSc Students: International and Domestic Full-Time Equivalent (FTE) and Domestic Eligible Full-Time Equivalent (EFTE), 2005–2006 to 2014–2015**



Note 2.6a: A full-time student counts as 1.0 full-time equivalent, while a part-time student counts as 0.3 of a full-time equivalent.

Figure 2.6b **MASc Students: International and Domestic Full-Time Equivalent (FTE) and Domestic Eligible Full-Time Equivalent (EFTE), 2005–2006 to 2014–2015**

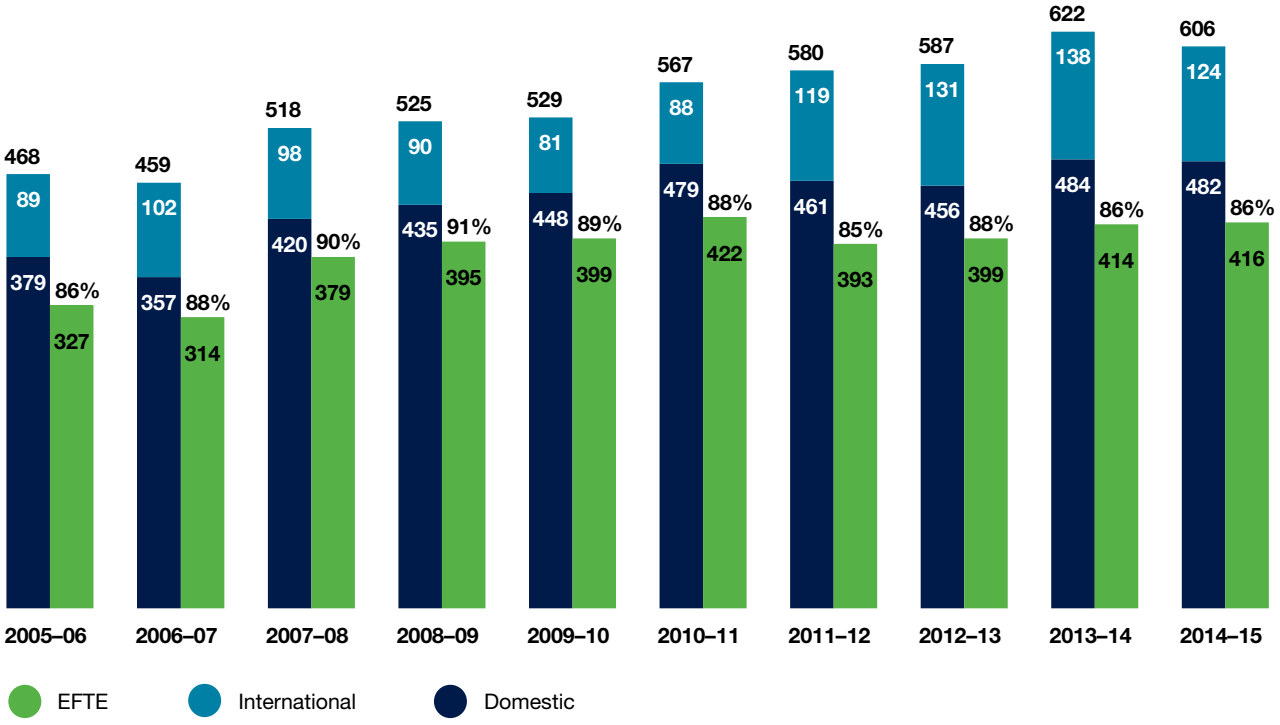
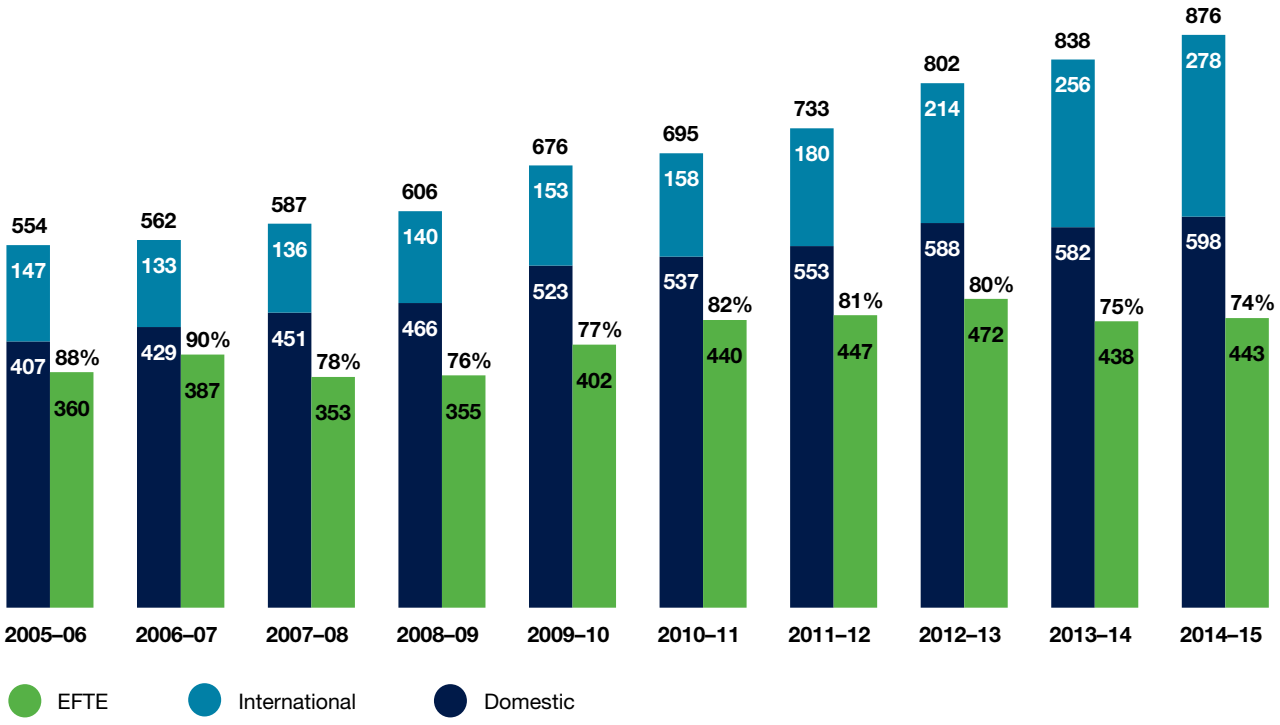


Figure 2.6c **PhD Students: International and Domestic Full-Time Equivalent (FTE) and Domestic Eligible Full-Time Equivalent (EFTE), 2005–2006 to 2014–2015**



The total funding for our graduate students from external scholarships is comparable to previous years.

Ontario Graduate Scholarship (OGS) funding decreased in 2013–2014 compared with 2012–2013. Prior to 2013, the provincial government adjudicated a province-wide competition for OGS awards. Historically, our graduate students competed for, and received, a higher proportion of these awards. In 2013, the provincial government changed to a system of assigning a block of OGS scholarships to each university based on enrolment. The University of Toronto School of Graduate Studies (SGS) in turn allocates a block to our Faculty. Since our students no longer compete with students from other universities for these awards, the total amount declined from previous years.

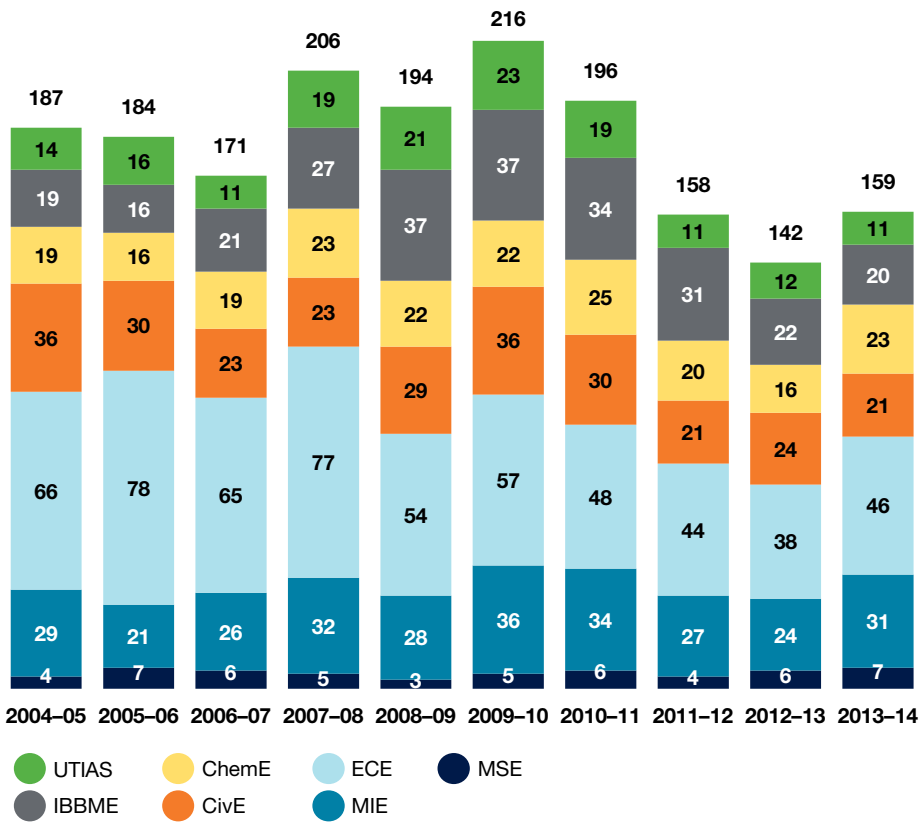
Our graduate students attracted 8 per cent more funding in NSERC scholarships compared with 2012–2013. The peak in NSERC scholarships that occurred from 2009–2010 to 2010–2011 was due to increased funding allocated to those programs as part of the federal government's economic stimulus package. This stimulus funding was a short-term initiative and the current funding level is consistent with our historical trend. It is also worth noting that master's-level NSERC scholarships are now allocated to universities in the same way as the OGS, which means our students no longer compete against students from other universities for these awards.

The large increase in the "other" external scholarship category is due to significant growth in the number of Canadian Institutes of Health Research and Ontario Trillium Scholarships our students hold.

Figure 2.7a **Total External Graduate Student Scholarships by Source, 2004–2005 to 2013–2014**

	NSERC	OGS	External-Other	Total
2004–2005	$3,221,367	$1,161,671	$77,334	$4,460,372
2005–2006	$3,400,236	$1,106,665	$23,500	$4,530,401
2006–2007	$3,228,150	$1,088,332	$31,100	$4,347,582
2007–2008	$3,827,494	$930,000	$68,167	$4,825,661
2008–2009	$3,737,157	$868,332	$111,770	$4,717,259
2009–2010	$4,255,856	$838,334	$226,563	$5,320,753
2010–2011	$4,267,783	$1,050,011	$213,519	$5,531,313
2011–2012	$3,711,717	$1,511,661	$259,363	$5,482,741
2012–2013	$3,342,616	$1,574,999	$295,023	$5,212,638
2013–2014	$3,620,505	$1,191,664	$595,265	$5,407,434

Figure 2.7b **Number of NSERC Graduate Student Award Recipients by Academic Area, 2004–2005 to 2013–2014**



Note 2.7a: NSERC = Natural Sciences and Engineering Research Council. OGS = Ontario Graduate Scholarship. External–Other includes awards from the Canadian Institutes of Health Research and the Social Sciences and Humanities Research Council, as well as foundations and industry sources. Data reported by academic year (September to August).
Note 2.7b: Data reported by academic year (September to August).

Our graduate students attracted more funding than ever in 2013–2014 (the most recent year for which funding data is available), reaching a record total of $42.8 million. The amount of funding received through Faculty and department funds increased by nearly $2 million from the previous year. Figure 2.8b shows how this funding is distributed across academic areas.

Figure 2.8a **Graduate Student Funding by Category, 2004–2005 to 2013–2014**

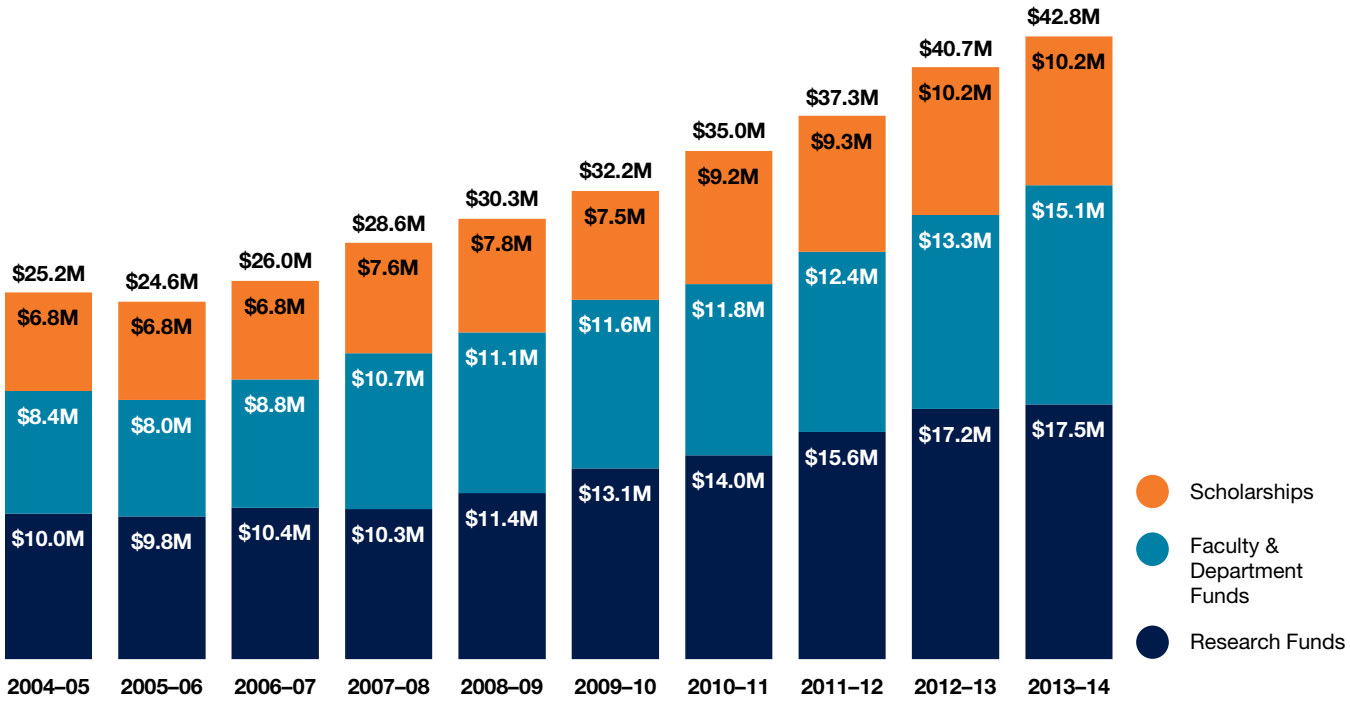
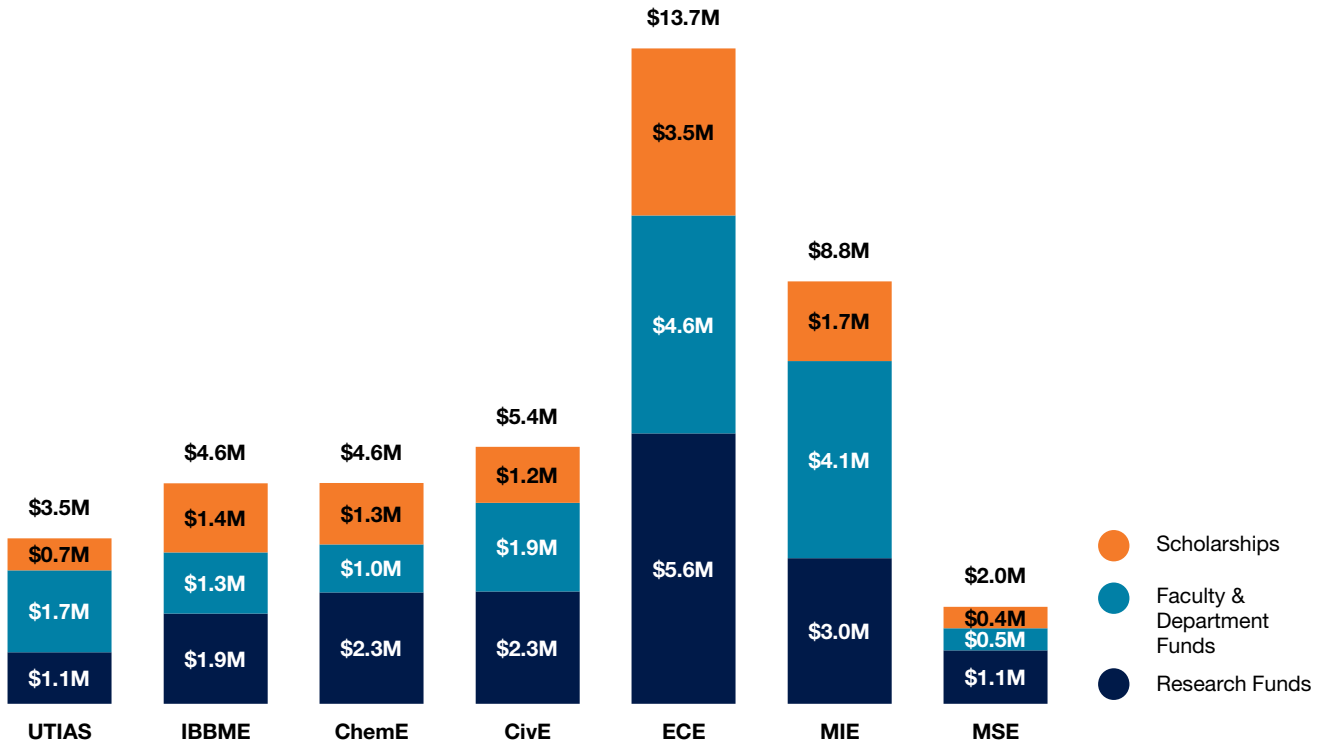


Figure 2.8b **Graduate Student Funding by Category and Academic Area, 2013–2014**



Note 2.8a: Scholarships reported in 2.8a include a number of internal scholarships, while those reported in 2.7a are external scholarships only.

Graduate Studies Completion

The number of students who fast-tracked from the MASc to the PhD (Figure 2.9), and the duration of graduate degrees (Figure 2.10) were on par with previous years. Figure 2.11 indicates that we are graduating record numbers of MEng, MASc and PhD students, which reflects the growing enrolment of the past few years.

Figure 2.9 Number of Students Fast-Tracked from MASc to PhD by Academic Area, 2006–2007 to 2013–2014

Fast-tracked during	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Most began PhD in	**Fall 2007**	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**	**Fall 2014**
UTIAS	1	2	8	6	5	3	4	6
IBBME	2	8	9	8	7	5	8	6
ChemE	7	4	9	8	5	8	8	12
CivE	5	4	4	3	4	5	0	3
ECE	2	2	1	1	6	3	2	4
MIE	3	8	9	4	6	8	4	4
MSE	2	2	4	2	2	6	1	3
Total	**22**	**30**	**44**	**32**	**35**	**38**	**27**	**38**

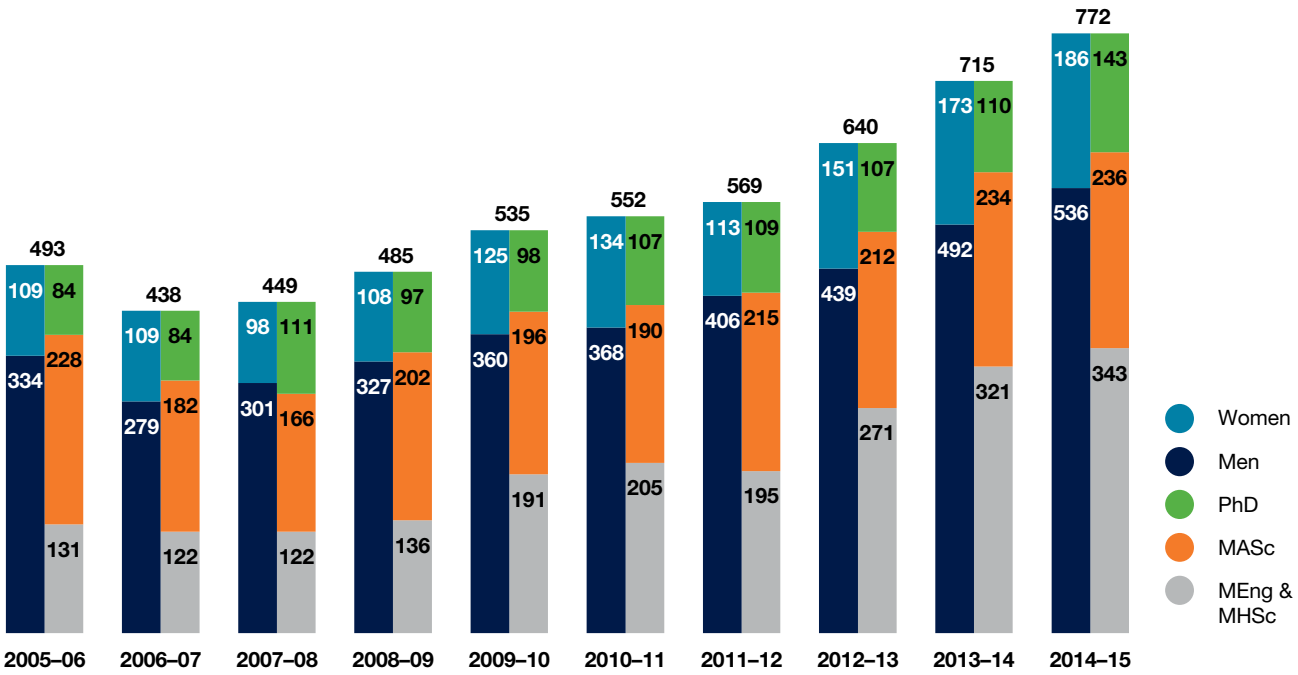
Figure 2.10 Time to Graduation for PhD, MASc, MEng and MHSc Students, 2005–2006 to 2014–2015

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
PhD	4.3	5.0	4.7	4.7	4.7	5.3	5.0	5.3	5.2	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)	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.0	1.0
MEng & MHSc (PT)	2.3	2.0	2.0	2.3	2.3	2.3	2.0	2.0	2.0	2.0

For more details on time-to-completion, see Appendix C: Time to Completion for Graduate Studies.

Note 2.9: Data reported by academic year (September to August).

Figure 2.11 **Graduate Degrees Awarded by Degree Type and Gender, 2005–2006 to 2014–2015**



Graduate Studies Initiatives

Collaborative Program in Engineering Education

In September 2014, we launched Canada's first collaborative program in Engineering Education, in partnership with the Ontario Institute for Studies in Education (OISE). Graduates of the program will develop innovative approaches to teaching and learning to train the next generation of engineers. The program is open to graduate students in both engineering and education and its first cohort consists of six graduate students. Vivek Goel, U of T's vice-president of research and innovation, presented a talk on Massive Open Online Courses at the well-attended launch event for the EngEd.

We also created two graduate-level courses in engineering education in 2014–2015. APS 1204 – Instructional Design uses a design perspective to examine the creation of new courses and curricula. APS1205/1206 – Engineering Education Research Seminars attracts interest well beyond graduate students, with 10 to 20 people attending weekly, including both teaching and research-stream faculty.

Expanding MEng Offerings

Over the past five years, our Faculty has invigorated the MEng program, in line with the Academic Plan (see Academic Plan, Chapter 4, Goal 11). Many departments have developed and launched new graduate courses specifically with MEng students in mind. These courses focus on applied topics and are often taught by industry experts. Currently, we offer approximately 15 of these courses to MEng students.

In fall 2015, we added two new areas of emphasis to the MEng program. The Sustainable Energy emphasis draws on expertise in the Institute for Sustainable Energy, while the Advanced Manufacturing emphasis leverages the resources of the new Toronto Institute of Advanced Manufacturing. In total, seven areas of emphasis are now offered to students in multiple departments and a further four areas of emphasis are offered to students in only one department. By far the most popular specialization to date is Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE), with the number of certificates awarded nearly doubling since 2011–2012 (Figure 2.12).

The Master of Engineering in Cities Engineering and Management (MEng CEM) provides graduates with a fundamental understanding of the complex and cross-disciplinary issues facing cities. In addition to 12 months of courses, MEng CEM students complete a four-month internship with a municipal, university or corporate partner. Eight students registered in this program in 2013–2014, its first year, and in 2014–2015 enrolment increased to 16.

The Biomedical Engineering MEng, set to launch in fall 2016, will focus on medical device design. It leverages the expertise available through IBBME and will include a four-month internship. The goal is to accept 10 students in the first year and increase enrolment by a further 10 students each year, reaching 50 students per year by 2020.

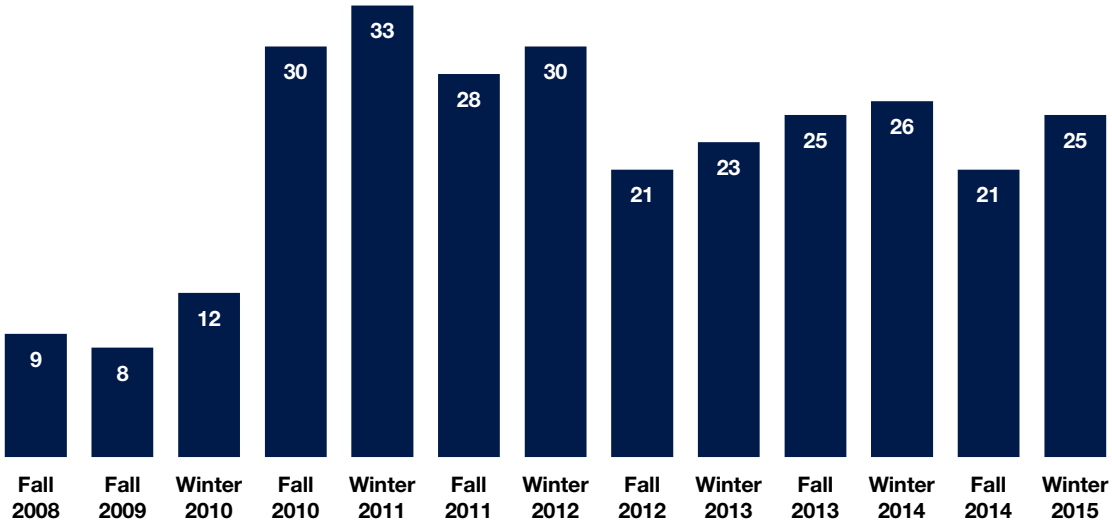
Due to the increasing numbers of MEng students, many departments now hold MEng-only orientation events and designate faculty to serve as MEng student advisors. Graduate student associations, historically led by MASc and PhD students, are actively reaching out to involve MEng students in social and professional development activities. These activities enhance opportunities for MEng students to engage fully with the Faculty.

A partnership between our Faculty and Magna International provides Magna employees with a specialized MEng curriculum, including a major technical project. The MEng program for the Stronach Centre for Innovation (MEng, SCFI) began in 2008 and continues to show strong demand.

Figure 2.12 **ELITE Certificates Awarded, 2008–2009 to 2014–2015**

	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
AeroE		1	1		7	2	4
ChemE		1	14	12	17	8	20
CivE	2	7	13	19	16	12	12
ECE	1	3	4	3	22	32	22
MIE		7	17	19	26	36	39
MSE			1	2	4	6	11
Total	**3**	**19**	**50**	**55**	**92**	**96**	**108**

Figure 2.13 **MEng, SCFI Program Enrolment, Fall 2008 to Winter 2015**



Selected Graduate Student Highlights

Four U of T Engineering students awarded Vanier Canada Graduate Scholarships

In August 2014, four U of T Engineering students received prestigious Vanier Canada Graduate Scholarships from the Government of Canada to enable pioneering research. Recipients were:

- PhD candidate Miles Montgomery (BioMedE) for his work in heart disease and regenerative medicine;
- PhD candidate Cameron Ritchie (CivE) for developing novel structural designs;
- PhD candidate Shrey Sindhwani (BioMedE) for breakthroughs in nanotechnology and cancer detection; and
- PhD candidate Lorraine Sugar (CivE) for her contributions to city-based climate action.

Each Vanier scholarship provides $50,000 per year for three years.

3D skin printer wins engineering students Canada Dyson Award

In September 2014, Arianna McAllister (BioMedE MASc 1T4) and Lian Leng (MechE MASc 1T0, PhD 1T5) were named the Canadian winners of the 2014 James Dyson Award for their invention, the PrintAlive Bioprinter. The device is designed to print 3D sheets of skin tissue to provide burn victims with skin grafts. The finished skin is printed into patterns of spots or stripes, using far fewer cells than a continuous sheet would require. The skin is grown from a patient's own stem cells, eliminating the chance of graft rejection. In addition to the James Dyson Award, Leng received a Heffernan Commercialization Fellowship from U of T Engineering to turn the product into a viable company.

"Sperm Olympics" could help couples become pregnant faster

QSperm is a system that runs sperm through a tiny obstacle course, selecting the highest quality cells to increase the chances of fertilization. It is based on research into microfluidics carried out in the laboratory of David Sinton (MIE) by PhD student Reza Nosrati (MechE) and alumna Lise Eamer (MechE 0T8 MASc 1T3). The primary market for the technology is couples who are experiencing infertility, but the system has also been tested using animal sperm and there is potential to use it for artificial insemination, a major industry in Canada. In May 2014, QSperm reached the finals in OneStart, an international competition that provides mentorship and business training to health sciences startups. The team also received support from the University of Toronto Innovations & Partnerships Office and MaRS Innovation.

3

Our researchers continue to do outstanding work that pushes boundaries in and beyond their fields, from bioengineering and sustainable energy to advanced communications. As a result, our Faculty attracted a record amount of research funding in 2013–2014. We also engaged a wider range of sponsors than ever before, including major support from the Canadian Institutes of Health Research (CIHR), industry associations and corporate partners.

Part of our success in securing research funding is due to our interdisciplinary research institutes, which contain unique facilities and expertise. In summer 2014, we launched the Ontario Centre for Characterization of Advanced Materials (OCCAM). This $20-million facility is significantly advancing a number of fields, such as electronics, telecommunications, high-performance vehicles and solar fuels. The Centre for Healthcare Engineering (CHE), which designs more efficient and cost-effective systems for health-care delivery, was also reinvigorated under the leadership of its new director, Professor Timothy Chan (MIE). Driving economic innovation through industrial partnerships is another key focus of our Faculty. The Toronto Institute of Advanced Manufacturing (TIAM), which was established in 2014, provides innovation and leadership in advanced manufacturing through research and development, training and education in Ontario, Canada and worldwide.

We also attracted many corporate partners, including those leveraged through the Natural Sciences and Engineering Research Council's (NSERC) Strategic Partnership Grants. These grants seek to increase research and training in targeted areas that could significantly enhance Canada's economy, society or environment in the next 10 years. In all, U of T Engineering collaborates with more than 300 partners in a range of sectors, such as telecommunications, mining, automotive, health care, information technology and power generation.

The commercialization of new discoveries not only provides economic benefits, but also enables the next generation of innovators, entrepreneurs and leaders to gain practical experience in translating ideas into the marketplace. Grants from NSERC's Collaborative Research and Training Experience (CREATE) program enhance our capacity to develop highly qualified students and post-doctoral fellows through innovative programs that encourage collaborative and integrative approaches to research and enable students and fellows to transition into the workforce. In 2014–2015, U of T Engineering was in the lead role on nine CREATE grants, including two new grants awarded in that year. This record of success is further evidence of our engineering leadership, both at home and around the world.

Selected Research Highlights

Decoding the Genetic Roots of Disease

Professor Brendan Frey (ECE) and his colleagues have developed a new way to identify genetic mutations that cause cancer, autism and other diseases. They achieved this innovation by focusing on the 98 per cent of our DNA that is non-coding — that is, it does not correspond to a specific gene or protein. Often overlooked, it affects both how and when genes are expressed. The team used innovative deep learning algorithms to analyze DNA sequences from hundreds of people, including those with and without genetic diseases. With these DNA sequences as training data, the algorithm learned to identify which mutations most commonly occur in people with a given condition. It then went one step further and ranked each mutation according to how likely it is to interfere with the expression of a known gene and affect human health. As reported in a paper Frey and his team published in *Science*, the system correctly predicted 94 per cent of known disease-causing mutations and identified several more that could be involved in autism or other disorders.

Medicine by Design Set to Transform Regenerative Medicine

U of T Engineering professors Molly Shoichet (IBBME, ChemE) and Peter Zandstra (IBBME) are among 50 researchers and clinicians from the University of Toronto and its partner hospitals who will be part of Medicine by Design, a groundbreaking initiative that will cement the University's position as one of the world's leading centres for the design and manufacture of cells, tissues and organs that can be used to treat degenerative disease. Funded by a $114-million grant from the Canada First Research Excellence Fund, Medicine by Design will undertake transformative research and clinical translation in regenerative medicine, enhance capability in synthetic biology and computational biology, and foster translation, commercialization and clinical impacts. The initiative, which builds on U of T's impressive record in regenerative medicine, is expected to generate new startups and attract international companies that will be eager to take advantage of U of T's expertise.

Preparing 150 Drone Experts for Environmental Monitoring and Agriculture

In May 2015, Professor Hugh Liu (UTIAS) received a $1.65-million CREATE grant from NSERC to train 150 new experts in the use of unmanned aerial vehicles (UAVs) for a variety of purposes, from agriculture to environmental monitoring. Liu's team, the Flight Systems and Control (FSC) Research Laboratory, develops algorithms that can help UAVs respond intelligently to a variety of inputs. For example, in a recent project with the Ontario Ministry of Natural Resources, the researchers fitted UAVs with thermal cameras that are sensitive to infrared light given off by hot objects. Algorithms designed by Liu and his team allowed these UAVs to find and trace the outlines of forest fires, helping to track the extent and spread of forest fires much more accurately than is currently possible. The CREATE grant will build on this work and allow Liu and his collaborators to design UAVs for many other possible applications, including scouting for mineral deposits or other natural resources, monitoring pipelines or railways for damage, checking on crops and applying fertilizers.

Engineering a New Kind of Rock Music

By carefully listening to the sounds of rocks under pressure, a group of U of T engineers is gaining insight that could more accurately predict earthquakes. PhD students Farzine Nasseri (CivE) and Hamed Ghaffari (CivE), along with their supervisor, Professor Paul Young (CivE), used an electronic vise to subject rock samples to stress. They then recorded the pattern of snaps and pops created by microscopic cracks in the rock structure. Unlike previous research that squeezed rocks in one direction only, the team's apparatus can apply different amounts of force along three separate axes. This 3D technique, known as polyaxial loading, more realistically simulates what happens to rocks in seismically active areas. The engineers developed a computer algorithm that matches the pattern of sounds to the type of stress induced. If applied to field recordings of the sounds made by rocks in seismically active areas, the algorithm could provide key information about how those rocks are being stressed. This information, in turn, could make it easier to detect early signs of seismic events such as earthquakes. It could also help prospectors learn more about the structure of rock layers, enabling them to locate deposits of fossil fuels and other natural resources. The research was published in the journal *Scientific Reports*.

OCCAM Advances Electronics, Next-Generation Materials and Renewable Fuels

On July 17, 2014, Professors Charles Mims (ChemE) and Doug Perovic (MSE), along with three-time Indy 500 winner Hélio Castroneves, opened the Ontario Centre for Characterization of Advanced Materials (OCCAM). The $20-million facility, funded by the Canada Foundation for Innovation, the Ontario government and Hitachi High-Technologies Canada, contains unique facilities, infrastructure and equipment to study and manipulate materials at the nano scale. A partnership with Integran Technologies will further improve the company's flagship technology for coating nano-engineered layers of metal on plastic, carbon fibre and virtually any other material. These coatings increase the strength of the material

without significantly adding to its weight, which is ideal for applications such as Castroneves' high-performance racing vehicles. Researchers at the Centre will also pursue materials that can mimic photosynthesis, making fuels from sunlight and atmospheric carbon dioxide. Other projects carried out in partnership with industry include non-stick materials that will prevent blood clots on medical implants and nano-patterned electronics that will improve computer-processing power.

New Research Network Helps Seniors AGE-WELL

Professor Alex Mihailidis (IBBME) has been appointed the joint scientific director of Canada's first national research network in technology and aging. AGE-WELL (Aging Gracefully across Environments using Technology to Support Wellness, Engagement and Long Life) is a new $36.6-million Network of Centre of Excellence. Its goal is to develop practical and affordable technologies that will help Canada's rapidly aging population live healthier, more productive lives. Research conducted by Mihailidis and his team focuses on outfitting homes with intelligent sensor systems that can detect emergencies, such as falls, and call for help. The team also designs personal assistive robots that can offer step-by-step prompting for adults with Alzheimer's disease and other forms of dementia. These technologies have the potential to help seniors remain independent longer and increase their quality of life. AGE-WELL brings together researchers from 26 universities and more than 70 industry and not-for-profit organizations and is co-directed by Andrew Sixsmith, professor of gerontology at Simon Fraser University.

$1 Million for Drones, Isotopes and More

In January 2015, six U of T Engineering professors received a total of more than $1 million from the Canada Foundation for Innovation's (CFI) John R. Evans Leaders Fund to purchase cutting-edge equipment and pursue innovative research in their fields. Professor Angela Schoellig (UTIAS) will use her grant to purchase a swarm of flying robotic drones that can scan for environmental hazards such as toxic algae blooms. The funding will also be used to equip labs to create new telecommunications devices (Professor Joyce Poon, ECE) and to use chemical isotopes to track emerging environmental contaminants, such as pharmaceutical products in wastewater (Professor Elodie Passeport, CivE, ChemE). The Faculty's three other recipients were Professors Gisele Azimi (ChemE, MSE), Eric Diller (MIE) and Amy Bilton (MIE).

Four New Canada Research Chairs Awarded

In 2014–2015, U of T Engineering gained four new Canada Research Chairs (CRCs), bringing the total to 27 across the Faculty. The Honourable Ed Holder, Canada's Minister of State for Science and Technology, came to U of T to make the initial announcement. Professor Goldie Nejat (MIE) became the new CRC in Robots for Society and will focus on designing robot prototypes to assist elderly people with dementia. Professor Aimy Bazylak (MIE) received the CRC in Thermofluidics for Clean Energy and will develop polymer electrolyte membrane fuel cells for electric vehicles or for supplying power in remote regions. Professor Elizabeth Edwards (ChemE), director of BioZone, received the CRC in Anaerobic Biotechnology. In April 2015, Professor Timothy Chan (MIE) became the new holder of the CRC in Novel Optimization and Analytics in Health. CRCs are funded by NSERC and consist of five-year (Tier 2) or seven-year (Tier 1) grants designed to attract and retain some of the world's most accomplished and promising researchers.

Advancing Treatments for Dental Disease and Cancer

Two teams involving U of T engineers received Collaborative Health Research Projects (CHRP) grants to work on medical applications ranging from gum disease to cancer. The first grant, involving Professor Eli Sone (IBBME, MSE), provides $550,000 to create a collagen-based material that can seal gaps between teeth and gums. Carried out in collaboration with researchers from the Faculty of Dentistry, the project aims to improve the treatment of periodontal gum disease. If the project is successful, researchers will partner with Octane Biotech Inc. to carry out commercialization. The other project, involving Professor Warren Chan (IBBME) and in partnership with BioVectra Inc., received $900,000 to develop a nanoparticle-drug combination to combat the growth of cancer cells. Both grants are jointly delivered by NSERC and CIHR, reflecting the increasingly diverse funding we receive. They also speak to the Faculty's leading expertise in bioengineering, one of our key research focus areas. From 2009 to 2013, IBBME core faculty members received thirteen CHRP grants totalling more than $4 million.

Sponging Up Oil Spills

Ali Rizvi (MIE PhD 1T4) has invented a sponge that can absorb 24 times its own weight in oil but does not absorb water. Today, commercially available sponges made of polypropylene can absorb only up to 9.2 grams of oil per gram of material. The new sponge is also made primarily of polypropylene, but it undergoes a blending process, during which it is reinforced with long fibres of polytetrafluoroethylene (PTFE). These fibres create a more open, porous structure that absorbs more oil, while at the same time increases hydrophobicity, excluding water. Later, the oil can be removed by simple mechanical compression. The sponge can be easily manufactured using commercially available equipment. Rizvi, who pursued the research during a PhD under the supervision of Professor Chul Park (MIE), was recognized as one of the "Top 30 under 30," by the Society of Manufacturing Engineering.

Research Funding and Partnerships

In 2013–2014, U of T Engineering attracted $81.6 million in research funding, the highest annual total in our history and a 21 per cent increase from the previous year. The steady growth in research operating funds over the last decade speaks to our increasing fundraising efforts, along with the excellence of our investigators and the innovative work we are doing.

The increase in research infrastructure funding in 2013–2014 is due in part to significant investments by CFI in new facilities that enable our leading-edge research. OCCAM, which was outlined in the previous section, is just one example. In 2014–2015, grants from CFI's John R. Evans Leaders Fund alone provided more than $1 million for six key projects. These projects will accelerate research in diverse areas such as environmental chemistry, digital communications and micro-robotics.

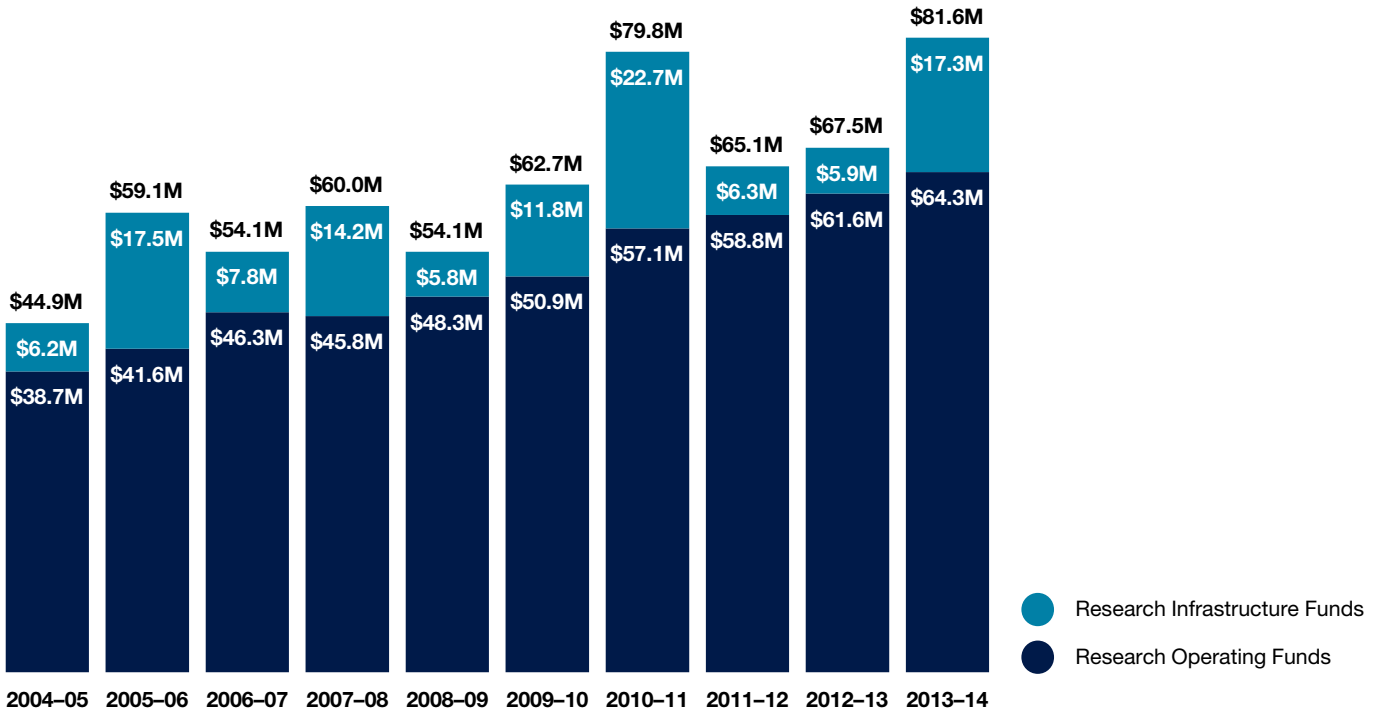
The Faculty achieved a record $27.4 million in Tri-Council (NSERC, CIHR and SSHRC) funding in 2013–2014 (Figure 3.1b). This puts us well on our way to achieving our new Tri-Council funding goal of $32 million by 2015–2016. We set this new goal after reaching our previous goal of $25 million in 2012–2013, three years earlier than anticipated.

We also attracted $1.7 million in funding from the Networks of Centres of Excellence (NCE). Figure 3.3a illustrates further how the total of Tri-Council and NCE funding shown here is pivotal to increasing our complement of CRCs.

While the majority of our Tri-Council funding continues to come from NSERC, the amount of money our researchers receive from CIHR has tripled in the past decade to $3.1 million, from $1 million in 2004–2005. CIHR funding now represents more than 10 per cent of the total compared with just 6 per cent 10 years ago. This trend is in line with our Academic Plan and reflects our continued excellence in fields such as biomedical engineering and health-systems research.

This focus on health research is embodied in the Centre for Healthcare Engineering (CHE), which was reinvigorated in 2014–2015 with the appointment of a new director, Professor Timothy Chan (MIE). Researchers at CHE use systems engineering to optimize the delivery of health care, from deploying ambulances and automatic defibrillators to scheduling surgeries. This work helps increase the benefit-to-cost ratio in health care. Health-care costs account for more than 40 per cent of the annual budgets of some Canadian provinces.

Figure 3.1a **Breakdown of Research Infrastructure Funding vs. Research Operating Funding, 2004–2005 to 2013–2014**



Note: The figures in this chapter report research funding the Faculty received in 2013–2014. 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 reliable data is available.

Figure 3.1b **Tri-Council and NCE Support: CIHR, NSERC and NCE Funding, 2004–2005 to 2013–2014**

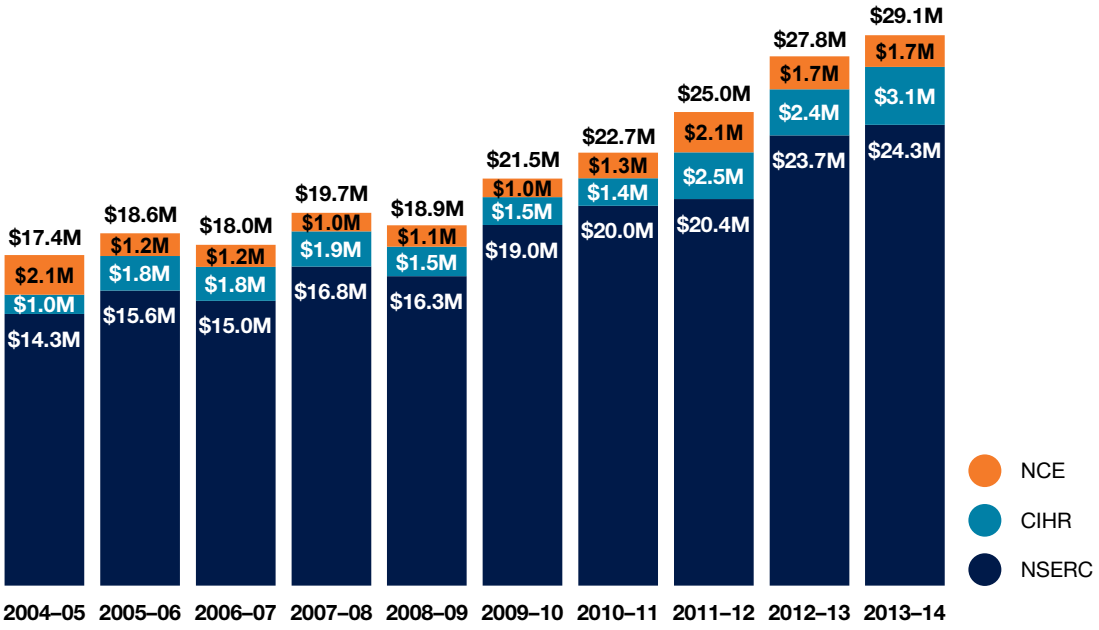
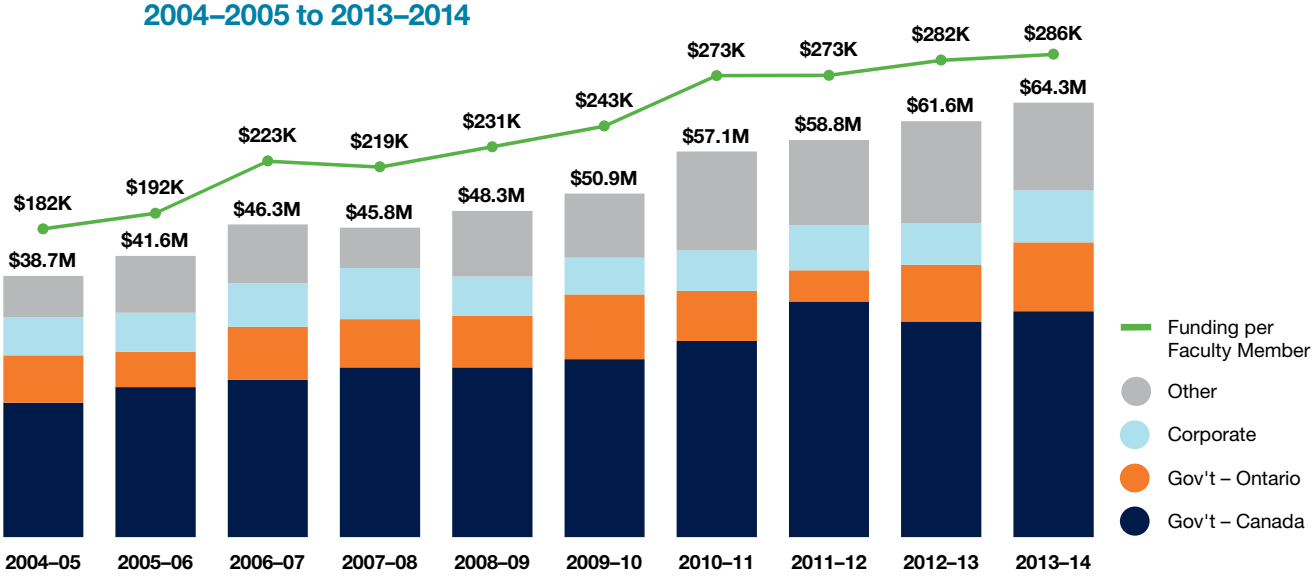


Figure 3.1c **Research Operating Funding by Year, Source and Funding per Faculty Member, 2004–2005 to 2013–2014**



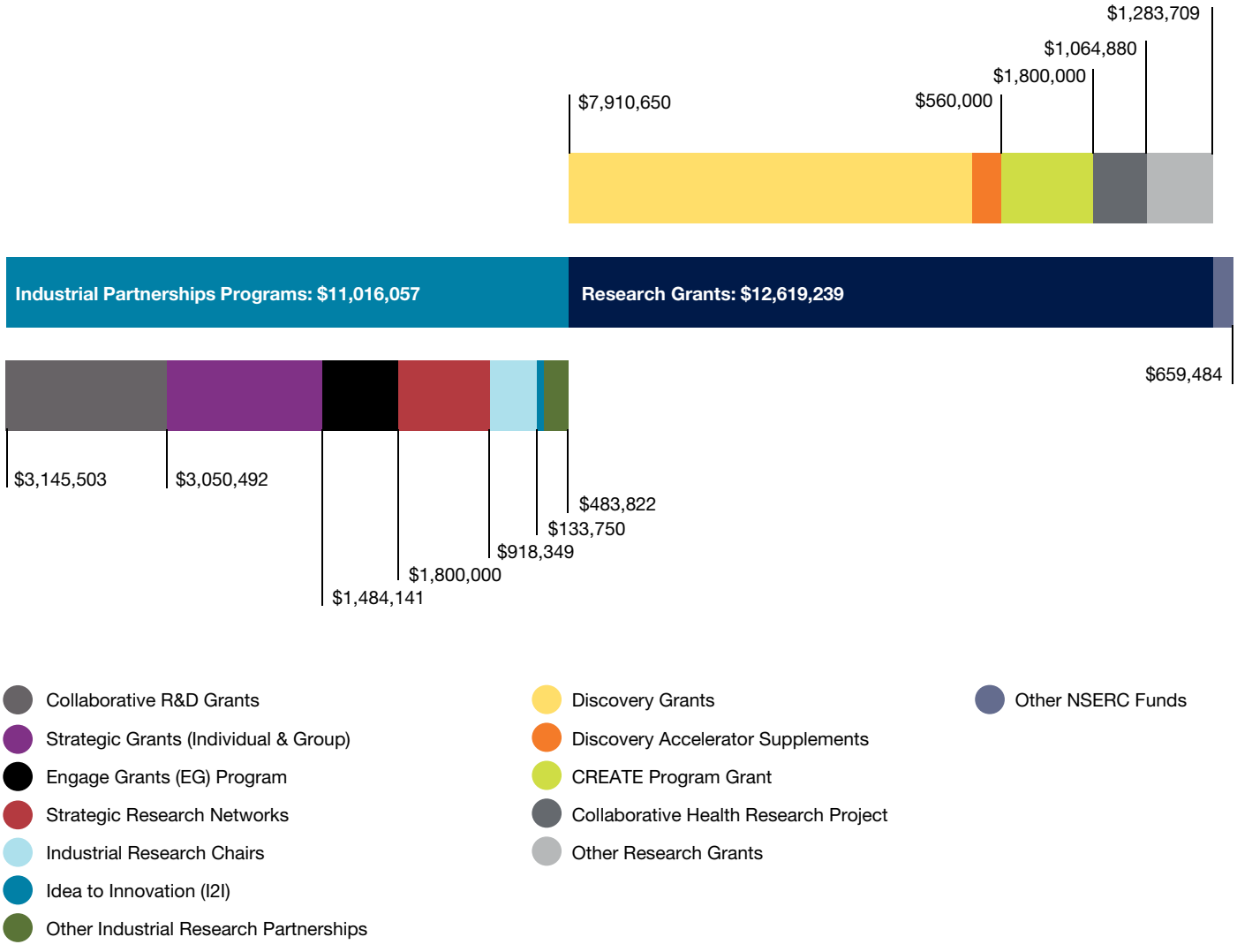
	Funding per Faculty Member	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total
2004–05	$182,434	$19,905,560	$7,015,973	$5,605,287	$6,149,095	**$38,675,915**
2005–06	$191,703	$22,183,632	$5,241,595	$5,791,694	$8,382,627	**$41,599,548**
2006–07	$222,562	$23,302,386	$7,817,967	$6,499,117	$8,673,512	**$46,292,982**
2007–08	$219,104	$25,108,970	$7,168,950	$7,545,281	$5,969,510	**$45,792,711**
2008–09	$231,073	$25,138,728	$7,618,346	$5,801,749	$9,735,463	**$48,294,286**
2009–10	$243,333	$26,347,468	$9,562,403	$5,455,799	$9,491,026	**$50,856,696**
2010–11	$273,177	$29,034,788	$7,414,298	$6,003,781	$14,641,188	**$57,094,055**
2011–12	$273,342	$34,854,732	$4,636,724	$6,706,605	$12,570,435	**$58,768,496**
2012–13	$282,383	$31,901,658	$8,421,917	$6,120,015	$15,115,998	**$61,559,588**
2013–14	$285,845	$33,428,021	$10,184,005	$7,713,708	$12,989,382	**$64,315,116**

Our Faculty is home to 71 research chairs held by 63 individual chairholders. These include CRCs, endowed chairs, NSERC Industrial Research Chairs, U of T Distinguished Professors and University Professors. A full list is available in Appendix D.

In addition to research chairs, our faculty members have successfully obtained prestigious CREATE grants from NSERC. Each of these grants provides approximately $1.65 million in support over six years and is aimed at training and mentoring highly qualified students in collaborative and integrative approaches. In 2014–2015, U of T Engineering was in the lead role on nine CREATE grants, including two new grants awarded in 2014–2015. The funding and recognition we receive through research chairs and major grants such as CREATE bolster our reputation as Canada's top engineering school.

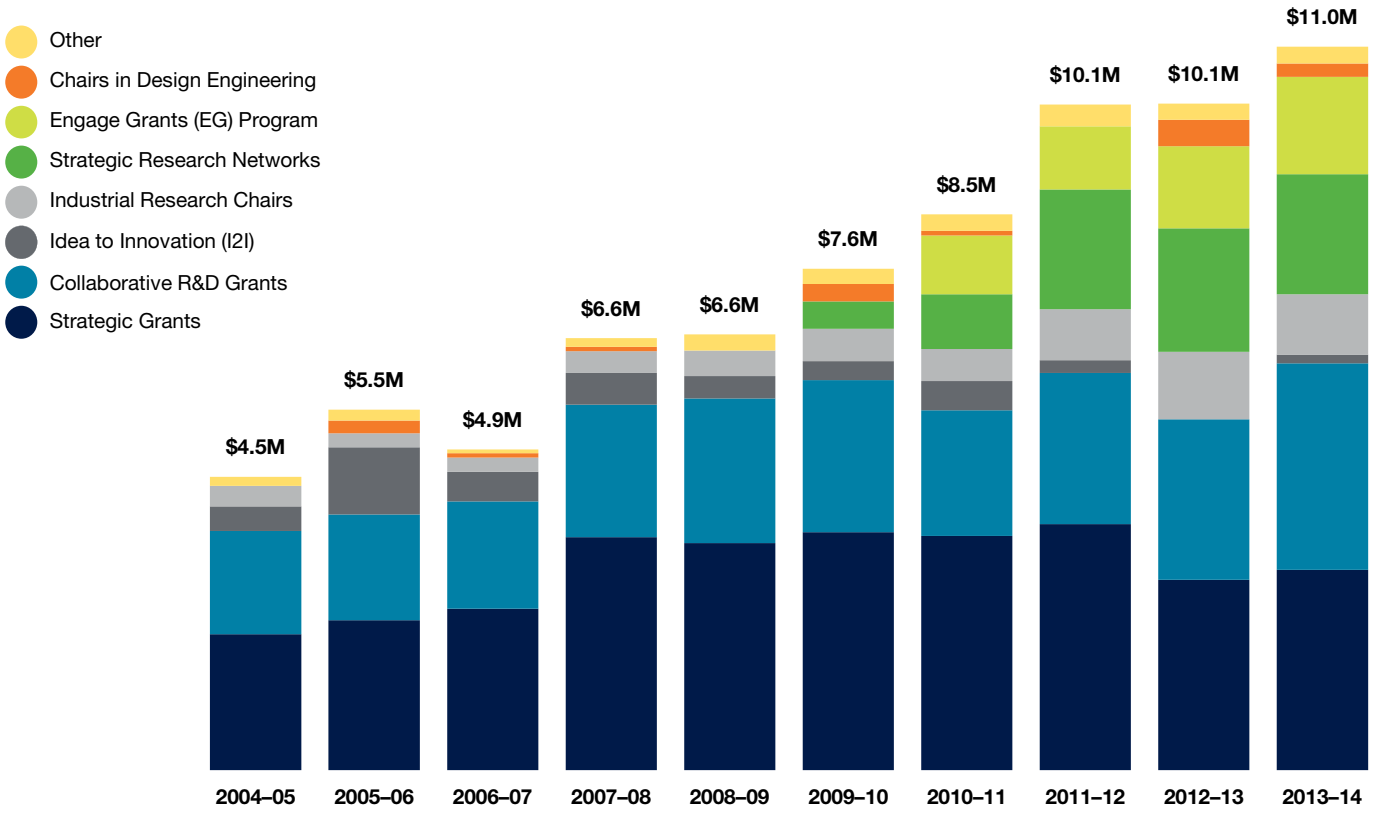
U of T Engineering continues to lead all Canadian peer institutions in the share of total annual NSERC funding that we attract. This funding is important to our overall research because it represents one-third of our research revenue (Figures 3.1a and 3.1b). It is also critical because the national reallocation of CRCs every two years is based on the proportion of Tri-Council and NCE funding each university receives (see Figure 3.1b). Our Faculty's strong growth in Tri-Council support is contributing to ongoing growth in our complement of CRCs.

Figure 3.2a **NSERC Funding, 2013–2014**



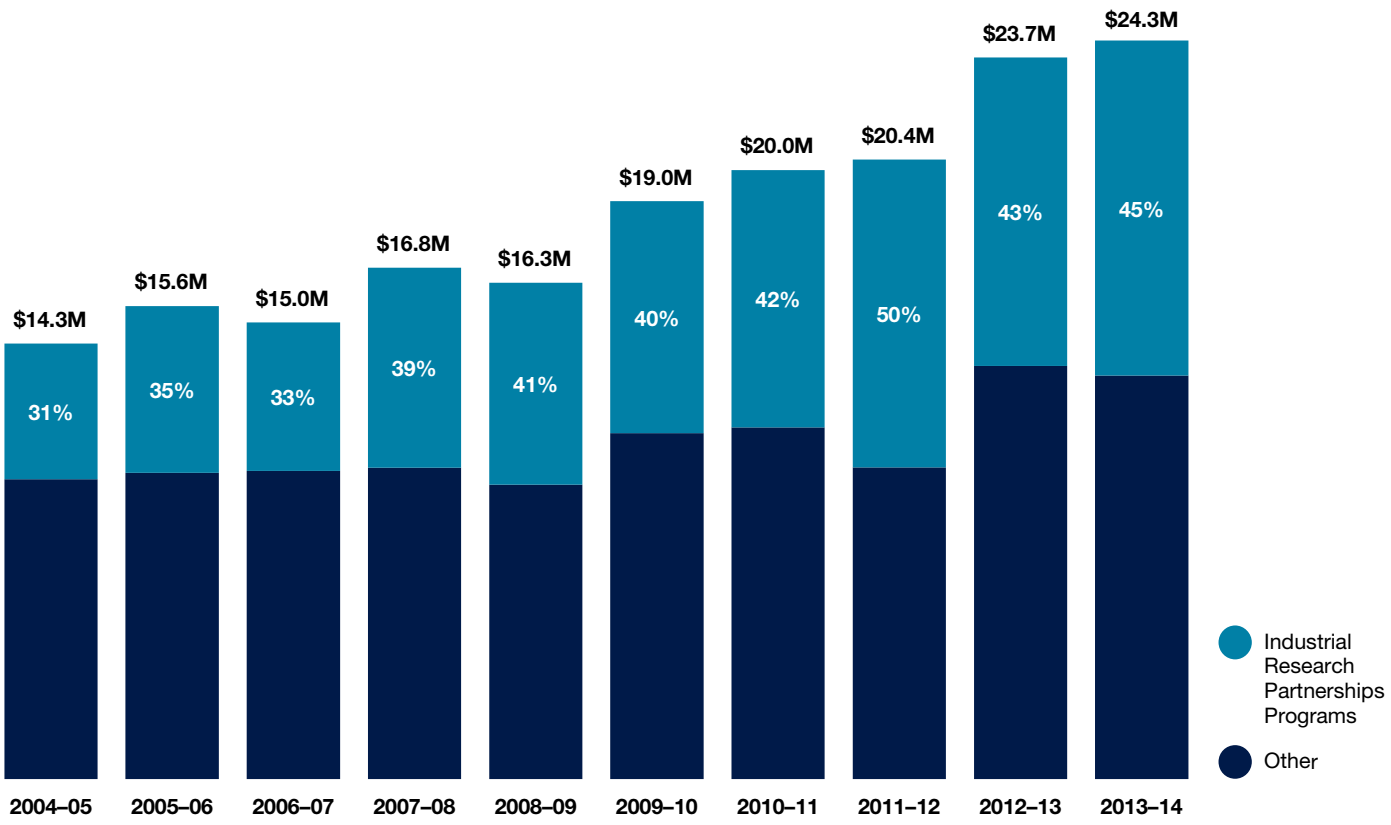
Note 3.2a: Data current as of May 2014 and based on grant year (April to March).

Figure 3.2b **NSERC Industrial Partnership Funding by Program, 2004–2005 to 2013–2014**



	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Other	$136,233	$163,537	$55,267	$130,000	$247,392	$230,000	$251,770	$328,780	$246,791	$258,882
Chairs in Design Engineering		$195,437	$69,076	$69,076		$267,173	$69,076		$400,000	$200,000
Engage Grants (EG) Program							$897,114	$960,531	$1,254,468	$1,484,141
Strategic Research Networks						$417,293	$832,697	$1,826,000	$1,879,000	$1,824,940
Industrial Research Chairs	$309,500	$211,000	$216,000	$329,834	$390,667	$493,197	$485,711	$773,964	$1,025,031	$918,349
Idea to Innovation (I2I)	$375,000	$1,023,640	$449,032	$483,200	$339,200	$287,417	$448,612	$195,000		$133,750
Collaborative R&D Grants	$1,571,393	$1,612,412	$1,637,132	$2,015,904	$2,203,103	$2,313,127	$1,909,431	$2,301,643	$2,445,232	$3,145,503
Strategic Grants	$2,072,793	$2,282,310	$2,457,079	$3,549,374	$3,457,330	$3,625,317	$3,568,312	$3,746,517	$2,898,502	$3,050,492
Total	**$4,464,919**	**$5,488,336**	**$4,883,586**	**$6,577,388**	**$6,637,692**	**$7,633,524**	**$8,462,723**	**$10,132,435**	**$10,149,024**	**$11,016,057**

Figure 3.2c **Industrial Partnerships as a Proportion of Total NSERC Funding, 2004–2005 to 2013–2014**



Generating and strengthening partnerships with industry is a key element of our Academic Plan (see Academic Plan, Chapter 6, Goal 7). In 2014–2015, our Faculty received $3.5 million in funding from NSERC's Strategic Partnership Grants program for eight new initiatives, including research into new catalysts that can convert waste gas into useful fuels and a project investigating the use of nanofibre membranes for water filtration and treatment.

Founded in 2014, the Toronto Institute of Advanced Manufacturing (TIAM) is increasing our collaborations with this key sector of the Canadian economy. TIAM brings together 17 professors in six academic areas who have expertise in advanced materials, processing methods and knowledge-based decision-making. Manufacturing companies will be able to develop innovations through partnerships with this team to become more competitive in the global marketplace.

Each November, the U of T Engineering Industry Partners Reception celebrates existing collaborators and welcomes new ones, from large multinationals such as IBM and General Electric to startups such as QD Solar and OneChip Photonics. More than 300 industrial partners currently provide funding through sponsored research agreements or as part of consortia.

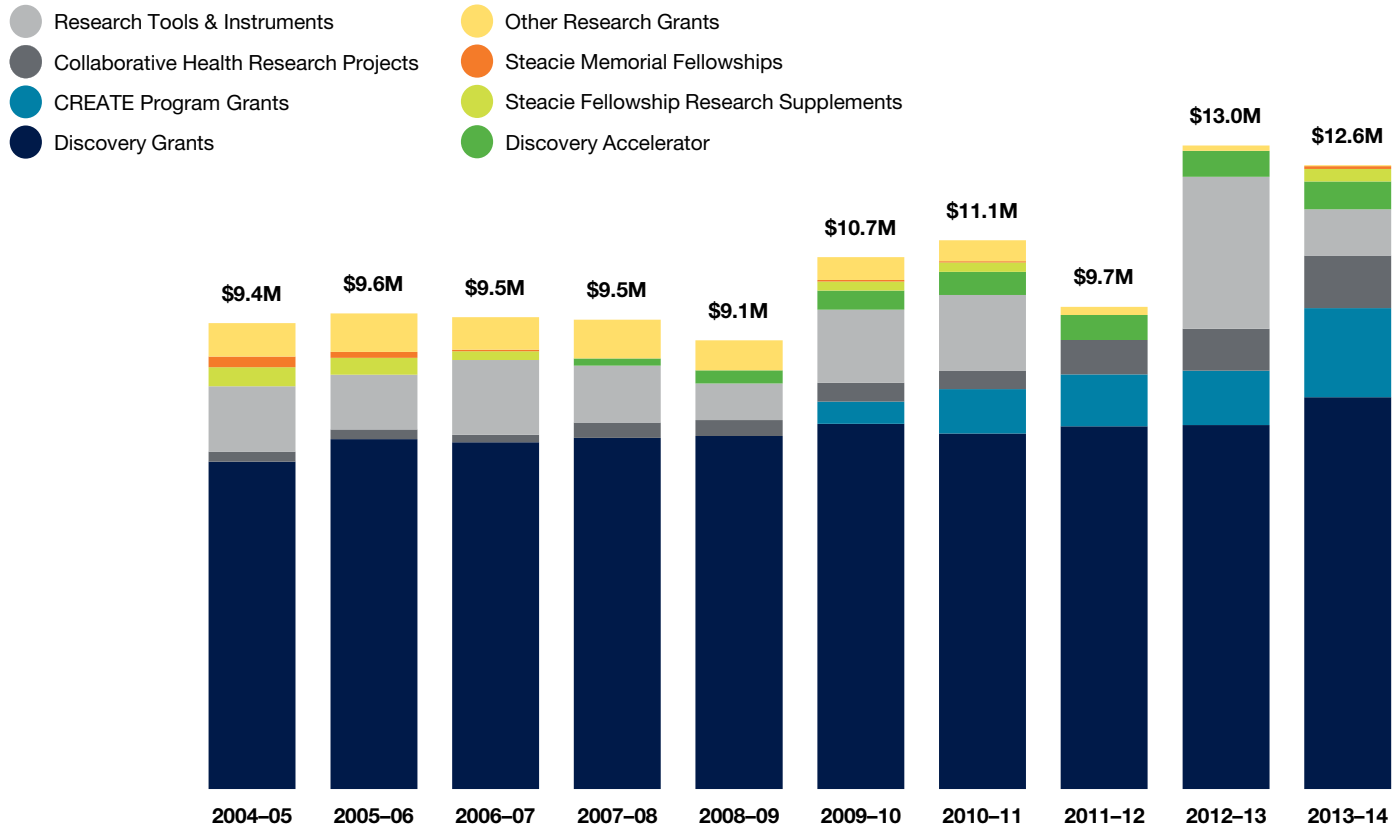
Figure 3.2d **Industrial Partnerships, 2014–2015**

- A.U.G. Signals Ltd.
- ABB Group
- Advanced Micro Devices Inc.
- Advanis
- Aerodyne
- Agnico Eagle Mines Ltd.
- Airbus SAS
- AISC
- Alcatel-Lucent Canada Inc.
- Alcohol Countermeasure Systems
- Allanson International Inc.
- Altera Corp.
- AMAG Ltd
- Americas Styrenics LLC
- Andec Manufacturing Ltd.
- Andritz Group
- Anemoi Technologies Inc.
- Anglo Operations Ltd.
- Antex Western
- Applanix
- Aquafor Beech Ltd.
- Armacell
- Arup Canada Inc.
- Asahi Glass Co., Ltd.
- Atomic Energy of Canada Ltd.
- Autodesk
- AV Nackawic Group
- Avalon Rare Metals
- Babcock & Wilcox Ltd.
- Barrick Gold Corp.
- Bell Canada
- Bell Helicopter / Textron Inc.
- Bio-Rad Laboratories Canada Ltd.
- Blackberry
- BLiNQ Inc.
- BMW
- Boise Cascade
- Bombardier Aerospace
- Bombardier Inc.
- Brammo, Inc.
- Braskem
- Brican Automated Systems Inc
- Brican Flight Systems Inc.
- Broadcom Corp.
- CAE
- CalEnergy Generation
- Calgon Carbon Corp.
- Cameco
- Canadian Institute of Steel Construction
- Canadian Renewable Fuels Assoc.
- Canadian Solar Inc.
- Canadian Urban Institute
- CANARIE Inc
- Candu Energy Inc.
- Candu Owners Group
- Carbon Cure Technologies
- Carter Holt Harvey Ltd.
- Cascades
- Celestica
- CellScale Biomaterials Testing
- Celulose Nipo-Brasileira
- Center for Automotive Materials and Manufacturing
- Centre Line Ltd.
- Christie Digital Systems Canada Inc.
- Ciena Canada Inc.
- Clearpath Robotics
- Clyde-Bergemann, Inc.
- CMC Electronics
- Colibri Technologies
- COM DEV International Ltd.
- ConCast Pipe
- Concrete Association of Canada
- Coraltec Inc.
- Corix Water Systems Inc.
- Crosswing Inc.
- Cytodiagnostics
- Daishowa-Marubeni International Ltd. - Peace River Pulp Division
- Dana Canada Corp.
- Daniels Group
- Datatrends Research Corp.
- DCL International
- Dell
- Detour Gold Corp
- Dionex
- Diros Technology Inc.
- Dr. Robot Inc.
- DSO National Laboratories
- E. I. du Pont Canada Company
- Eclipse Scientific Inc.
- Ecosynthetix
- Eco-Tec Inc.
- Eldorado Brasil
- Eli Lilly Research Laboratories
- Energent Inc.
- Engineering Services Inc.
- ENMAX Power Corporation
- Ensyn Technologies Inc.
- ERCO Worldwide
- Ericsson Canada Inc.
- ESG Solutions
- exactEarth Inc.
- Explora Foundation
- Facca Inc.
- Fibria Celulose
- Finisar Corporation
- Flight Safety International
- Ford Motor Company (U.S.)
- Ford Motor Company of Canada
- FP Innovations
- Fuji Electric Co. Ltd.
- Fujitsu Laboratories Ltd.
- Fujitsu Labs of America, Inc.
- G. S. Dunn Dry Mustard Millers
- G.Cinelli - Esperia Corporation
- GE Global Research
- GE Zenon
- Gedex Inc.
- Gener8 Inc.
- General Electric Canada
- General Electric Inc.
- General Motors of Canada Ltd.
- Genia Photonics Inc.
- Gennum Corp.
- Genpak
- Geosyntec Consultants
- Goodrich
- Grafoid Inc.
- Greencore Composites
- Groupe Mequaltech Inc.
- GTAA Toronto Pearson
- GVA Lighting
- Hanwha Solar Canada
- Hard Rock Innovations Inc.
- Hatch Ltd.
- Hawker Siddeley - Canada
- HDR Inc.
- Hewlett-Packard Company
- Hitachi High-Technologies
- Holcim Inc.
- Honeywell
- Huawei Technologies Co. Ltd.
- Hunch Manifest, Inc.
- Hydro One Networks
- Hydro Quebec
- Hyundai Motor Company
- IBM Canada Ltd.
- IBM T.J Watson Research Center
- iGEN Technologies Inc.
- Indian Oil Company
- Industrial Thermo Polymers Ltd.
- Ingenia Polymers Corp.
- Institute for Energy Technology (Norway)
- Integran Technologies Inc.
- Intel Corp.
- Interface Biologics Inc.
- International Paper Company
- Ionicon
- IONICS Mass Spectrometry Group Inc.
- IRISNDT Corporation
- Irving Pulp & Paper Ltd.
- ITS Electronics Inc.
- JDS Uniphase Inc.
- Johnson & Johnson Inc.
- Kapik Integration
- Kasai Kogyo Co. Ltd.
- Kevin Quan Studios
- Kiln Flame Systems Ltd.
- Kimberly-Clark Corp.
- Kinectrics
- Kinetica Dynamics
- Klabin
- Krauss Maffei Corp.
- Kumho Petrochemical R & D Center
- LaFarge Canada
- Lattice Semiconductor Ltd.
- Litens Automotove Group
- Lubrizol
- Lumentra Inc.
- Magellan Aerospace
- Magna Closures
- Magna Exteriors and Interiors
- Magna International Inc.

- Magna Powertrain
- Manitoba Hydro
- Mantech Inc.
- Marmak Information Technologies
- Maxim Integrated Products Inc.
- MDA - MacDonald, Dettwiler and Associates Ltd.
- MeadWestvaco (MWV) Corp.
- Mercedes-Benz Canada Inc.
- Messier-Bugatti-Dowty
- Messier-Dowty Inc.
- Meta North Inc.
- Metso Pulp, Paper & Power
- Microbonds Inc.
- Micropilot
- Mitsubishi Rayon Co., Ltd.
- Moldflow Corp.
- Morrison Hershfield Ltd.
- Mr. Robot Inc.
- Nanowave
- NatureWorks LLC
- NCK Engineering
- Nestle Canada
- Nike, Inc.
- Nordion International Inc.
- Northwest Mettech Corp.
- Nuclear Waste Management Organization
- NXP Semiconductors Netherlands B.V.
- Olympus Canada
- OneChip Photonics Inc.
- Ontario Clean Water Agency
- Ontario Institute for Regenerative Medicine
- Ontario Power Generation Inc.
- Ontario Renal Network: ORN
- Opus One Solutions Energy Corp.
- ORNGE Medical Transport
- Pfizer Inc. (New York)
- Plasco Energy Group
- Polaris Industries
- Polycon
- POSCO Center
- Pratt & Whitney Canada Inc.
- PrecisionHawk
- Process Research Ortech Inc.
- Procter & Gamble
- Purolator
- QD Solar Inc.
- Qualcomm Canada Inc.
- Qualcomm Technologies Inc.
- Quantum Dental Technologies (QDT) Inc.
- Questor Technologies, Inc.
- Quorum Technologies Inc.
- Redline Communications Inc.
- Research in Motion Ltd.
- Resonance Ltd.
- Rio Tinto Alcan Inc.
- Robert Bosch Corp.
- Rockwell International
- Rocscience Inc.
- Rolls Royce Canada Ltd.
- Rosellini Scientific, LLC
- Royal Bank of Canada
- RWDI
- Sabic
- Safety Power Inc.
- Samsung Advanced Institute of Technology
- Saudi Basic Industries Corp. (SABIC)
- Schlumberger Canada Ltd.
- Sealed Air Corp.
- Semiconductor Research Corp.
- Sendyne Corp.
- Sensor Technology Ltd.
- ShawCor
- Side Effects Software
- Siemens ADGT
- Sigma Bio-Instruments Inc.
- Silicon Mitus
- Siltech Corp.
- Sinclair Interplanetary
- Sinclair Technologies Inc.
- SINTEF Energi AS
- Solantro Semiconductor Corp.
- Solar Ship Inc.
- Solvay Specialty Polymers
- SPP Canada Aircraft Inc.
- St Mary's Cement Group
- Stackpole International
- Stantec Inc.
- Steel Structures Education Foundation
- StoraEnso
- Sulzer Metco
- Suncor Energy Inc.
- Sunwell Technologies
- Suzano Papel e Celulose
- Syncrude Canada Ltd.
- Taiwan Semiconductor Manufacturing
- Tantalus Rare Earths AG
- Teck Resources Ltd.
- Teknion
- Teledyne ISCO
- TELUS
- Telus Mobility
- Tembec Industries, Inc.
- Tenova GoodFellow Inc.
- Tessonics Inc.
- Texas Instruments Inc.
- Thales Canada Inc.
- The Iron Ore Company of Canada (IOC)
- The Miller Group
- Thermodyne Engineering
- Tolko Industries Ltd.
- Toshiba Corporation
- Total American Services Inc.
- Tower Automotive
- Tower Solutions
- Toyota Collaborative Safety Research Center (CSRC)
- Toyota Technical Center U.S.A., Inc.
- TransCanada
- Trojan
- TSI
- Ultra Electronics
- Ultrasonix
- Unisearch Associates
- UTC Aerospace Systems
- VAC Aero International Inc
- Vale Canada Ltd.
- Valmet Ltd.
- Van-Rob Kirchhoff Automotove
- Varilume Lighting Inc
- Vicicog
- VisImage Systems Inc.
- VTT Technical Research Centre of Finland
- Westport Innovations
- Whitemud Resources
- Wurth Elektronik eiSos GmbH & Co. KG
- Wuzhong Instrument Company
- Xilinx Inc.
- Xiphos Technologies Inc.
- Xogen Technologies Inc.
- Xstrata Nickel
- Xylitol Canada
- Zentrum Mikroelektronik Dresden AG
- Zotefoams PLC

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.

Figure 3.2e **NSERC Research Grant Funding by Program, 2004–2005 to 2013–2014**



	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Other Research Grants	$677,933	$778,537	$653,000	$781,400	$607,950	$462,319	$422,583	$162,000	$111,000	$15,000
Steacie Memorial Fellowships	$210,000	$120,000	$30,000			$30,000	$30,000			$60,000
Steacie Fellowship Research Supplements	$389,763	$336,477	$179,250			$187,500	$187,500			$250,000
Discovery Accelerator Supplements				$144,000	$264,000	$383,999	$464,000	$504,000	$520,000	$560,000
Research Tools & Instruments	$1,315,207	$1,108,037	$1,510,468	$1,150,928	$734,572	$1,477,018	$1,533,781		$3,070,814	$933,709
Collaborative Health Research Projects	$204,500	$197,752	$151,355	$311,245	$326,169	$378,774	$366,899	$696,536	$846,731	$1,064,880
CREATE Program Grants						$450,000	$900,000	$1,050,000	$1,096,000	$1,800,000
Discovery Grants	$6,611,191	$7,064,011	$7,002,674	$7,090,644	$7,128,551	$7,374,093	$7,178,603	$7,323,475	$7,350,942	$7,910,650
Total	**$9,408,594**	**$9,604,814**	**$9,526,747**	**$9,478,217**	**$9,061,242**	**$10,743,703**	**$11,083,366**	**$9,736,011**	**$12,995,487**	**$12,594,239**

Figure 3.3a **Canadian Peer Universities vs. University of Toronto Share of NSERC Funding for Engineering Cumulative Five-Year Share, 2009–2010 to 2013–2014**

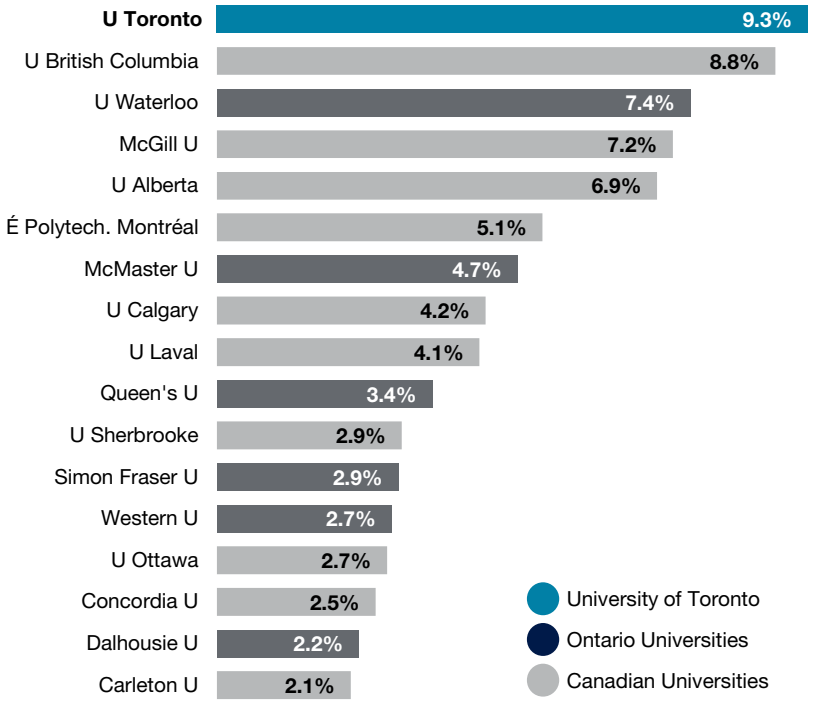


Figure 3.3b **U of T Annual Share of NSERC Funding in Engineering, 2004–2005 to 2013–2014**

2004–05	9.1%
2005–06	9.1%
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%

Figure 3.4a **Engineering Invention Disclosures by Academic Area, 2010–2011 to 2014–2015**

	2010–11	2011–12	2012–13	2013–14	2014–15	5-Yr Total
UTIAS	1.0	1.0	1.0	1.0	0.0	**4.0**
IBBME	9.3	14.0	8.2	5.9	7.5	**44.9**
ChemE	13.5	5.8	12.4	10.3	8.0	**50.0**
CivE	7.0	3.3	1.8	5.0	5.0	**22.1**
ECE	40.3	24.5	38.1	16.5	42.3	**161.7**
EngSci	0.0	0.0	0.5	1.2	0.0	**1.7**
MIE	14.7	20.7	13.1	9.5	18.2	**76.2**
MSE	4.7	3.0	4.0	2.5	1.5	**15.7**
Annual Total	**90.5**	**72.3**	**79.1**	**51.9**	**82.5**	**376.3**
University Annual Total	**192.0**	**158.0**	**166.0**	**147.0**	**176.0**	**839.0**
Engineering Percentage	**47%**	**46%**	**48%**	**35%**	**47%**	**45%**

Nearly half of all invention disclosures filed in 2014–2015 at U of T originated with our Faculty's researchers. ECE filed almost half of U of T Engineering's new disclosures, while MIE accounted for 22 per cent. Our Faculty also applied for 15 patents, representing more than one-third of all patent applications across U of T in 2014–2015.

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, 2014–2015**

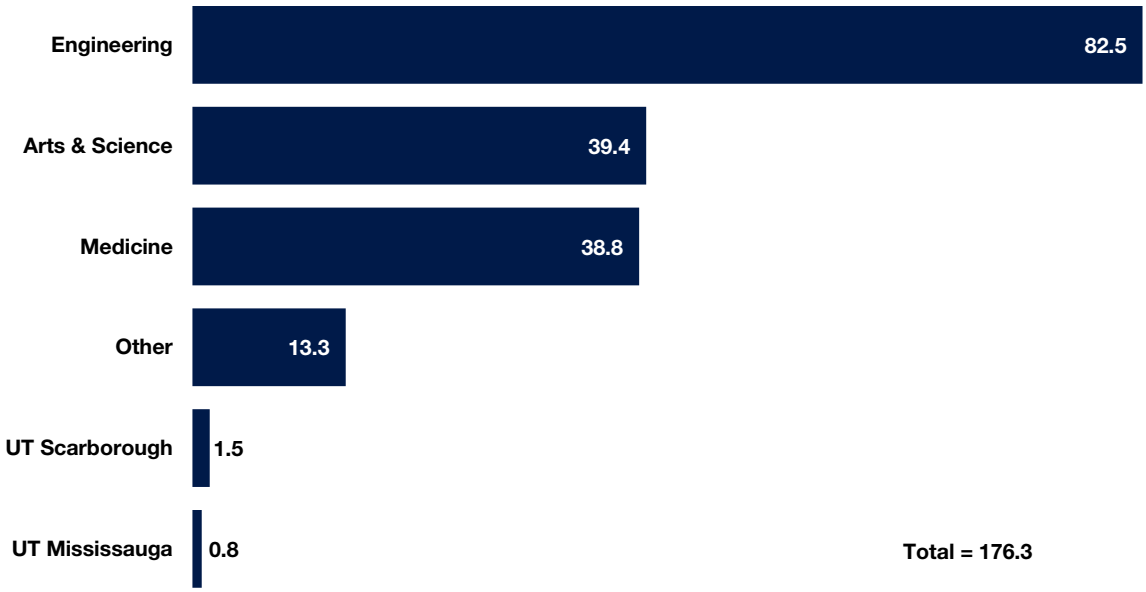


Figure 3.4c **U of T Patent Applications by Faculty, 2014–2015**

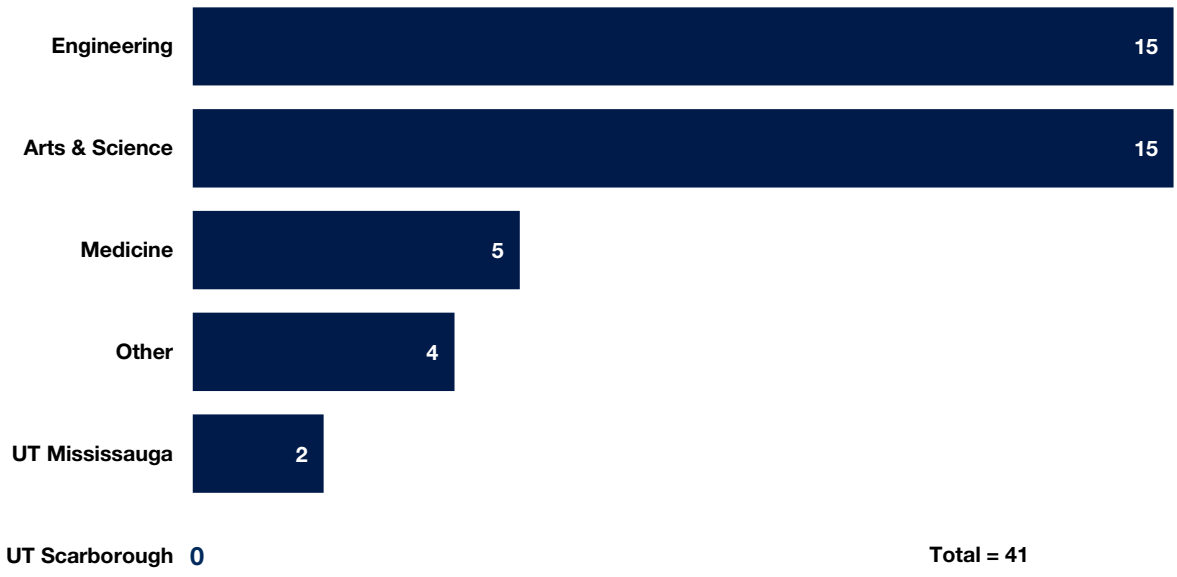
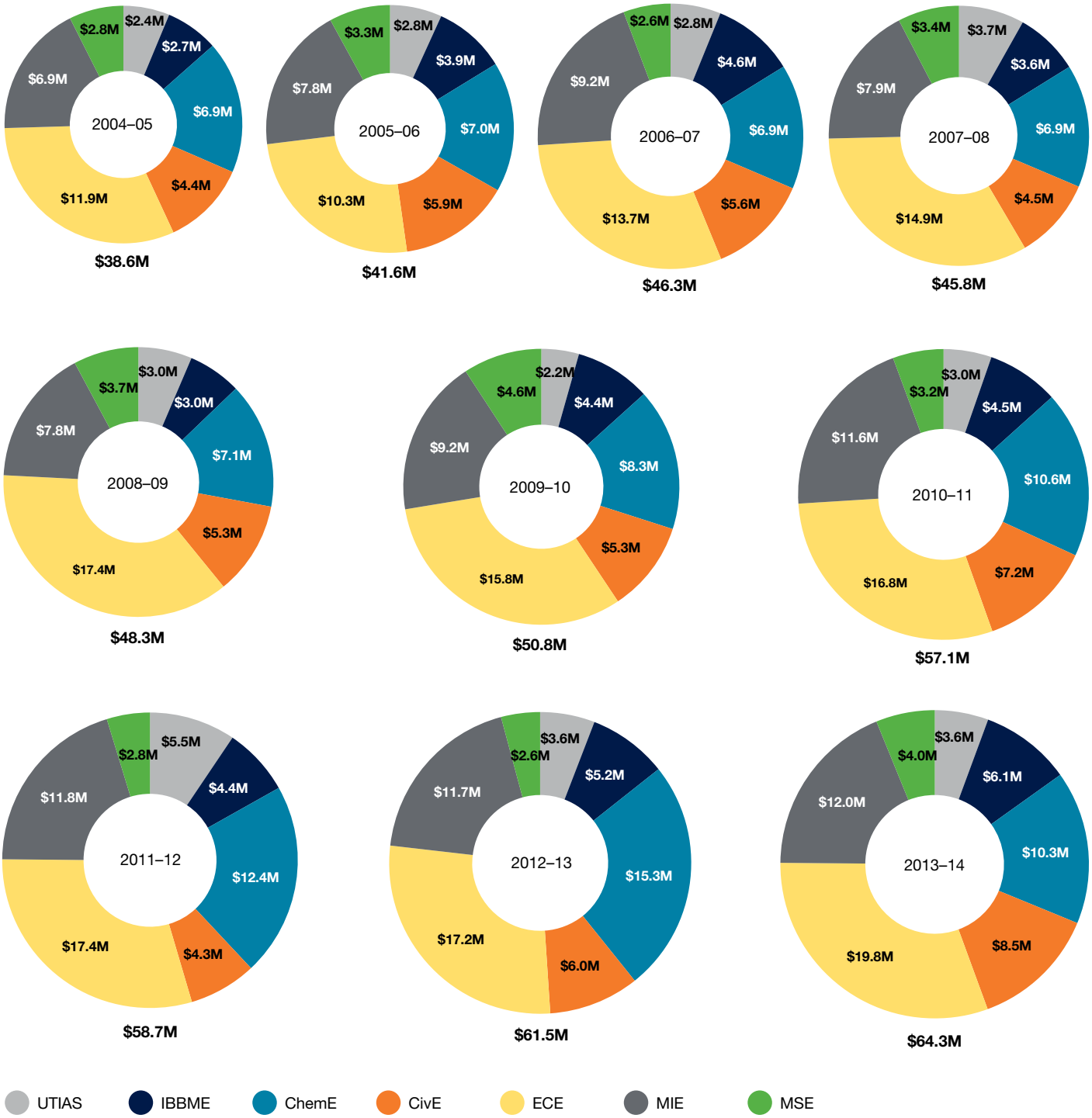


Figure 3.5 **Distribution of Research Operating Funding by Academic Area, 2004–2005 to 2013–2014**



Strong growth in research operating funding in several departments fuelled the Faculty's year-over-year increase in total research funding. Our Faculty's consistent growth in operating funding is a testament to the scientific, technological and leadership competencies of individual faculty members, as well as Centre and Institute directors, academic leaders and staff.

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 2013–14 represents 68 per cent 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

Cross-disciplinary teamwork and experiential learning are woven throughout our academic programs, research and co-curricular activities.

U of T Engineering's undergraduate minors and certificates allow students from any discipline to come together around common areas of interest. In spring 2015, nearly one-third of our graduating class completed a minor, and students have shown particularly strong interest in our Engineering Business minor and certificate. We continue to broaden our offerings to allow students to customize their learning. Nanoengineering, our newest minor, has applications in electronics, drug delivery, structural engineering and many other fields. A new certificate in Communication is available to students who wish to develop their skills in this area beyond the required foundation.

Capstone courses across our Faculty encourage teamwork and problem solving in a societal context. APS 490 – Multidisciplinary Capstone Design Project is one example, led by the University of Toronto Institute for Multidisciplinary Design & Innovation (UT-IMDI). In this course, teams of students from all disciplines partner with leading companies to solve practical design problems. In just two years since its inception, 37 projects have been completed for 23 clients, including one that has become a startup company.

Our co-curricular activities further enhance students' competencies in collaborating across disciplines. This is especially true of initiatives such as The Entrepreneurship Hatchery. Founded in 2012, the Hatchery provides mentoring and seed funding to teams of engineering students to develop their entrepreneurial skills. To date, 37 teams have accelerated their innovations and startups through this program. Our Faculty also nurtures entrepreneurs through programs such as the Heffernan Commercialization Fellowships, which help graduate students bring their inventions to market.

The Professional Experience Year (PEY), the largest optional internship program of its kind in Canada, places students in 12- to 16-month work assignments with leading companies around the world. These companies gain fresh perspectives and ideas, while students benefit by applying their newly acquired engineering competencies in a professional environment. In 2014–2015, a record 724 students gained a head start on their careers through PEY.

Effective leadership is a key ingredient in facilitating multidisciplinary collaboration. Our students build confidence and self-awareness through courses and initiatives offered by the Institute for Leadership Education in Engineering (ILead). Together, all of these opportunities nurture the whole engineer. Our graduates are versatile, creative and prepared to lead in the global economy.

Undergraduate Engineering Minors and Certificates

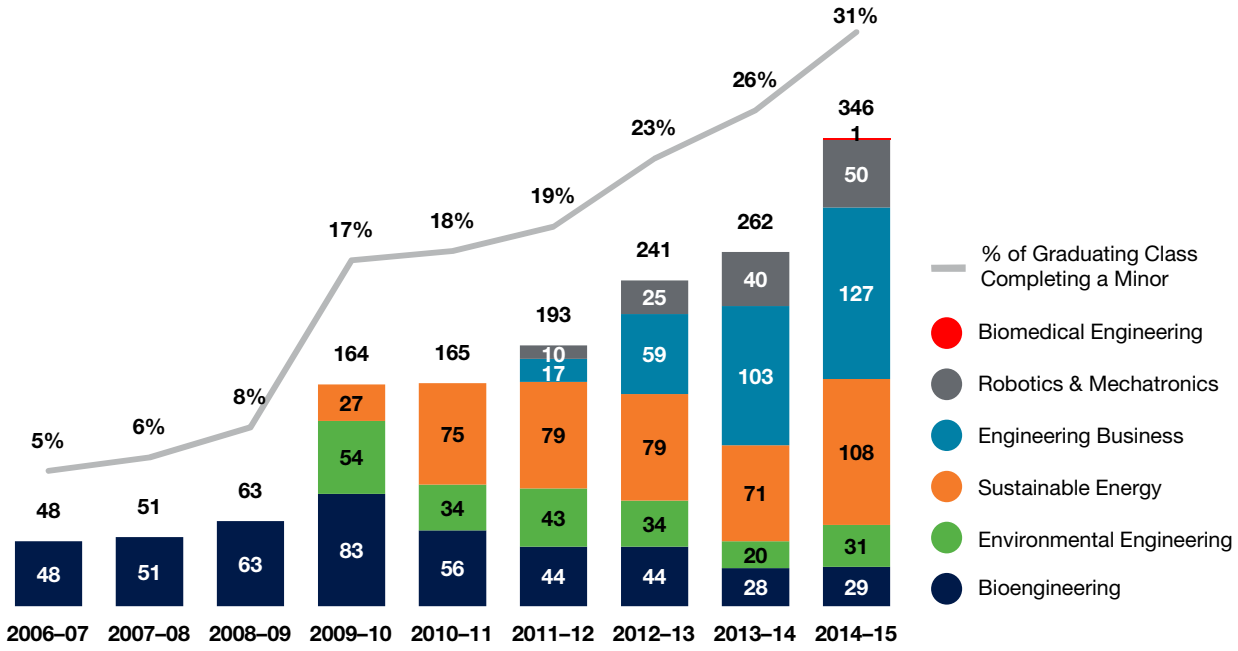
Our undergraduate minors and certificates offer a unique way for students to tailor their educational experiences. For example, students from Materials Science, Mechanical Engineering and Electrical Engineering might meet in a bioengineering class, leveraging their multi-faceted expertise to create better artificial limbs. A complete list of undergraduate engineering minors and certificates appears below:

Minors
- Bioengineering
- Biomedical Engineering (new in 2014)
- Engineering Business
- Environmental Engineering
- Nanoengineering (new in 2015)
- Robotics & Mechatronics
- Sustainable Energy

Certificates
- Communication (new in 2015)
- Engineering Business
- Engineering Leadership (new in 2014)
- Entrepreneurship, Innovation & Small Business
- Global Engineering
- Mineral Resources
- Nuclear Engineering
- Renewable Resource Engineering (new in 2014)

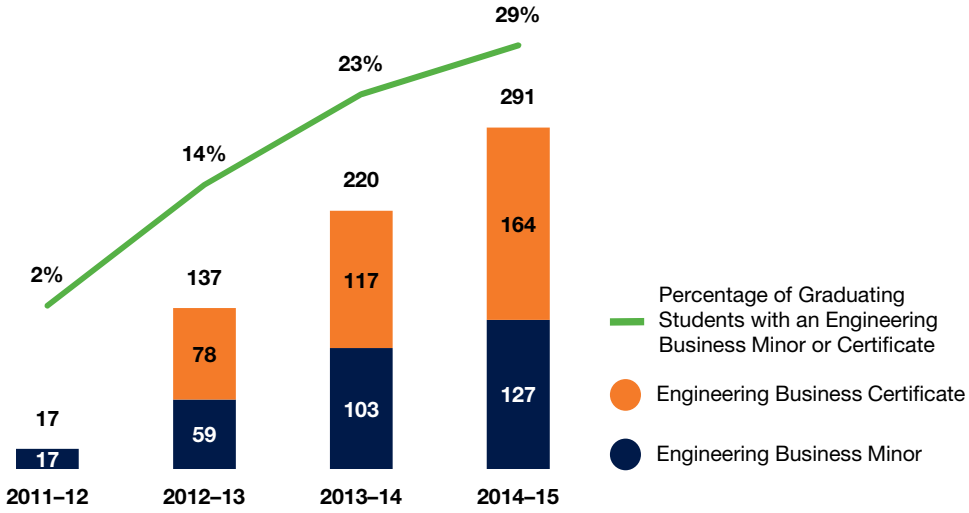
The number of undergraduate students convocating with a minor or certificate continues to increase. We now offer seven minors and eight certificates that enable students to broaden their learning and pursue particular areas of interest. In 2015, nearly one-third of graduating students completed a minor, compared with only 5 per cent in 2006–2007 (Figure 4.1a).

Figure 4.1a **Number of Students and Percentage of Graduating Class Completing an Engineering Minor, 2006–2007 to 2014–2015**



One example of the impact of minors and certificates is the number of students graduating with either a minor or certificate in Engineering Business. Since the introduction of these programs five years ago, this number has increased to nearly one-third of all graduating students (Figure 4.1b).

Figure 4.1b **Students Graduating with an Engineering Business Minor or Certificate, 2011–2012 to 2014–2015**



Streamlining and Enhancing Undergraduate Minors

Our Faculty constantly reviews and optimizes the structure of courses within the undergraduate minors to ensure they provide an enriching educational experience. We recently expanded our non-technical engineering course offerings (for example, project management and communication) that students take through their electives.

We actively encourage community building among students pursuing minors. In 2014–2015, we piloted a mentorship initiative for students in the Biomedical Engineering minor. Students partnered with IBBME faculty members for one-to-one focused discussions on goal setting, prioritization and career planning, all within the context of biomedical engineering. To date, 13 student-faculty pairs have completed the program.

Nanoengineering Minor

In November 2014, Faculty Council approved the new Nanoengineering minor, which will officially start in September 2015. Second- and third-year materials science courses provide a deep understanding of the structure and characterization of nanomaterials, while fourth-year courses give students hands-on experience in creating and fabricating nanomaterials. The minor reflects a growing focus on engineering materials and devices at the nano scale in many sectors — electronics, communications, energy, medical diagnostics and more.

Certificate in Communication

Starting in 2015–2016, undergraduate students will be able to complete a new certificate in Communication. Approved by Faculty Council in April 2015, the certificate will recognize the commitment of students who develop their communication skills beyond the required foundations by completing three one-semester courses. This program is part of the Faculty's strategy to broaden students' competencies and prepare our graduates for leadership roles.

Undergraduate Design and Research

Our dedication to providing experiential learning opportunities in engineering design and research begins in the first year of undergraduate studies. These elements are embedded in the Engineering Strategies and Practice courses taken by undergraduate students in our core academic programs, as well as the Praxis courses for Engineering Science students.

After further honing their competencies in second and third year, students consolidate their education through final-year design projects. The ECE design fair held each April showcases many such projects. This year they included: an application for designing side-scrolling video games, a system to help power grids respond to electrical interruptions, and a powered exoskeletal leg that helps those with cerebral palsy extend their lower leg when walking.

Experiential learning is a major focus of the University of Toronto Institute for Multidisciplinary Design & Innovation (UT-IMDI). This institute partners with leading companies to provide multidisciplinary teams of undergraduate students with industrial challenges to solve. Projects are completed either through a full-year course — APS 490 – Multidisciplinary Capstone Design Project (MCP) — or through summer internships with partner companies. Since 2012, nearly 150 students have been through APS 490, with 37 projects completed for 23 clients. One of these has led to a new startup company, Syncadian Inc., which develops solutions to help shift workers and military personnel manage their sleep cycles.

In March 2015, the newest cohort of students to complete projects through UT-IMDI demonstrated their solutions. One team created a device to reduce neck strain in helicopter pilots, completed in partnership with Defence Research and Development Canada. Another team created a portable, light-weight, inexpensive ramp for wheelchair or mobility scooter users through a partnership with the Toronto Rehabilitation Institute.

Each year, hundreds of our undergraduate students advance the frontiers of engineering research. They work with world-leading investigators at U of T through summer programs such as the Engineering Science Research Opportunities Program (ESROP), which culminate in presentations at our annual Undergraduate Engineering Research Day (UnERD). They also have opportunities to conduct research abroad through programs administered by U of T's Centre for International Experience. Partner institutions participating in these programs include the National University of Singapore, the University of Queensland (Australia) and the King Abdullah University of Science and Technology (Saudi Arabia). Starting in summer 2015, the Faculty is offering students in some programs the option of receiving degree credit for such exchanges through a new course, APS299Y — Summer Research Abroad. Students can receive scholarships for travel costs through the Centre for International Experience.

For more information on student experiences abroad, see Chapter 9: International Initiatives.

Figure 4.2a Undergraduate Participation in Summer Research Opportunities, 2009–2010 to 2014–2015

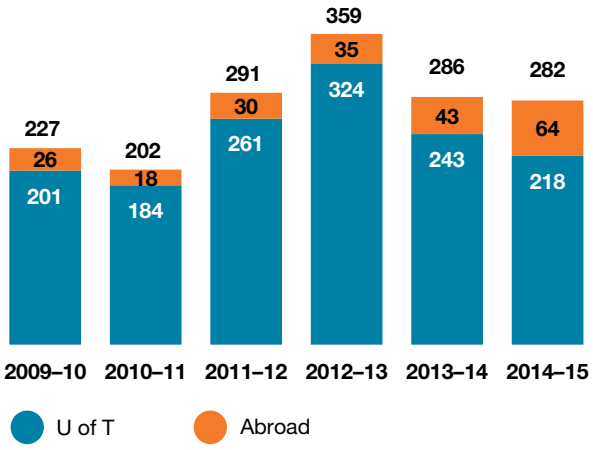


Figure 4.2b Undergraduate Participation in Summer Research Opportunities, by Academic Area, 2014–2015

Research Participation:	U of T	Abroad	Total
ChemE	40	14	54
CivE & MinE	26	5	31
ECE	34	4	38
EngSci	76	36	112
MIE	35	4	39
MSE	5	1	6
Other (Non-Degree)	2	0	2
Total	218	64	282

Engineering Leadership

A complete engineering education requires a commitment to developing students' leadership potential. With roots going back more than a decade, the Institute for Leadership Education in Engineering (ILead) provides opportunities for students to improve their leadership competencies: organization, project management, communication and much more.

ILead's courses play an important role in undergraduate and graduate programs as electives. For instance, MEng students can count these credits toward the Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE) certificate. Undergraduate students can earn credits toward a certificate in Engineering Leadership. In 2014–2015, we increased the number of undergraduate and graduate courses available from ILead to 13 from six the previous year. Enrolment in these courses nearly doubled to 474 students.

This year, ILead launched *The Game*, a year-long co-curricular program that emphasized societal leadership. Students worked in teams to frame and design solutions to complex social problems. The teams pitched their ideas to a selection committee on Game Night for a grand prize of $5,000. The winning team created *canact*, an online platform that links socially minded individuals with volunteer opportunities around the world.

The Society for Teaching and Learning in Higher Education awarded ILead the 2014 Alan Blizzard Award in recognition of its track record of success and innovation in teaching engineering leadership. This national award recognizes exemplary collaboration in university teaching. Our Faculty previously won this award in 2007 for its unique Engineering Strategies and Practice course.

Student Entrepreneurship

U of T Engineering has committed significant energy and resources to entrepreneurship training and education. We attract bright and creative students and provide them with mentors, space, networking opportunities and seed funding. This support helps develop the new businesses that will drive the 21st-century economy.

In fall 2014, the Ontario government gave $3 million to the University of Toronto through the new Campus-Linked Accelerator Program. This funding will help four leading accelerators across U of T — including our own Entrepreneurship Hatchery — increase training and support for student entrepreneurship.

The Entrepreneurship Hatchery

Launched in 2012, The Entrepreneurship Hatchery provides resources, mentorship and community-building services to turn ideas into prototypes and startups. Networking events such as the weekly Idea Market, monthly Speaker Series and the annual Accelerator Weekend are open to students from all Faculties at U of T. To apply for the Hatchery's resources, students form teams that must include at least one engineering student. If successful, the teams receive one-on-one mentorship, summer fellowships, space, and access to prototype funds.

Thirty-seven teams have entered the Hatchery since 2012. This year's top teams received more than $40,000 in prizes at Demo Night, held in September 2014. They included:

- FuelWear, which has developed garments embedded with carbon fibre heating elements that can add 10 degrees Celsius in -20 degree weather. Its founders, Alex Huang (ElecE 1T3+PEY) and Jason Yakimovich (CompE 1T3+PEY), raised more than $80,000 on Indiegogo — four times their initial goal — and won this year's Lacavera Prize at Demo Night.
- PheedLoop, which helps speakers and planners at events and conferences get instant, anonymous feedback on how they are resonating with their audiences. Developed by Rahul Goel (EngSci 1T6) and Phil Isaac (EngSci 1T5 + PEY), PheedLoop won second place at the Hatchery's Demo Night. The product is already available for purchase and has clients in the United States, the U.K. and Canada.

Heffernan Commercialization Fellowships

Our strong support for entrepreneurship extends to graduate students as well as undergraduates. The Heffernan Commercialization Fellowships provide $17,000 per year for up to two years for MASc and PhD students (or recent graduates) to translate their research into working prototypes and create companies to bring their ideas to market. Fellows are also encouraged to pursue other matching opportunities. Originally created in 1997 as the Heffernan/Co-Steel Innovation Post-Graduate Fellowships, they were extended in 2013 with a gift of $2.5 million from Gerald Heffernan (MMS 4T3); a further $2.5 million went to create a new home for The Entrepreneurship Hatchery in the Centre for Engineering Innovation & Entrepreneurship. The following are some of the projects funded through the Heffernan Commercialization Fellowships in 2014–2015:

- Brandon Chen (MechE PhD 1T3) developed a robotic platform that could greatly improve quality control for the integrated circuits used in microprocessors for computers and smart phones. Used with a scanning electron microscope, the platform's eight robotic arms can quickly probe the nanometer-sized components to check whether they are working as expected. Chen's company, Toronto Nano Instrumentation Inc., has already had purchase orders.
- Geoff Frost (MHSc 1T2), founder of XOR Laboratories Toronto, Inc., created a device that extends the viability of donated lungs, increasing the number that can be transplanted. The device exercises the lungs outside the body, preventing damage and keeping them in transplantable condition. A proof-of-concept device is used at Toronto General Hospital, and XOR is developing a portable prototype.
- Several fellowships were also renewed. The ExoGlove, invented by Martin Lebrecque (CompE MASc 0T5, PhD 1T1), is a more intuitive human-machine interface that could improve video games, remote surgery, video editing and more. Oleg Chebotarev (MechE MASc 1T2) created a microfluidic drug-testing platform. It works by applying drugs to small amounts of real human tissues (e.g., brain, liver, blood) grown from stem cells, providing quick, reliable information on side effects or adverse drug interactions.

The value of these fellowships is evident in the success of past recipients. For example, ChipCare, which was initially seeded by a Heffernan Fellowship, raised $5 million from investors in spring 2015 — $2 million more than its goal — to help bring its "point-of-care" disease testing technology to market. This technology will give people in developing countries better access to test results for diseases such as HIV.

UTIAS *Start* Entrepreneurship Program

In fall 2014, Francis Shen (EngSci 8T1, AeroE MASc 8T3) established a new entrepreneurial incubation program called UTIAS *Start* Entrepreneurship Program. This program encourages UTIAS graduate students to use the knowledge and competencies they have gained through their education to create startup businesses. Francis Shen and Professor David Zingg, Director of UTIAS, oversee the program.

In its first year, 14 teams received grants of $5,000 or $25,000 to further develop their ideas, for a total investment of $250,000. One of these teams is teaBOT, invented by PhD candidate Rehman Merali (AeroE 1T5) and Brian Lee. teaBOT is a computerized tea kiosk that brews custom cups of tea; users submit their orders via an app, specifying the precise blend, water temperature and steeping time. In the past year, prototypes have been tested on U of T campus, Harry Rosen stores and at the MaRS Discovery district.

The Next 36

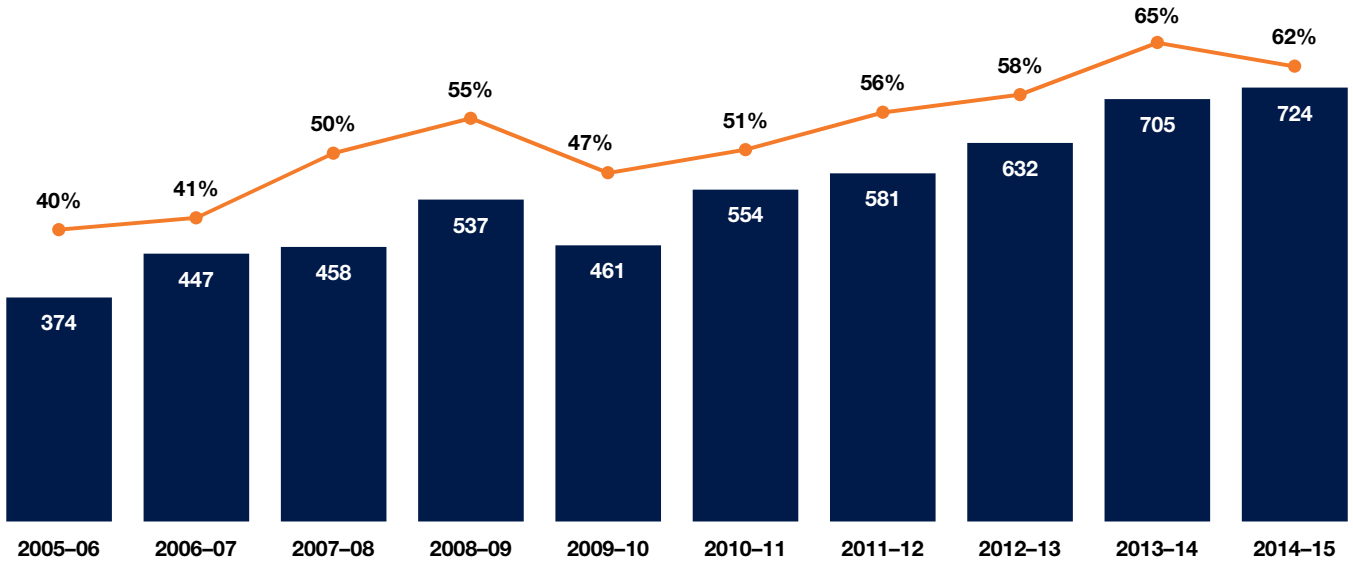
Founded in 2010, The Next 36 is a non-profit organization that is increasing Canada's long-term prosperity by fast-tracking the development of Canada's most talented young innovators. U of T Engineering students have been well represented in this annual competition, with more than 30 selected over the past five years. Here are some recent U of T Engineering projects:

- Shums Kassam (EngSci 1T5) and Jaclyn Ling created Blynk Style, an app that provides personalized fashion advice. The company won a $100,000 investment for top spot in the 2014 International Startup Festival in Montreal.
- Marissa Wu (EngSci 1T3) created Onyx Motion, a program that integrates with smart watches and other wearables to act as a virtual coach, improving sporting performance.

Many of our alumni also benefit from entrepreneurial opportunities at the University of Toronto. Please see Chapter 7: Advancement for an overview of select engineering alumni achievements fostered by U of T's entrepreneurship accelerators.

Professional Experience

Figure 4.3a **PEY Internship Placements for Engineering Undergraduates with Percentage Participation from Previous Third-Year Class, 2005–2006 to 2014–2015**



The Professional Experience Year (PEY) is the largest optional internship program of its kind in Canada. In 2014–2015, 724 students — more than 60 per cent of eligible students — interned through the PEY program, our highest number yet. PEY placements abroad continue to be popular and have grown by 50 per cent from just two years ago (Figure 4.3b). The number of employers involved with PEY is also higher than ever. Of the 317 companies that hosted PEY interns in 2014–2015, 14 were new companies, including commercial real estate developer Cadillac Fairview.

PEY employers range from small-scale, local startups to large, multinational corporations. They represent nearly every industry: transportation, mining, health care, aviation and aerospace, electronics, automotive, financial, manufacturing, utilities and more. Roughly 42 per cent of PEY placements fall into the technology industry. On average, PEY students earn a yearly salary of more than $46,000. This year, PEY students earned a total income of more than $40 million during their work terms.

PEY is one of several ways our students can gain professional experience in the workplace. The Engineering Career Centre also offers the following programs:

- The Engineering Summer Internship Program (eSIP) is more akin to a traditional co-op placement. Students work for approximately four months over the summer and return to school full-time in the fall.
- The Transportation Career Development Program (TDCP) is a specialized program open to CivE students. Participants work rotational placements over three consecutive summers with three sectors: the Ontario Ministry of Transportation, large-size engineering consulting firms and small-size contractors.

Figure 4.3b **Canadian and International PEY Internship Placements for Engineering Undergraduates, 2005–2006 to 2014–2015**

	Canadian Placements	US Placements	Other International Placements	Total PEY Placements
2005–06	348	19	7	**374**
2006–07	423	17	7	**447**
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**

Professional development also extends to graduate students. For PhD candidates interested in a career in academia, we created the Prospective Professors in Training Program (PPIT). Students learn to design courses and research programs; develop an effective academic CV, teaching dossier and research statement; and prepare for an academic job interview. Thirty-four graduate students have earned PPIT certificates in the last three years. Starting in 2015–2016, PPIT will become part of the Graduate Professional Skills (GPS) program administered through the School of Graduate Studies (SGS). Students taking courses through PPIT can earn credits toward a GPS designation, further preparing them for a successful career post-graduation.

Figure 4.3c **Companies or Organizations that Hired Engineering Students on PEY Internships, 2009–2010 to 2014–2015**

	PEY Employers who Hired Engineering Students
2009–10	158
2010–11	185
2011–12	221
2012–13	241
2013–14	304
2014–15	317

Engineering Communication

The Engineering Communication Program (ECP) helps undergraduate students develop professional communication competencies. ECP courses are integrated across the curriculum, from first year to fourth year. In addition, students can book 30-minute sessions with ECP's expert tutors at any time for one-to-one feedback on their writing assignments.

In 2014–2015, we launched several initiatives to further expand ECP services:

- Online tutoring sessions allow students to upload their work and receive feedback from tutors by a given deadline or in real-time using the live chat feature.
- Walk-in sessions at specified times on Mondays and Fridays allow students to receive feedback with no prior booking.
- Starting in 2015–2016, all undergraduate students can now take an elective ECP course, APS 281 – Language and Meaning. Taught by Dr. Penny Kinnear, the course teaches students how scholars study the phenomenon of making meaning with language. This helps them learn to be more effective in writing, listening and speaking.
- ECP partnered with ILead to create APS445 – The Power of Story: Discovering your Leadership Narrative. The course teaches students to use storytelling to advocate for their ideas. By asking students to take risks and share personal stories, they build self-awareness, confidence and other key competencies in professional development.

In addition to these initiatives, ECP also enhanced outreach activities to make more students aware of the services available. The uptake of these services has increased by 70 per cent compared to previous years.

Student Clubs and Teams

The U of T Engineering community provides myriad opportunities for students to become involved outside of the classroom. Athletics abound, as do student-led chapters of professional associations, engineering design teams, cultural clubs and more. A complete list of student clubs and teams can be found in Appendix B: Engineering Student Clubs and Teams. Beyond our Faculty, Engineering students also have access to an additional 800 clubs and teams across U of T.

5

Our high-achieving students, faculty and alumni receive an incredible number of merit-based awards each year. In 2014, U of T Engineering earned 25 per cent of the major honours bestowed on engineering faculty across Canada. This is three times as many as the next most successful Canadian engineering school.

Our reputation for attracting the most talented young engineering scholars is reflected in the many awards that went to early-career researchers and educators. Micah Stickel (ECE), Chair of First Year, is one of the American Society for Engineering Education's Top 20 under 40. Aimy Bazylak (MIE) was awarded an Alexander von Humboldt Fellowship for Experienced Researchers. Natalie Enright Jerger (ECE) won the Ontario Professional Engineers Young Engineer Medal. Milica Radisic (ChemE, IBBME) became a member of the Royal Society of Canada's College of New Scholars, Artists and Scientists, which recognizes the emerging generation of Canadian intellectual leadership.

The success of faculty members in winning honours not previously awarded to U of T Engineering professors attests to the growing impact of our research and innovation. Paul Santerre (IBBME) received the Ernest C. Manning Principal Award for his technology to reduce blood clotting from medical devices. Michael Sefton (ChemE, IBBME) is the only Canadian this year to become a Foreign Associate of the Institute of Medicine of the U.S. National Academies of Science. The 2015 L'Oréal-UNESCO "For Women in Science" Laureate for North America is Molly Shoichet (ChemE, IBBME), only the third Canadian to achieve this honour in its 17-year history.

Our standard of excellence also extends to teaching, student experience and leadership within the U of T community. Doug Reeve (ChemE) received the Vivek Goel Faculty Citizenship Award, the fourth winner from our Faculty in the six years since the award's inception. Brenda McCabe (CivE) won the Joan E. Foley Quality of Student Experience Award. Greg Evans (ChemE) received a 2015 President's Teaching Award, the University's highest honour for teaching. U of T Engineering also earned three Distinguished Professor awards: Mark Fox (MIE) is Distinguished Professor of Urban Systems Engineering, Frank Kshischang (ECE) is Distinguished Professor of Digital Communications and Chul Park (MIE) is Distinguished Professor of Microcellular Engineered Plastics. Molly Shoichet (IBBME, ChemE) and Ted Sargent (ECE) earned the rank of University Professor in 2014 and 2015, respectively. Also in 2015, U of T named three professors from the Faculty — Parham Aarabi (ECE), Richard Cobbold (IBBME, ECE) and Hugh Liu (UTIAS) — "Inventors of the Year," recognizing exceptional researchers who are commercializing new technologies that can benefit society. These accomplishments underline the contributions of our Faculty to the University of Toronto community.

Selected Awards Received by Faculty Members and Alumni

In 2014, our faculty members and alumni received more than 40 international, national and provincial awards for excellence in their respective fields. Figure 5.1 shows a summary of key engineering awards won by faculty since 2006. As indicated by Figures 5.2a and 5.2b, U of T Engineering professors won a quarter of major national and international engineering awards received by engineering professors in this country, three times as many as any other Canadian school. Full descriptions for major awards can be seen in Appendix G.

International

Alexander von Humboldt Foundation
Alexander von Humboldt Fellowship for Experienced Researchers
Aimy Bazylak (MIE)

Alfred P. Sloan Foundation
Sloan Research Fellowship
Natalie Enright Jerger (ECE)

American Concrete Institute
Wason Medal for Most Meritorious Paper
Doug Hooton (CivE)

American Institute for Medical and Biological Engineering
Fellow
Milica Radisic (IBBME, ChemE)

American Institute of Steel Construction
Lifetime Achievement Award
Peter Birkemoe (CivE)

American Society for Engineering Education
Donald E. Marlowe Award
Jean Zu (MIE)
Sharon Keillor Award for Women in Engineering Education
Susan McCahan (MIE)
Top 20 Under 40
Micah Stickel (ECE)

American Society of Mechanical Engineers
Fellow
Hani Naguib (MIE, MSE)
Kamran Behdinan (MIE)

ASM International
Fellow
Javad Mostaghimi (MIE)

Committee on the Status of Women in Computing Research
Borg Early Career Award
Natalie Enright Jerger

Human Factors & Ergonomics Society Surface Transportation Technical Group
Stephanie Binder Young Professional Award
Birsen Donmez (MIE)

Institute of Electrical and Electronics Engineers
Control Systems Award
Bruce Francis (ECE)
Fellow
Deepa Kundur (ECE)
Baochun Li (ECE)
Yu Sun (MIE)

Institute of Medicine of the U.S. National Academies
Foreign Associate
Michael Sefton (ChemE, IBBME)

International Academy of Food Science and Technology
Lifetime Achievement Award
Levente Diosady (ChemE)

L'Oreal/UNESCO
For Women in Science Award
Molly Shoichet (ChemE, IBBME)

MIT Technology Review
Top 35 Innovators Under 35
David He (ECE 0T5)

Order of Merit of the Republic of Hungary
Officer's Cross
Levente Diosady (ChemE)

Réunion Internationale des Laboratoires et Experts des Matériaux
Fellow
Doug Hooton (CivE)

Society of Plastics Engineers
Fellow
Hani Naguib (MIE, MSE)

Tissue Engineering & Regenerative Medicine International Society
Senior Scientist Award
Molly Shoichet (ChemE, IBBME)

U.S. National Academy of Engineering
Member
David Yao (MIE MASc 8T1, PhD 8T3)

National

Canadian Council for the Arts: Killam Prize in Engineering
Andreas Mandelis (MIE)

Canadian Academy of Engineering (2014)
Fellow
Uwe Erb (MSE)
Edward (Ted) Sargent (ECE)
Yu Sun (MIE)

Canadian Academy of Engineering (2015)
Fellow
Kamran Behdinan (MIE)
Pu Chen (MIE MASc 9T3)
Greg Evans (ChemE)
Vladimiros Papangelakis (ChemE)
Anne Sado (IndE 7T7)
Michale Sefton (ChemE, IBBME)
Jim Wallace (MIE)
Honorary Fellow
Norbert Morgenstern (CivE 5T6)

Canadian Society for Chemical Engineering
Syncrude Canada Innovation Award
Radhakrishnan Mahadevan (ChemE)

Canadian Society for Civil Engineering
Horst Leipholz Medal
Frank Vecchio (CivE)
Fellow
Frank Vecchio (CivE)

Engineering Institute of Canada
Julian C. Smith Medal
Alberto Leon-Garcia (ECE)
Fellow
Baher Abdulhai (CivE)
David Sinton (MIE)

Canadian Society for Mechanical Engineering
C.N. Downing Award
Kamran Behdinan (MIE)
Fellow
Lidan You (MIE)
Jules Stachiewicz Medal
Sanjeev Chandra (MIE)

Engineers Canada Awards (2014)
Gold Medal Award
Michael Sefton (ChemE, IBBME)

Engineers Canada Awards (2015)
Award for the Support of Women in the Engineering Profession
Samantha Espley (MinE 8T8)
Medal for Distinction in Engineering Education
Jonathan Rose (ECE)

Ernest C. Manning Awards Foundation
Principal Award
Paul Santerre (IBBME)

NSERC
E.W.R. Steacie Fellowship
Wei Yu (ECE)

Royal Society of Canada
Fellow
Edward (Ted) Sargent (ECE)
Peter Zandstra (IBBME)
Member, College of New Scholars, Artists and Scientists
Milica Radisic (IBBME, ChemE)

Transportation Association of Canada
Outstanding Career Centennial Road Safety Award
Ezra Hauer (CivE)

Provincial

Ontario Professional Engineers Awards (2014)
Citizenship Award
Marta Ecsedi (CivE 7T6)
Research and Development Medal
Frank Vecchio (CivE)
Young Engineer Medal
Natalie Enright Jerger (ECE)

Ontario Professional Engineers Awards (2015)
Gold Medal
Cristina Amon (MIE)
Management Medal
Michael Butt (CivE 6T3)
Citizenship Award
Claire Kennedy (ChemE 8T9)
Engineering Excellence Medal
Jeanette Southwood (ChemE 8T6, MASc 8T8)

U of T

Distinguished Professor of Digital Communications
Frank Kschischang (ECE)

Distinguished Professor of Microcellular Engineered Plastics
Chul Park (MIE)

Distinguished Professor of Urban Systems Engineering
Mark Fox (MIE)

Joan E. Foley Quality of Student Experience Award
Brenda McCabe (CivE)

Inventor of the Year Awards
Parham Aarabi (ECE)
Richard Cobbold (IBBME, ECE)
Hugh Liu (UTIAS)

President's Teaching Award
Greg Evans (ChemE)

University Professor (2014)
Molly Shoichet (IBBME, ChemE)

University Professor (2015)
Ted Sargent (ECE)

University of Toronto Honorary Degree
Alfred Aho (EngSci 6T3)

Vivek Goel Faculty Citizenship Award
Doug Reeve (ChemE)

Figure 5.1 Summary of Major International, National and Provincial Awards and Honours, 2006 to 2014

	2006	2007	2008	2009	2010	2011	2012	2013	2014
International									
MIT Top 35 Under 35			1				1		
U.S. National Academies*					1	1			1
National									
3M Teaching Fellowship*		1							
Alan Blizzard Award		1							1
Canadian Academy of Engineering Fellowship	2	1	3	9	8	1	7	6	3
Engineering Institute of Canada Awards					1	2	1	2	
Engineering Institute of Canada Fellowship	2	2	3	4	3	3	3	3	3
Engineers Canada Awards				1	3		1	1	1
Killam Prize*			1						1
Killam Research Fellowship*			2		2				
Manning Innovation Award									1
Royal Society of Canada Fellowship*	1	1	1	1	2	4	3		2
Royal Society of Canada College of New Scholars, Artists and Scientists									1
Steacie Fellowship*				1			2	1	1
Steacie Prize*							1		
Synergy Award for Innovation				1			1		
Provincial									
Ontario Professional Engineers Awards	1		3	4	4	5	3	2	2
Total	**6**	**6**	**14**	**21**	**24**	**16**	**23**	**15**	**17**

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

Figure 5.2a **Number of Major National and International Awards Received by U of T Engineering Compared to other Canadian Engineering Faculties, 2014**

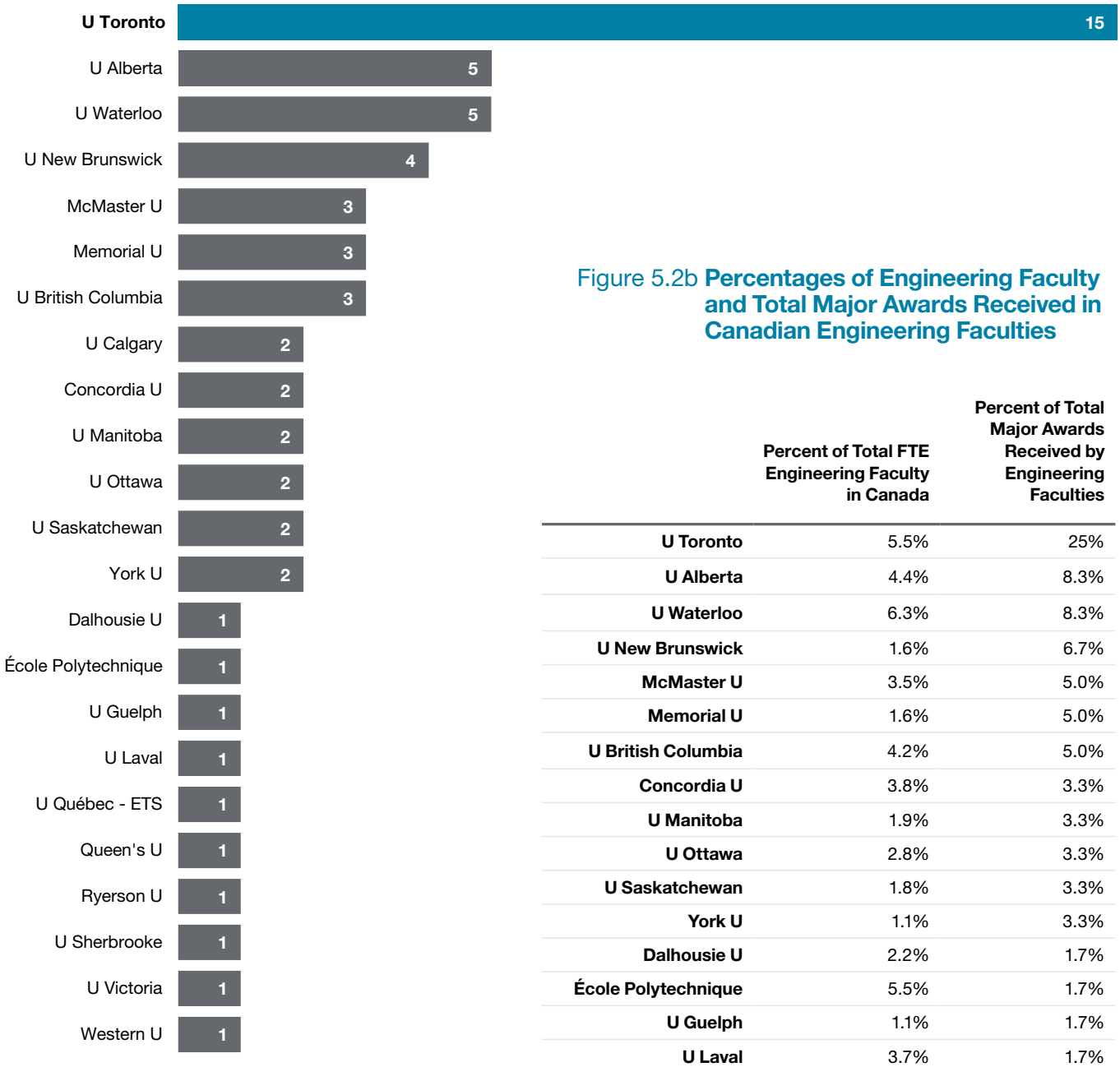
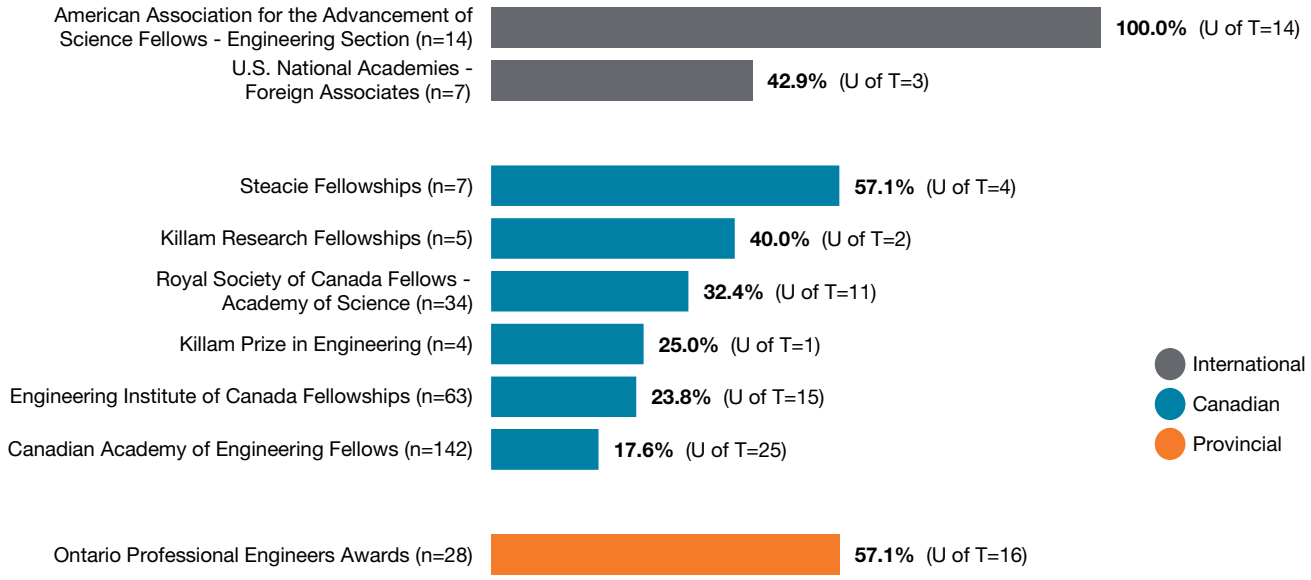


Figure 5.2b **Percentages of Engineering Faculty and Total Major Awards Received in Canadian Engineering Faculties**

	Percent of Total FTE Engineering Faculty in Canada	Percent of Total Major Awards Received by Engineering Faculties
U Toronto	5.5%	25%
U Alberta	4.4%	8.3%
U Waterloo	6.3%	8.3%
U New Brunswick	1.6%	6.7%
McMaster U	3.5%	5.0%
Memorial U	1.6%	5.0%
U British Columbia	4.2%	5.0%
Concordia U	3.8%	3.3%
U Manitoba	1.9%	3.3%
U Ottawa	2.8%	3.3%
U Saskatchewan	1.8%	3.3%
York U	1.1%	3.3%
Dalhousie U	2.2%	1.7%
École Polytechnique	5.5%	1.7%
U Guelph	1.1%	1.7%
U Laval	3.7%	1.7%
U Québec – ETS	7.9%	1.7%
Queen's U	3.4%	1.7%
Ryerson U	2.9%	1.7%
U Sherbrooke	5.0%	1.7%
U Victoria	1.3%	1.7%
Western U	2.2%	1.7%

Note 5.2a and 5.2b: The following major awards are included: International – MIT Top 35 under 35, U.S. National Academies; National – Alan Blizzard Award, CAE Fellowships, EIC Awards, EIC Fellowships, Engineers Canada Awards, Killam Fellowships, Killam Prize (Engineering), Manning Innovation Awards, Royal Society of Canada Fellowships (Engineering/Physical Sciences), RSC College of New Scholars, Artists and Scientists, Steacie Fellowships, 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, 2009–2010 to 2013–2014**



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.

2014–15: Belinda Li (ECE)
2013–14: Oscar del Rio (MIE)
2012–13: Mary Stathopoulos (ECE)
2011–12: Giovanni Buzzeo (CivE)

Early Career Teaching Award

Presented in recognition of teaching excellence early in a career.

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

Faculty Teaching Award

The highest teaching tribute awarded by the Faculty.

2014–15: Jason Foster (EngSci)
2013–14: Greg Evans (ChemE)
2012–13: Evan Bentz (CivE)
2011–12: Jonathan Rose (ECE)

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.

2014–15: Kelly Hayward (ECE)
2013–14: Luke Ng (MSE)
2012–13: Tom Nault (Office of the Registrar)
2011–12: Harpreet Dhariwal (Office of the Dean)

Influential Leader Award

Presented to a staff member who demonstrates exemplary support for the Faculty's education and research endeavours. Recipients inspire others to realize their potential through their significant and sustained contributions.

2014–15: Joe Baptista (MIE)
2013–14: Lisa Camilleri (Office of the Dean)
2012–13: Sandra Walker (IBBME)
2011–12: Austra Ozolins (ECE)

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.

2014–15: Darlene Gorzo, Jaro Pristupa and Joe Wong (ECE)
2013–14: Tomas Bernreiter (MIE)
2012–13: Khuong Doan, Adam Fox, Linda Marsh, Sergei Metropolitansky and Dan Pettigrew (Office of the Registrar)
2011–12: Jay Li (ECE)

Quality of Student Experience Award

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

2014–15: Mike Mehramiz (ECE)
2013–14: Susan Grant (ECE)
2012–13: Deborah Peart (ChemE, MIE)
2011–12: Shannon Osborne (MIE)

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.

2014–15: Honghi Tran (ChemE)
2013–14: Javad Mostaghimi (MIE)
2012–13: Elizabeth Edwards, Radhakrishnan Mahadevan and Emma Master (ChemE)

Sustained Excellence in Teaching Award

Presented to a faculty member who exhibits teaching excellence over a sustained period of time.

2014–15: Jonathan Rose (ECE)
2013–14: Glenn Gulak (ECE)
2012–13: Tarek Abdelrahman (ECE)

Engineering Alumni Association Awards

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.

2014–15: Luca Casciato (MechE 1T5); Haruna Monri (CivE 1T5)
2013–14: Christopher Sun (EngSci 1T3+PEY)
2012–13: Ryan Alafriz (IndE 1T2+PEY); Thineshan Kathirchelvan (EngSci 1T2+PEY)

7T6 Early Career Award

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

2014–15: Stefanie Blain-Moraes (EngSci 0T5); Todd Reichert (EngSci 0T5)
2013–14: Mathew Szeto (CompE 0T4)
2012–13: Terrence Michael Branch (CompE 0T3)

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.

2014–15: Janet Elliot (EngSci 9T0); Suneet Tuli (CivE 9T0)
2013–14: Ted Maulucci (MechE 8T9)
2012–13: Samantha Espley (MinE 8T8)

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.

2014–15: R. Christopher Hinde (CivE 5T0)
2013–14: Caprice Boisvert (MechE 9T3)
2012–13: Claire Kennedy (ChemE 8T9)

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.

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, PhD 6T7)
Gerald Smith (MechE 8T7)
Som Seif (IndE 9T9)
William Troost (ChemE 6T7)

2012–13:
Anthony Lacavera (CompE 9T7)
Lee Lau (ElecE 7T7, ECE MEng 8T2)
Donald Sadoway (EngSci 7T2, MSE MASc 7T3, MSE PhD 7T7)
David Wilkinson (EngSci 7T2, MSE MASc 7T4)
Anna Dunets Wills (CivE 7T6)

Engineering Alumni Medal

As the Engineering Alumni Association's highest honour, this award is presented to an alumnus/alumna who has demonstrated superior accomplishment and serves as an outstanding role model for students.

2014–15: Frank Dottori (ChemE 6T3)
2013–14: Arthur Slutsky (EngSci 7T0, IndE MASc 7T2)
2012–13: Paul Cadario (CivE 7T3)

Honorary Member – Engineering Alumni Association

2015: Ronald D. Venter (MIE)

6

World Recognition by Rankings

The globalization of higher education means U of T Engineering is competing for the brightest students, faculty and researchers with universities in Canada, North America and from around the world. While rankings are only one of many measures of the Faculty's excellence, they are widely cited as a resource top students and faculty consider when selecting U of T. The exceptional calibre of applicants continues to grow, as do the number of international students who seek admission to our prestigious programs.

In 2014, U of T was the top-ranked Canadian engineering school across all international rankings and one of the best in the world. We also ranked among the best engineering schools in North America, placing among the top 10 public universities across all rankings. Globally, U of T was the only Canadian university to place in the top 25 in the 2014 Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) for Engineering/ Technology and Computer Sciences and the Times Higher Education (THE)–Thomson Reuters World University Ranking for Engineering and Information Technology.

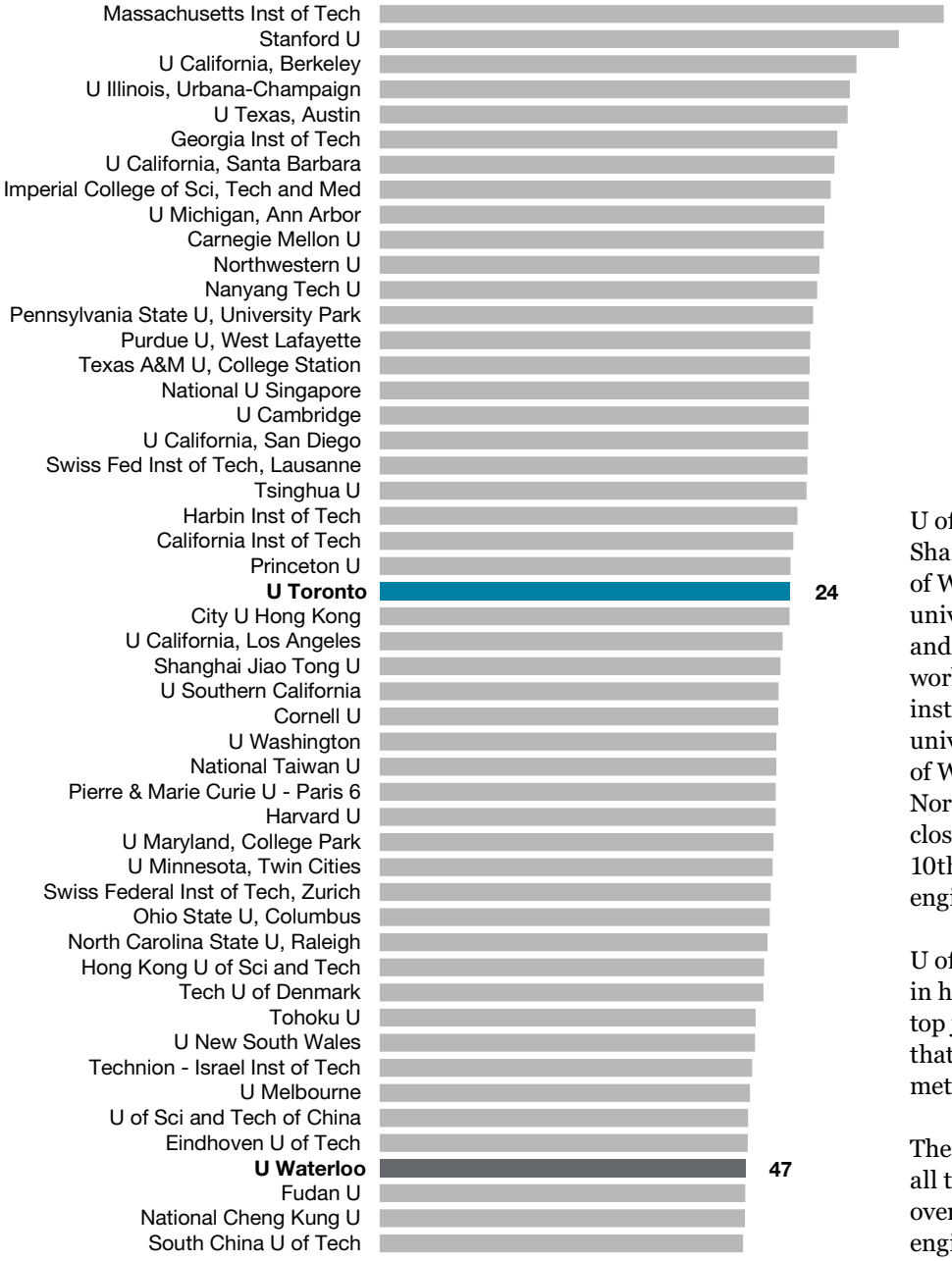
The strength and depth of U of T Engineering across all disciplines was also evident in the subject rankings carried out by QS World University Rankings for Engineering and Information Technology and National Taiwan University (NTU) Performance Ranking of Scientific Papers for World Universities. Again, U of T Engineering demonstrated its pre-eminence among Canadian engineering schools, earning first place in at least five of six subjects in both rankings for the fourth year in a row.

While U of T Engineering continued to rank first in Canada and among the top public universities in North America, the Faculty experienced some volatility in world rankings, particularly in the ARWU and QS rankings. Engineering schools across North America are being challenged by the enormous investments being made by some Asian governments in their local universities for engineering education and research. U of T Engineering is reviewing global ranking trends to gain a broader understanding of current methodologies and criteria to ensure the Faculty continues to be recognized for its excellence.

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, 2014**



U of T Engineering was highly rated in the Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) top 50 universities for engineering/technology and computer sciences, ranking 24th worldwide, the highest of any Canadian institution. The only other Canadian university in the top 50 was the University of Waterloo, which ranked 47th. Among North American public universities — our closest peer institutions — U of T ranked 10th, and was one of only three Canadian engineering schools in the top 25.

U of T led Canadian engineering schools in highly cited research and articles in top journals, two of three indicators that constitute the ARWU's evaluation methodology.

The ARWU is the longest running of all the global rankings. It has provided overall rankings since 2003 and engineering field rankings since 2007.

Note on presentation: This year we have adopted a new format for presenting the rankings that provides more context for U of T's performance. The four categories within each ranking are: (1) the top 50 global engineering schools, (2) the top North American public universities, (3) Canada's 15 leading research-intensive universities (the Canadian U15) in the top world universities, and (4) where available, subject rankings or category rankings (Canadian U15 within the top 100)

Figure 6.1b **ARWU Top North American Public Universities, 2014**

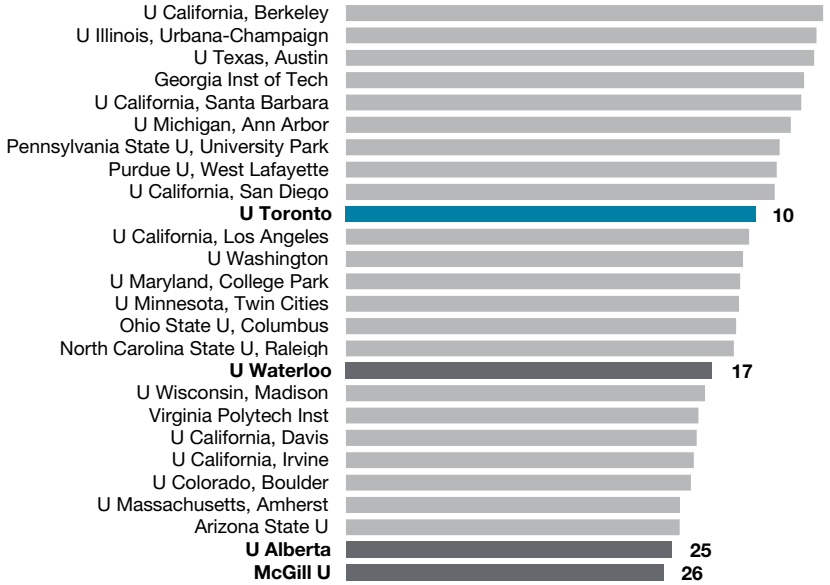


Figure 6.1c **Canadian U15 Universities in ARWU Top 200, 2014**

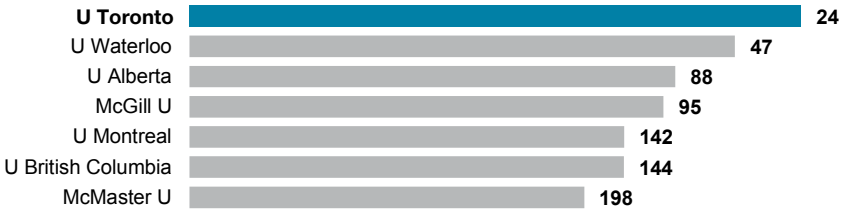
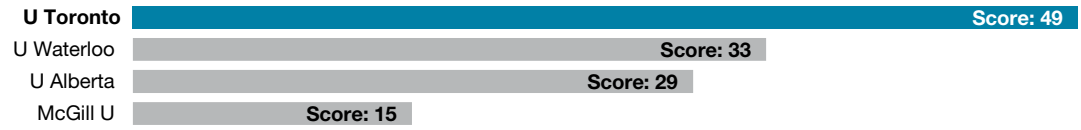


Figure 6.1d **Scoring Analysis of Canadian U15 Universities in ARWU Top 100, 2014**

Scoring on Highly Cited Research: (HiCi) Indicator



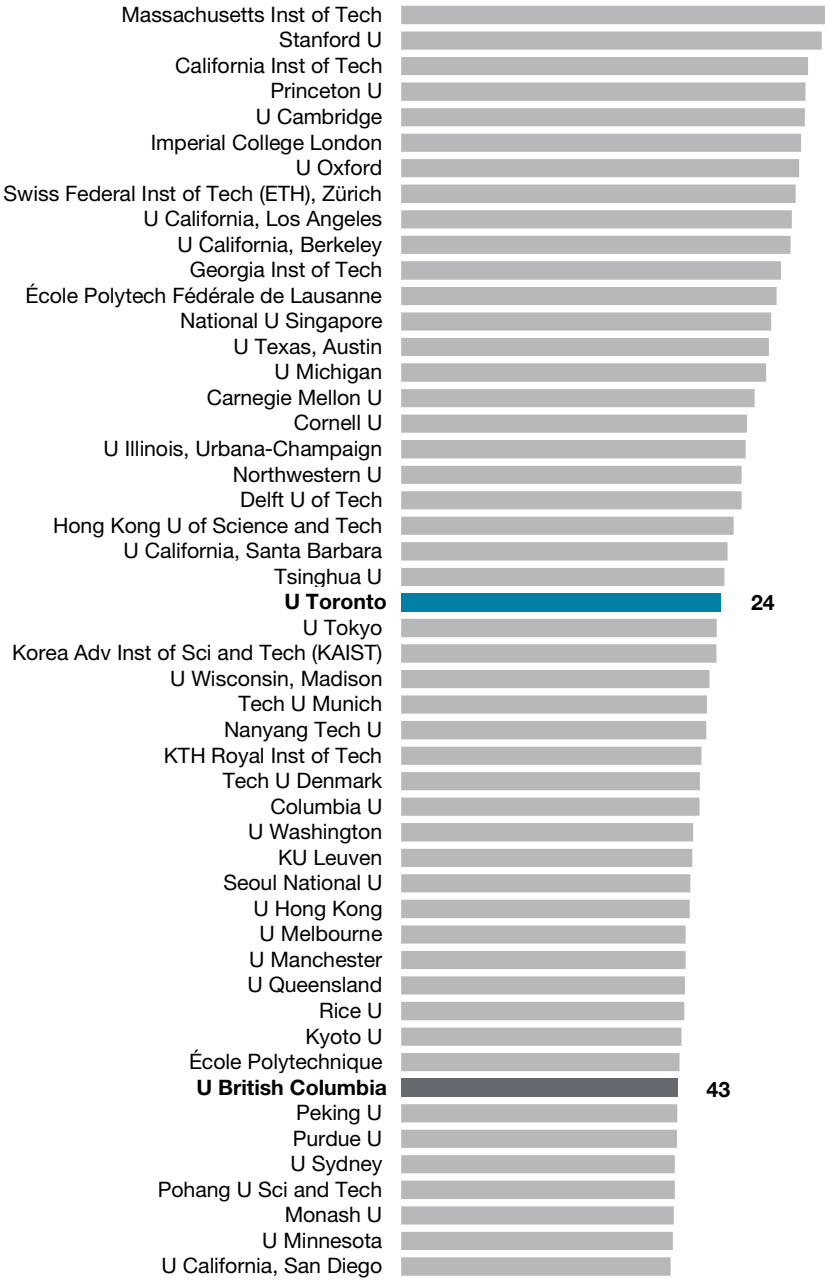
Scoring on Published Articles: (PUB) Indicator

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 Expenditure (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.

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

Figure 6.2a **THE Top 50 World Universities, 2014**



U of T Engineering's global ranking remained strong at 24th in the Times Higher Education (THE)–Thomson Reuters World University Rankings for Engineering and Information Technology. The University of British Columbia was the only other Canadian university in the top 50, at 43rd. U of T ranked eighth among North American public universities, the only Canadian university to place in the top 10.

THE is the second-longest running survey of its kind after the ARWU. What sets THE 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 per cent)
- Research: volume, income and reputation (30 per cent)
- Citations: research influence (30 per cent)
- International outlook: staff, students and research (7.5 per cent)
- Industry income and innovation (2.5 per cent)

Figure 6.2b **THE Top North American Public Universities, 2014**

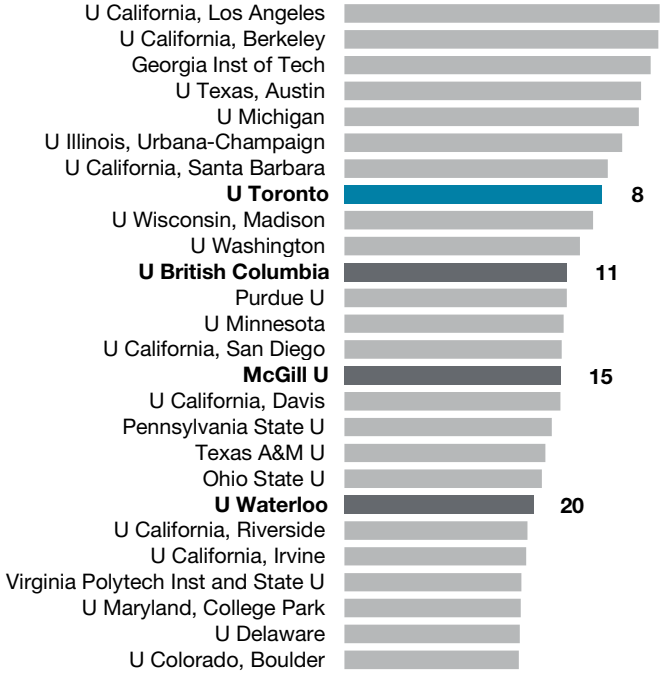


Figure 6.2c **Canadian U15 Universities in THE Top 100, 2014**

Figure 6.3a **QS Top 50 World Universities, 2014**

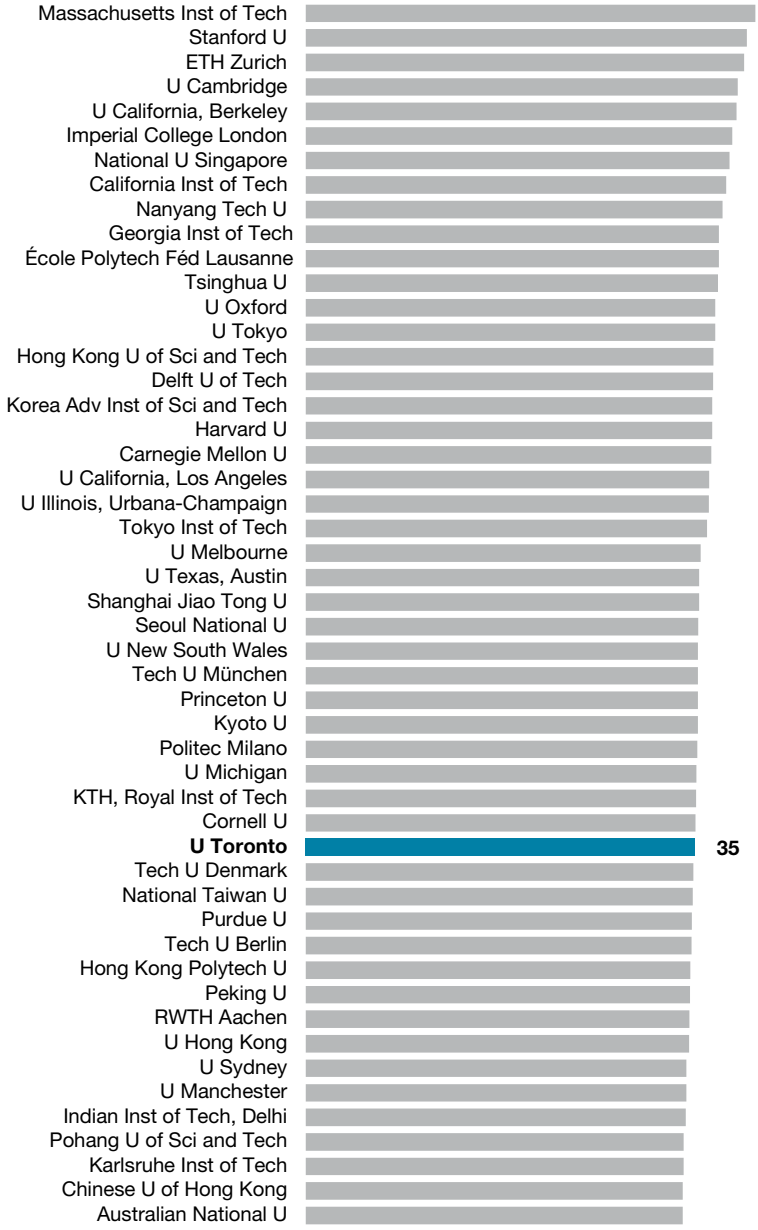


Figure 6.3b **QS Top North American Public Universities, 2014**

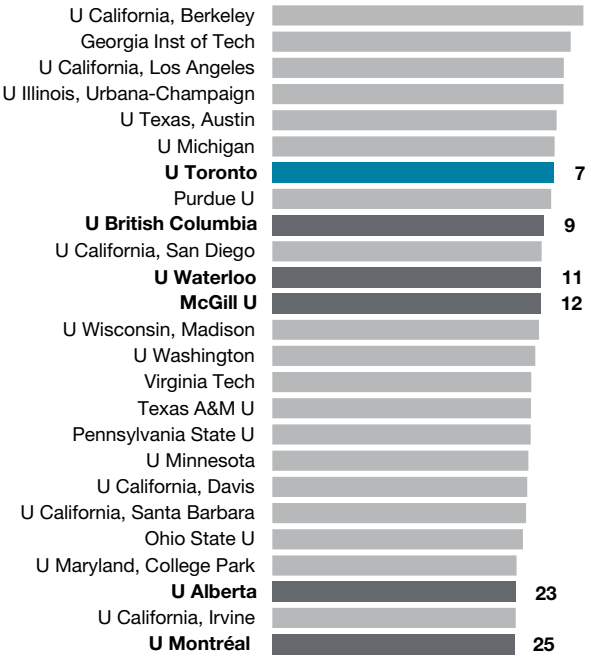
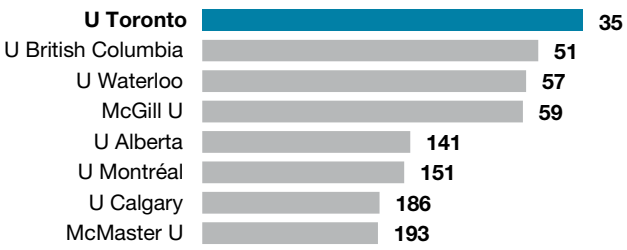


Figure 6.3c **Canadian U15 Universities in QS Top 200, 2014**



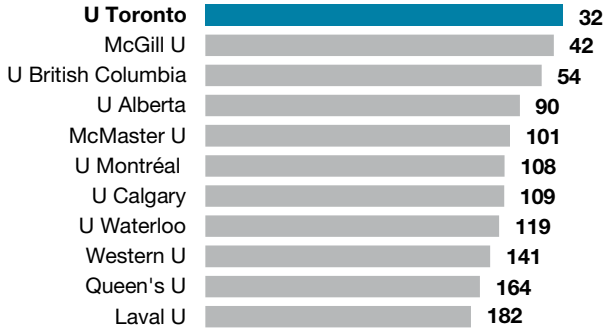
Amid intense international competition, U of T Engineering was the only Canadian university to rank in the 2014 QS World University Rankings Top 50 Universities for Engineering and Information Technology, placing 35th. As shown in Figure 6.3c, only three other Canadian schools — the University of British Columbia, the University of Waterloo and McGill University — were in the top 100. Among North American public universities, U of T ranked seventh.

In discipline-specific scoring, shown in Figure 6.3d, U of T ranked the highest of any Canadian engineering school in five out of six branches of engineering and information technology.

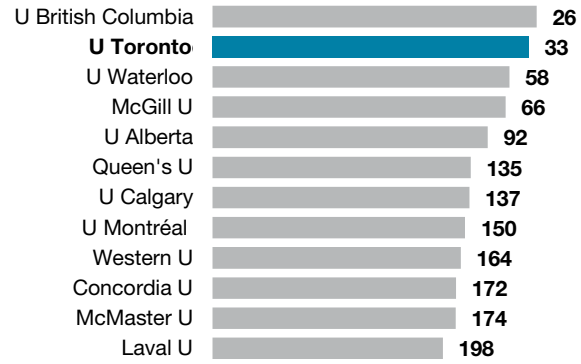
The QS World University Ranking draws on four criteria, which are weighted differently for each engineering discipline: Academic Reputation, Employer Reputation, Citations Per Paper and H-Index. The heavy emphasis on reputation is the key distinction of the QS ranking, with reputation accounting for between 50 and 80 per cent of the total score, depending on the discipline. The H-Index, first included in 2012, attempts to measure both the productivity and impact of published work based on citations.

Figure 6.3d **Canadian Universities in QS by Subject, 2014**

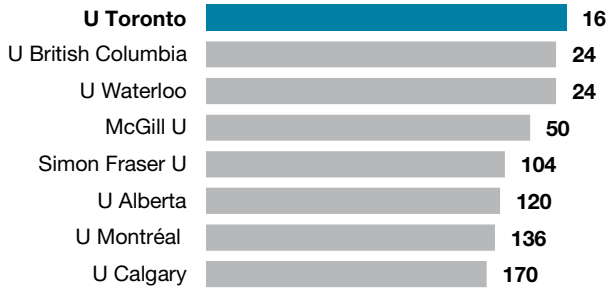
Chemical Engineering



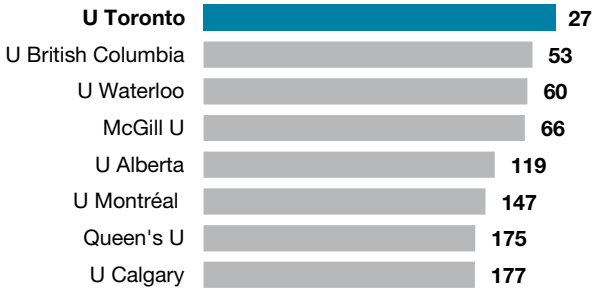
Civil & Structural Engineering



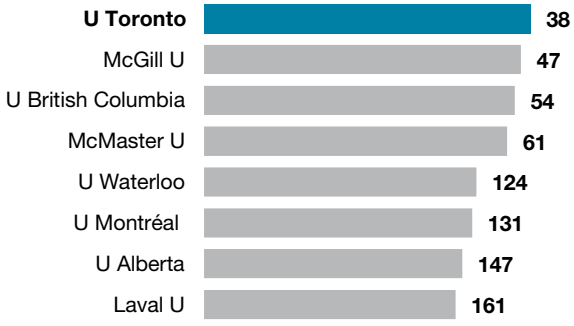
Computer Science & Information Systems



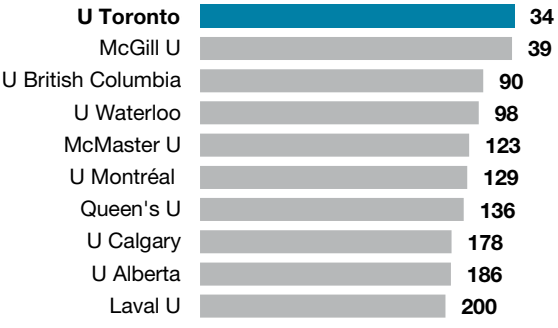
Electrical & Electronic Engineering



Materials Sciences



Mechanical, Aeronautical & Manufacturing Engineering



National Taiwan University (NTU) Performance Ranking of Engineering Papers

The international ranking administered by National Taiwan University (NTU) placed U of T Engineering 30th among world universities and number one in Canada. U of T also ranked among the best North American public universities, in eighth place.

NTU uses the publication of engineering papers as the basis on which 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 (2003–13) [10 per cent]
- Total number of articles published in the most recent year reported (2013) [15 per cent]

Research Impact

- Total number of citations in the past 11 years (2003–13) [15 per cent]
- Total number of citations in the past two years (2012–13) [10 per cent]
- Average annual number of citations over the past 11 years (2003–13) [10 per cent]

Research Excellence

- H-index (measures productivity and impact of published work) of the past two years (2012–13) [10 per cent]
- Number of highly cited papers in the past 11 years (2003–13) [15 per cent]
- Number of papers published in high-impact journals in the current year (2013) [15 per cent]

Figure 6.4a **NTU Top 50 World Universities, 2014**

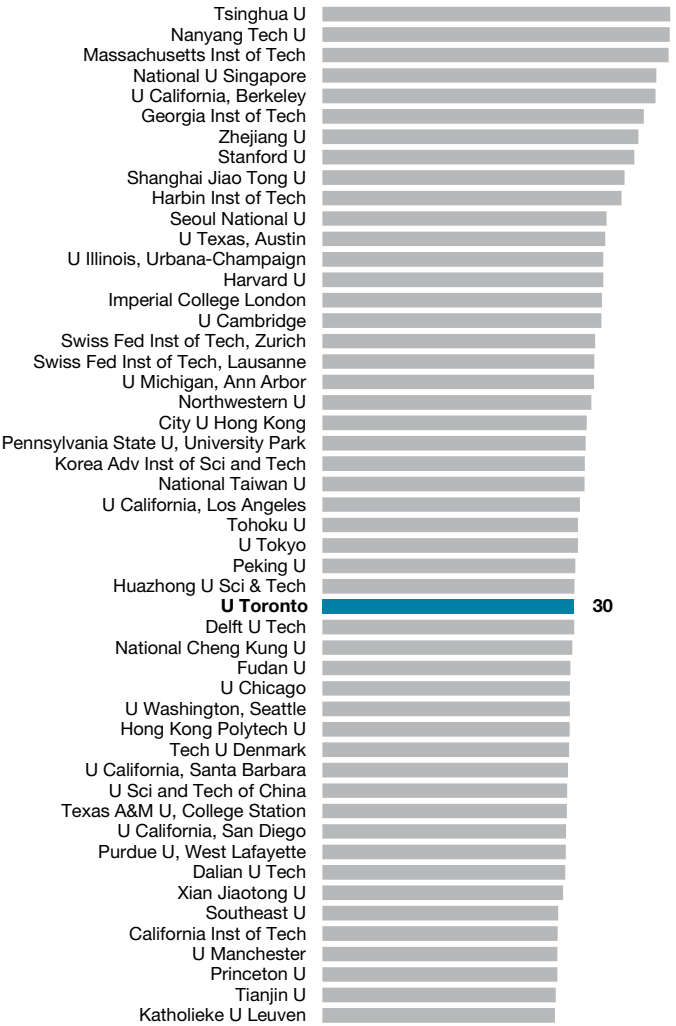
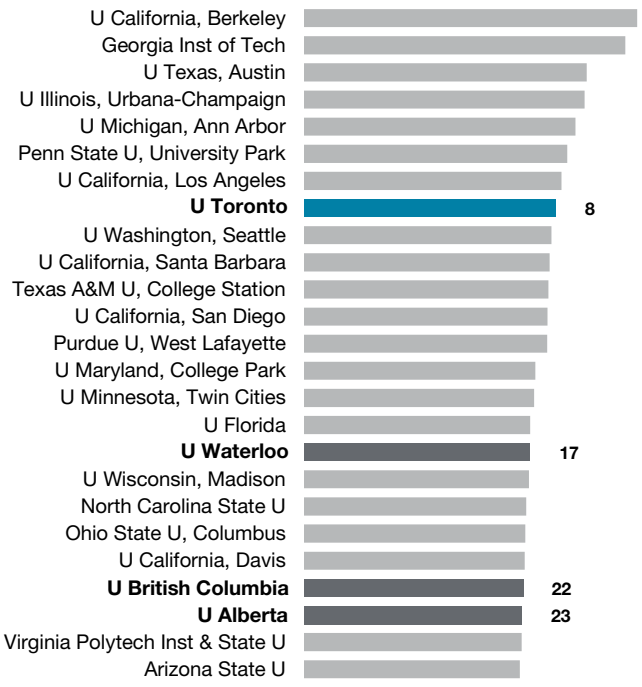


Figure 6.4b **NTU Top North American Public Universities, 2014**

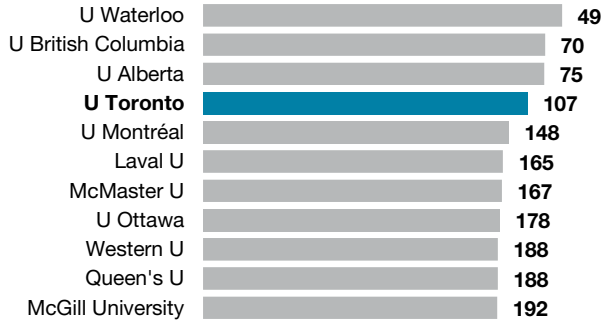


In NTU's rankings of engineering and information technology subject areas (Figure 6.4d), U of T Engineering placed first among Canadian institutions in five out of six subject rankings. U of T's Civil and Electrical Engineering programs were particularly strong, respectively ranking 10th and 19th globally.

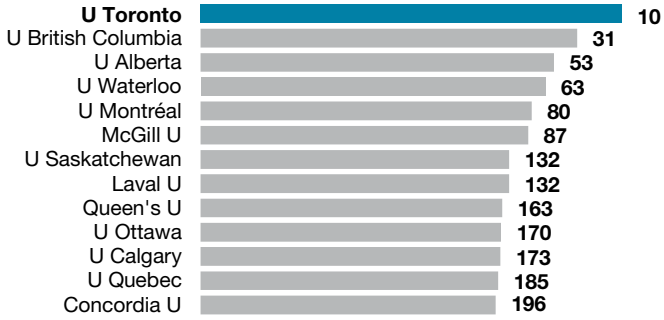
Figure 6.4c **Canadian U15 Universities in NTU Top 200, 2014**

Figure 6.4d **Canadian Universities in NTU by Subject, 2014**

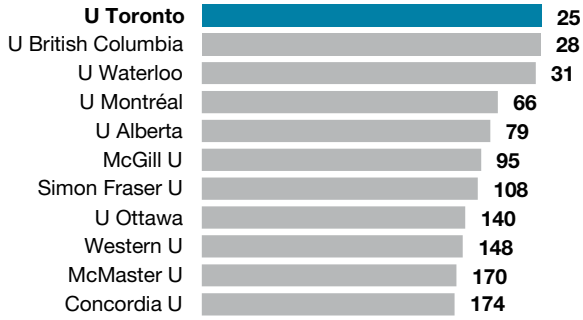
Chemical Engineering



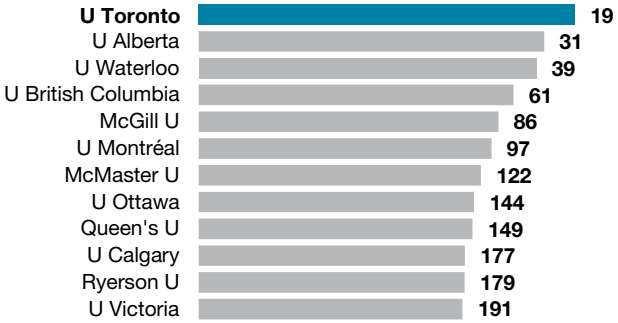
Civil Engineering



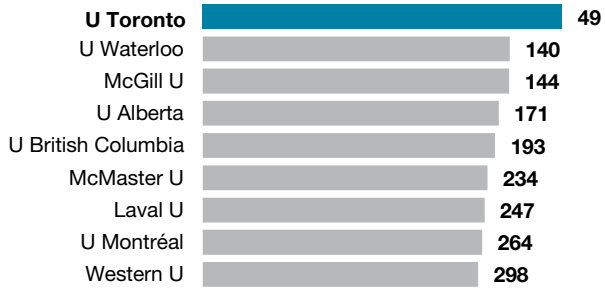
Computer Science



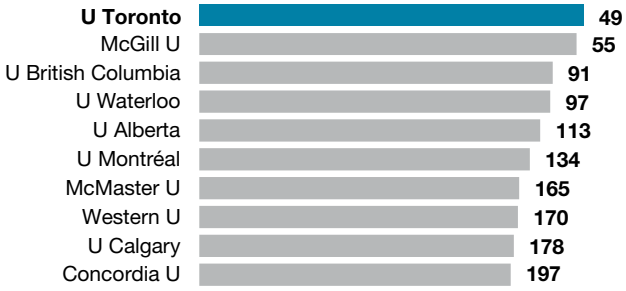
Electrical Engineering



Materials Science

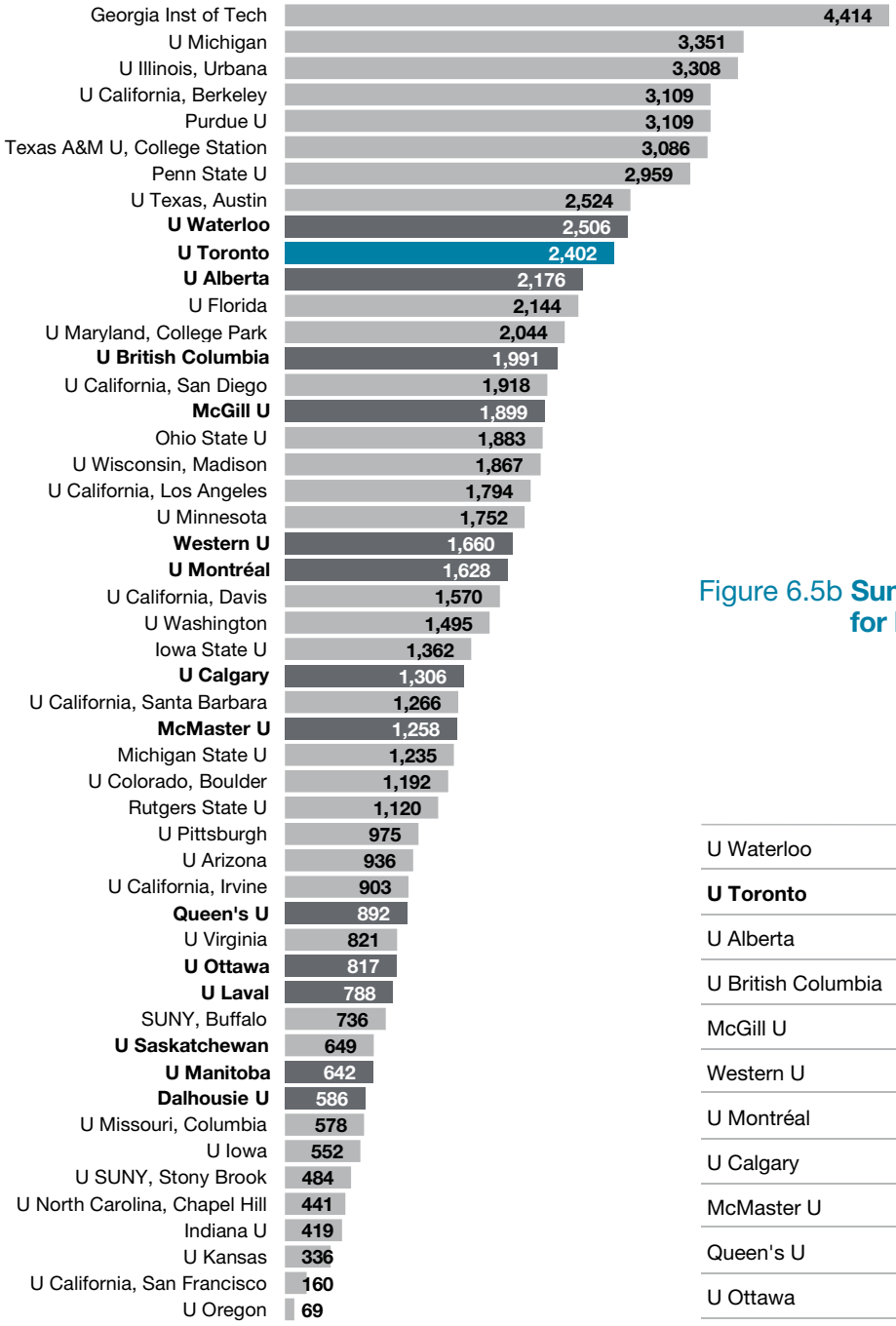


Mechanical Engineering



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, 2009 to 2013**



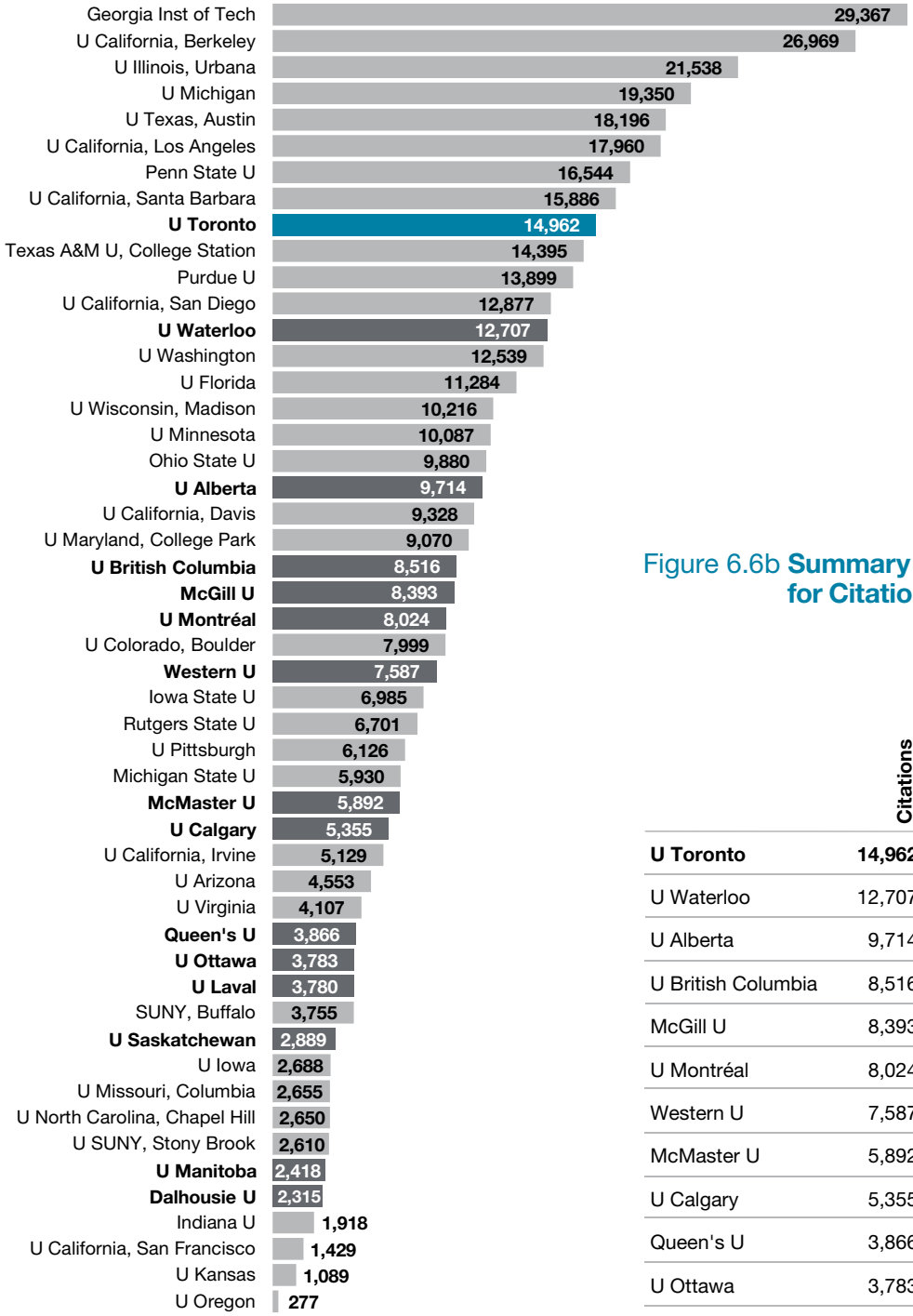
The Association of American Universities (AAU) index measures research output, productivity and intensity based on publication counts. U of T Engineering ranked 10th in North America and second in Canada with 2,402 papers, just behind the University of Waterloo, for publication counts between 2009 and 2013.

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

	Publications	Faculty Count	Publications per Faculty	Rank on Pub per Faculty
U Waterloo	2,506	270	9.3	6
U Toronto	**2,402**	**241**	**10.0**	**5**
U Alberta	2,176	192	11.3	3
U British Columbia	1,991	180	11.1	4
McGill U	1,899	135	14.1	2
Western U	1,660	95	17.5	1
U Montréal	1,628	242	6.7	12
U Calgary	1,306	161	8.1	8
McMaster U	1,258	148	8.5	7
Queen's U	892	147	6.1	14
U Ottawa	817	121	6.8	11
U Laval	788	162	4.9	15
U Saskatchewan	649	83	7.9	10
U Manitoba	642	80	8.0	9
Dalhousie U	586	94	6.2	13

Note 6.5b: Faculty counts for analysis of U15 publications per faculty member are from the Engineers Canada 2013 Resources Report.

Figure 6.6a **Number of Engineering Citations Indexed by Thomson Reuters for Association of American Universities (AAU) Public and Canadian Peer Institutions, 2009 to 2013**



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 was the ninth-most cited public institution in North America. We ranked third in Canada for citations per faculty after Western University and McGill 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 6.6b **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	**14,962**	**241**	**62.0**	**3**	**6.2**	**1**
U Waterloo	12,707	270	47.0	6	5.1	2
U Alberta	9,714	192	50.6	4	4.5	8
U British Columbia	8,516	180	47.4	5	4.3	12
McGill U	8,393	135	62.2	2	4.4	10
U Montréal	8,024	242	33.2	10	4.9	3
Western U	7,587	95	80.0	1	4.6	7
McMaster U	5,892	148	39.8	7	4.7	5
U Calgary	5,355	161	33.4	9	4.1	13
Queen's U	3,866	147	26.3	13	4.3	11
U Ottawa	3,783	121	31.3	11	4.6	6
U Laval	3,780	162	23.3	15	4.8	4
U Saskatchewan	2,889	83	35.0	8	4.5	9
U Manitoba	2,418	80	30.2	12	3.8	15
Dalhousie U	2,315	94	24.6	14	4.0	14

Summary of Ranking Results

In 2014, U of T Engineering remained the top Canadian university across all rankings and the only Canadian institution among the top 25 worldwide for ARWU and THE. We also ranked among the top 10 North American public universities across all ranking systems. Although no rankings can decisively illustrate a school's performance, world-class rankings such as the ones discussed increase our Faculty's ability to attract top faculty, researchers and students from across the globe.

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 2014	1	10	24
ARWU Scoring Detail by Category	August 2014			
– Highly Cited (HiCi)		1	12	23
– Publications (PUB)		2	9	58
– Publications in Top Journals (TOP)		1	19	66
Times Higher Education (THE)–Thomson Reuters World University Ranking for Engineering & Technology	October 2014	1	8	24
QS World University Rankings for Engineering and Technology	September 2014	1	7	35
QS World University Rankings by Subject	March 2015			
– Chemical Engineering		1	7	32
– Civil & Structural Engineering		2	7	33
– Electrical & Electronic Engineering		1	7	27
– Materials Science		1	9	38
– Mechanical, Aeronautical & Manuf. Eng.		1	7	34
– Computer Science & Information Systems		1	2	16
National Taiwan University (NTU) Performance Ranking of Scientific Papers for World Universities by Subject	October 2014	1	8	30
NTU Performance Ranking by Subject	October 2014			
– Chemical Engineering		4	24	107
– Civil Engineering		1	2	10
– Electrical Engineering		1	6	19
– Materials Science		1	10	49
– Mechanical Engineering		1	12	49
– Computer Science		1	8	25

7

U of T Engineering's priorities, both academic and capital, drove a highly successful fundraising year in 2014–2015. Major gifts from alumni, donations from graduating students and support from other members of our vibrant community, along with research gifts for broad-based research themes, reached $34.9 million, a significant increase from the previous year.

The Centre for Engineering Innovation & Entrepreneurship (CEIE), which broke ground in June 2015, is the centerpiece of our $200-million campaign for Boundless: The Campaign for the University of Toronto. Alumni around the world have generously supported the CEIE and we are working with many of our Engineering Asia-Pacific alumni groups toward ambitious fundraising goals. Together with gifts from industry partners, this support will enable us to set a new standard for engineering education and research. The CEIE will be a vibrant multidisciplinary hub that will further drive innovation, foster entrepreneurship and cultivate global engineering leaders.

We also attracted tremendous support for research, education and entrepreneurship across diverse disciplines, including major gifts for biomedical engineering and an entrepreneurship incubator at UTIAS.

We continued to enhance relationships with our international alumni community. In 2014–2015, we held 68 events around the world that connected new graduates, alumni and families of current and prospective students with the Faculty and one another. These events also offered opportunities to explore timely and relevant topics in engineering. For example, through BizSkule, our keynote speaker series for business-savvy alumni, we hosted engaging talks and networking events in Toronto, Calgary and Palo Alto, California. We also enhanced the communication channels we use to celebrate and share the accomplishments of our alumni, refreshing the design of our alumni magazine *Skulematters* and improving engagement with our quarterly alumni newsletter.

All of these achievements reflect our far-reaching impact and enhance our reputation around the globe.

Philanthropic Support

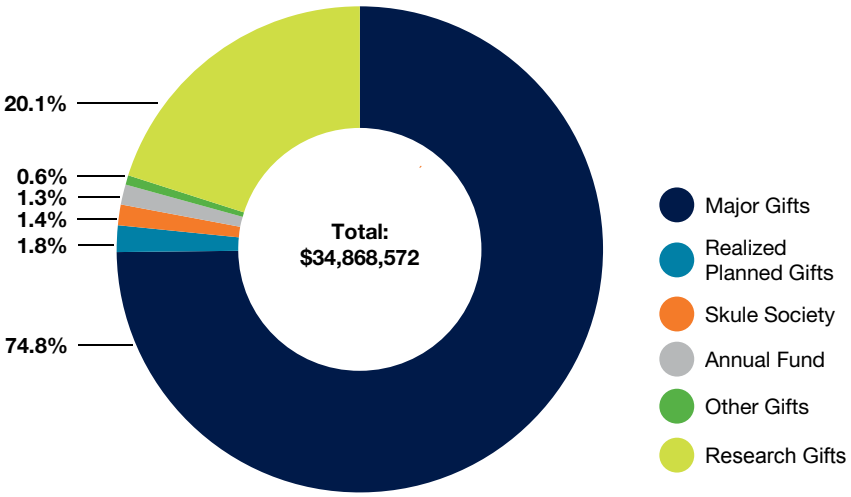
Our accomplished and committed networks of supporters — alumni, friends, faculty, staff, students and industry partners — are a key factor in making U of T Engineering the premier engineering school in Canada and one of the best in the world. We actively engage this worldwide community in opportunities to collaborate, innovate and invest their time, talents and financial gifts toward our world-leading research and education.

In 2014–2015, we celebrated a highly successful fundraising year, attracting philanthropic gifts of $27.9 million and research gifts of $7.0 million. Our overall fundraising total of $34.9 million represented an increase of 19 per cent from $29.3 million in 2013–2014. A record number of major donors supported all aspects of our Boundless campaign. To date, we have raised more than $152 million toward our campaign goal of $200 million. The Centre for Engineering Innovation & Entrepreneurship (CEIE), a core priority of the Faculty's campaign, continues to inspire donors. Collectively, thanks to the generous support of alumni and friends, along with Faculty and University commitments, we raised more than $70 million toward this transformative project — 75 per cent of total costs — before breaking ground in June 2015.

Our research, education and entrepreneurship across diverse disciplines inspired several major gifts in 2014–2015. The Rogers family donated $20.5 million to U of T Engineering as part of an unprecedented $130-million gift to create the Ted Rogers Centre for Heart Research. Francis Shen (AeroE MASc 8T3) donated $1 million to develop UTIAS *Start*, a new entrepreneurship incubator.

Engagement with the *Graditude* senior-class giving program grew, reflecting the commitment and generosity of our students and new alumni. A record 42 per cent of fourth-year students participated, up from 33 per cent in 2013–2014. The campaign designates all *Graditude* funds to student activities and clubs.

Figure 7.1a **Advancement Results, 2014–2015**



Note 7.1a, 7.1b and 7.1c: Data are shown by fiscal year (i.e., May to April).

Figure 7.1b **Philanthropic Support, 2005–2006 to 2014–2015**

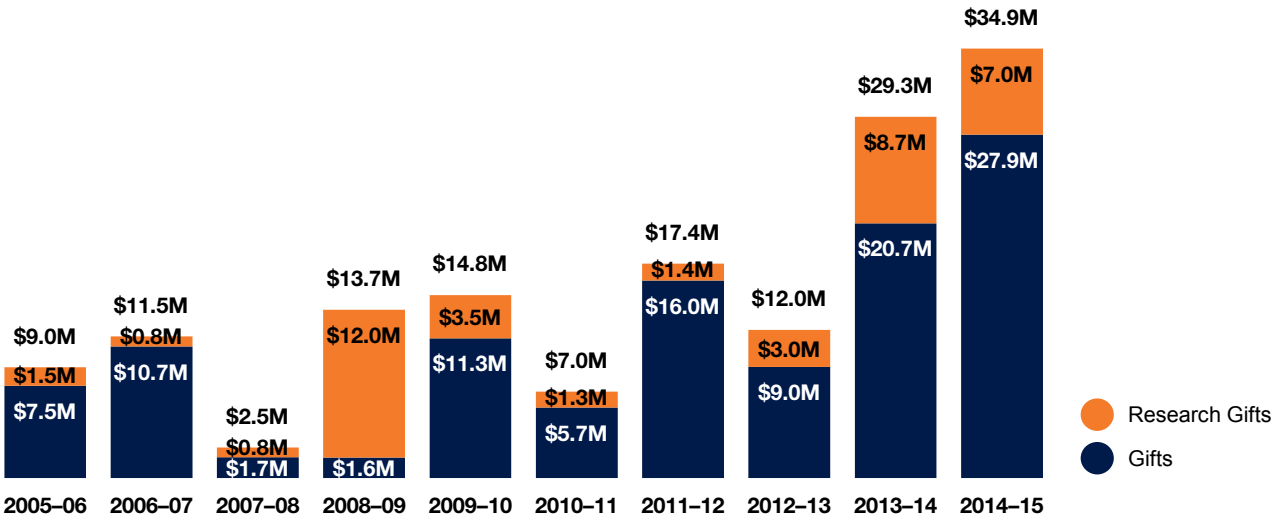


Figure 7.1c **Gift Designations, 2014–2015**

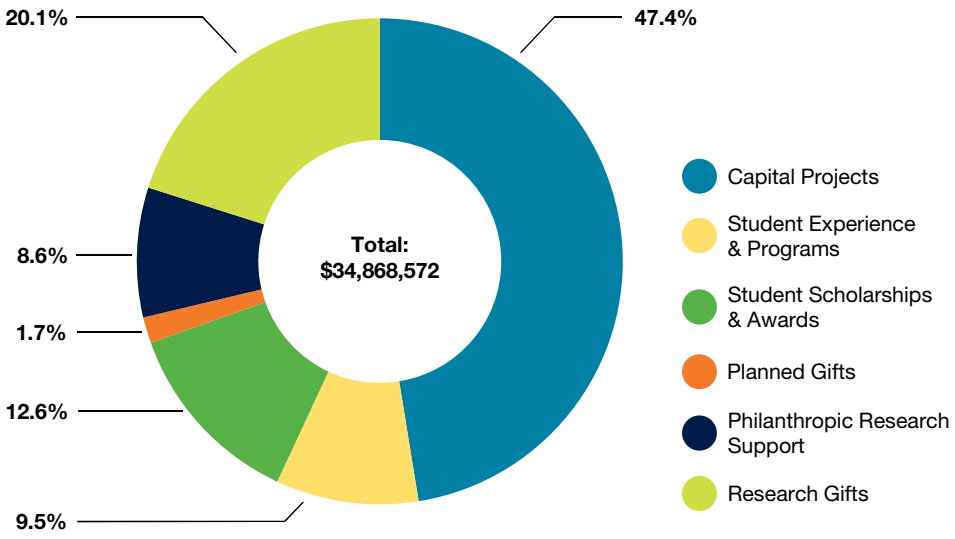
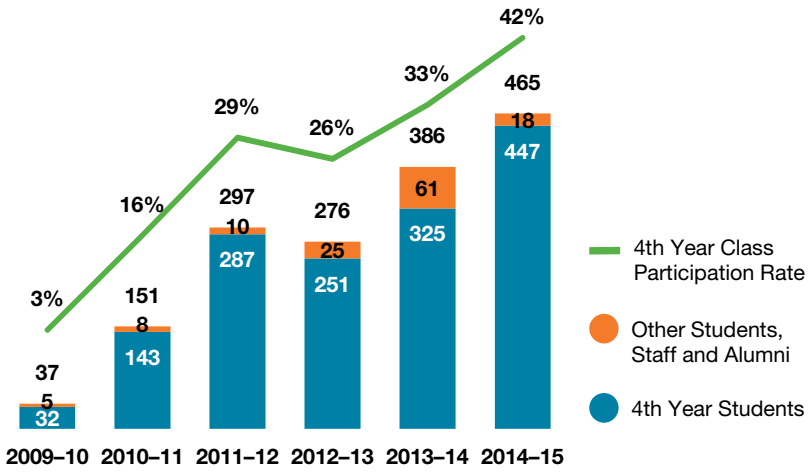


Figure 7.1d **Graditude Participation, 2009–2010 to 2014–2015**



Initiatives and Projects

Centre for Engineering Innovation & Entrepreneurship (CEIE)

Thanks to the generosity and commitment of our entire U of T Engineering community, we broke ground on the CEIE on June 24, 2015. More than 200 alumni, faculty, staff, students, industry partners and friends joined the Honourable Michael Wilson, Chancellor of the University of Toronto, Judy Goldring, Chair of the University's Governing Council, President Meric Gertler, Dean Cristina Amon, Professor Ron Venter, Chair of the Project Planning Committee, George Myhal, Chair of the Campaign Executive Committee, and former and current presidents of the Engineering Society to celebrate the milestone, which brings this transformative project one step closer to reality.

Among the generous gifts to the CEIE received most recently was Henry Wu's (EngSci 7T5, ChemE MASc 7T9) gift of $3.5 million in honour of his late father to create the Dr. Woo Hon Fai Innovation Floor, which will house conference rooms, a terrace and new spaces for the Institute for Sustainable Energy and the Institute for Water Innovation. To learn more about the CEIE, visit uoft.me/CEIE.

Dubai Reception

In December 2014, Dean Cristina Amon and members of the Advancement team hosted a reception in Dubai for alumni and parents of U of T Engineering students. The event provided an opportunity to engage with parents of current and prospective students and to raise the profile of the University in this region, which is a key focus of international recruitment. The reception will serve as a model for similar events that are being planned this year in Toronto, Hong Kong and other parts of China.

Alumni Events and Engagement

The cornerstone of the U of T Engineering community is our diverse and accomplished network of more than 46,000 alumni around the world. We invite them to see Skule™ not only as a place where they have earned a degree that is recognized internationally, but also as an ongoing resource for ideas and networking that they can draw on throughout their lifetimes. To nurture this engagement, we create meaningful and comprehensive experiences that provide opportunities for alumni to connect with faculty members, students and fellow graduates, including learning events, volunteering and regular communications. These activities strengthen our alumni network, cultivate relationships and new collaborations, highlight our Faculty's commitment to excellence and encourage alumni to support our ambitious goals.

In 2014–2015, the Engineering Society, in partnership with the Engineering Alumni Relations Office, launched Skule™ Alumni Outreach (SkuleAO). This student-run program invites alumni to engage with current students through volunteering and mentorship opportunities, networking events, open coffee houses and workshops. We also worked closely with the You're Next Career Network, a student-run networking organization, to strengthen the Alumni Mentorship Program (formerly Skule™ Mentorship Program), which fosters invaluable mentorship relationships between alumni and students. This year, the program matched 235 third- and fourth-year engineering students with 121 alumni.

In 2014–2015, we hosted 68 events for our alumni around the world. We expanded our popular BizSkule speaker series to Calgary, increasing opportunities to connect successful, business-savvy engineering alumni at different stages in their careers. This year's BizSkule events included:

- Next Generation Air Travel (April 2014, Toronto)
- The 3rd Urban Revolution: Re-thinking the Future of Transportation (October 2014, Toronto)
- The Heart of the Matter: The Future of Wearable Technology (February 2015, Palo Alto, California)
- From Crisis to Opportunity: Leadership for Challenging Times (May 2015, Toronto)
- Enterprising Engineers: Knowing When and How to Embrace Opportunity (June 2015, Calgary)

We continued to reach out to regional alumni chapters in Asia-Pacific to further strengthen this important area. We also expanded partnerships with the Engineering Recruitment Office to offer opportunities for alumni in key regional areas to be ambassadors for recruitment.

Alumni volunteerism continues to thrive, with more than 167 participating in various committees

and advisory boards both at the Faculty and University levels.

We also took a number of steps to improve our communications with alumni. In response to a comprehensive readership survey in November 2014, we expanded and brought a fresh new look to *Skulematters*, our annual alumni magazine, which was well-received by alumni and key donors. Significant improvements to the format and readability of our quarterly alumni newsletter led to an increase of 10 percentage points in open and click-through rates, pushing them well above the industry average for education communications. We more than doubled the number of original and repurposed stories for the alumni news website, including donor profiles, research features and student successes. The increase in rich content contributed to a 44 per cent increase in site pageviews over the previous fiscal year. We also created dedicated web pages for Engineering Alumni Association chapters in Calgary and Hong Kong, and are in the process of doing the same for the San Francisco Bay Area chapter, helping to increase their profile and market their regional events. We worked strategically to improve the visibility of these achievements and connect with our alumni through social media.

Gift Highlights

Rogers Family — $20.5 million

In November 2014, the Rogers family donated $130 million — the largest private donation in Canadian health-care history — to create the Ted Rogers Centre for Heart Research (TRCHR). The new Centre unites research expertise from the University of Toronto, the Hospital for Sick Children (SickKids) and the University Health Network (UHN). Together, these organizations are matching the Rogers family gift with $139 million, for a total investment of $269 million. With a goal of reducing hospitalization for heart failure by 50 per cent in Canada over the next decade, the cross-disciplinary TRCHR was conceived in memory of the late Ted Rogers, who spent his life embracing new technologies and also had first-hand experience with heart disease.

U of T Engineering received $20.5 million of the donation, which will be dedicated to transformative research and commercialization at the Institute of Biomaterials & Biomedical Engineering (IBBME), a unique, multidisciplinary graduate research unit at the cutting edge of innovation in biomedical engineering.

Several U of T Engineering faculty members and graduate students will join the TRCHR as part of a new Translational Biology and Engineering Program (TBEP). Here, they will combine stem cell technology with tissue engineering to regenerate heart tissue, heart valves and cardiovascular vessels. The research will reveal new possibilities for more effective heart therapies and create new technologies for improving heart diagnosis and monitoring in clinics. The donation enables the expansion of IBBME's state-of-the-art laboratories, and also creates two new Chairs — one in Immuno-Bioengineering and another in Cellular Systems Modelling.

The Rogers family donation is not the first in support of U of T Engineering's research and teaching excellence. In 2000, they gave $25 million to establish two research chairs — the Edward S. Rogers Sr. Chair in Engineering and the Velma M. Rogers Graham Chair in Engineering — and endow graduate and undergraduate scholarships that supported 150 students in the last year alone and more than 1,600 students since it was established. The Faculty also renamed the electrical and computer engineering department in honour of Ted Rogers' father, Edward S. Rogers Sr., who was a student in the department from 1919 to 1921.

Francis Shen — $1 million

Francis Shen (AeroE MASc 8T3) knows what it takes to succeed as an entrepreneur after creating Aastra, a multimillion-dollar company, right out of graduate school. Now, Shen is helping U of T Engineering nurture the next generation of entrepreneurs with a $1-million gift to establish an entrepreneurship incubator called UTIAS *Start*. The program will provide mentorship, networking and funding to participants with promising ideas, while encouraging collaboration among groups.

Lyon Sachs — $1 million

Ottawa-based developer Lyon Sachs (IndE 4T9) has provided a $1-million gift to strengthen collaborations between U of T Engineering and Israel's Technion Institute of Technology. His gift builds on earlier support, which combined with his current donation totals $2 million toward this collaboration. Like his initial gift in 2009, the initiative is designed to accelerate research collaborations between U of T's Faculty of Applied Science & Engineering and Technion in biomedical and civil engineering.

Brookfield Foundation — $700,000

The Brookfield Foundation donated generously to the CEIE to celebrate the leadership of George Myhal (IndE 7T8), chief operating officer at Brookfield Asset Management, Inc., who provided a pace-setting $5-million gift in 2012 to support this transformative initiative. Myhal also chairs the Engineering Campaign Executive Committee for the Faculty's campaign, of which the CEIE is the cornerstone.

Fostering Alumni Entrepreneurship

A culture of entrepreneurship runs throughout the U of T Engineering community. The Entrepreneurship Hatchery, as well as incubators in other parts of the university, including the Rotman School of Management's Creative Destruction Lab and Techno, provide resources, mentorship and community to turn ideas into successful startups. We celebrate some of our young alumni entrepreneurs who achieved remarkable success over the past year.

- Michael G. Helander (EngSci 0T7, MSE PhD 1T2), Xiaofeng Terry Xu (MSE MASc 1T2), Zhibin Wang (MSE PhD 1T2) and others from MSE worked through Rotman's Creative Destruction Lab to launch OTI Lumionics, which is dedicated to commercializing organic light-emitting diodes (OLEDs) through its flagship consumer product, the aerelight. Sustainable Development Technology Canada recently awarded the company $5.7 million to implement a pilot production line capable of producing high volumes of OLED lighting panels.
- Xavier Snelgrove (EngSci 1T1) and William Walmsley (MIE MASc 1T2) worked through Rotman's Creative Destruction Lab to develop Whirlscape, a smarter, more responsive keyboard for smart phones.
- Richard Medal (ECE 1T2+PEY) worked through U of T's Techno program to create a custom electronics lab kit for use in undergraduate laboratory courses.

8

Communications

Showcasing our undergraduate and graduate programs, our world-leading research and innovation, and the remarkable accomplishments of our faculty, students and alumni enhances our profile and visibility as one of the best engineering schools in the world. It is also part of our strategy to attract the brightest students in Canada and internationally, to increase the diversity of our research and learning community and to nurture relationships with our alumni, friends and industry partners.

In 2014–2015, we refined our strategic communication foci to support the objectives of the Faculty's Academic Plan, the Boundless Campaign and the University's strategic priorities. One of the first projects to benefit from this renewed focus was our new Faculty website (launched in May 2015), which enhances our ability to communicate with our diverse audiences, integrates more seamlessly with social media channels and is optimized for the increasing proportion of our users who access our content from mobile phones and tablets. We also built a new Engineering news website to better highlight our research, education and innovation, and a "Say Yes to U of T Engineering" microsite to support the Faculty's recruitment goals.

Proactive media outreach resulted in a substantial increase in the Faculty's media coverage, the majority of which appeared in international outlets. We also continued to enhance social media engagement with our Facebook and Twitter audiences and established a Faculty presence on Instagram, which provided additional opportunities to steer traffic to our comprehensive online content.

Closer coordination and collaboration among the more than 30 Faculty communicators who make up the Engineering Communications Network continued to be a priority. Regular meetings featuring information-sharing and a strong professional development component are enhancing the quality and consistency of our storytelling and better positioning the Faculty as a leader among global engineering schools.

Selected Communication Projects

Integrated Women in Engineering Media Campaign

In 2015, we executed our first targeted media campaign to celebrate women in engineering and build on the success of our strategies to recruit more women to U of T Engineering. The campaign included a "Say Yes to U of T Engineering" microsite (women.engineering.utoronto.ca), online news stories and focused media relations efforts. A January 2015 story celebrating the high proportion of women in our 2014–2015 first-year class — "U of T Engineering celebrates record number of female first-year students" — launched the campaign, securing 12,154 pageviews and a total social media reach of more than 653,300 as of April 30, 2015. Our proactive public relations outreach led to 120 media stories, with more than 23 million impressions, over four months across Canada and around the world. This campaign was part of a coordinated, Faculty-wide initiative to recruit women students, which also included enhanced communication efforts to promote the Girls' Leadership in Engineering Experience (GLEE) and a Women in Science and Engineering poster mailing to select high schools.

Launch of Engineering News Site

In August 2014, we launched a news website (news.engineering.utoronto.ca) to better profile our Faculty's world-leading education, research and innovation. In addition to allowing us to tag stories by strategic communications foci or academic unit, the site is mobile-friendly, enables enhanced search-engine optimization, improves analytics reporting and opens up opportunities for more dynamic and shareable content. Our stories are now receiving significantly more readers, with overall pageviews and pageviews per story both increasing by more than 70 per cent since launch.

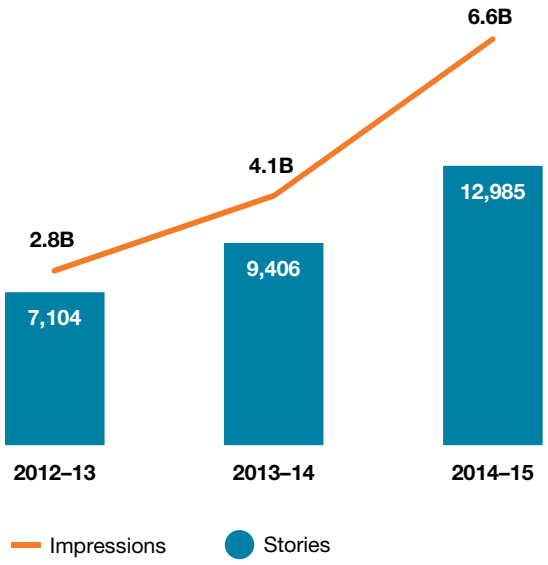
New Faculty Website

The U of T Engineering website is often our first point of contact with prospective students, partners and media from around the world. We launched the new Faculty website in May 2015 to enhance our online presence, communicate more effectively with our diverse audiences and provide better integration with social media channels. Working with a global agency, we developed a clean, modern design for the website with an improved information architecture. It is more user-friendly and easily accessible to the increasing proportion of visitors who interact with our website on tablets and mobile devices. The site complies with the World Wide Web Consortium Web Content Accessibility Guidelines (WCAG) 2.0.

Redesign of Faculty and Staff Newsletter

We redesigned our faculty and staff newsletter this past year to increase internal engagement and to share information more effectively across the Faculty. In the five months after the new newsletter launched, the average open rate increased by five percentage points compared with the previous five months (38 per cent compared with 33 per cent). We implemented the new format after a survey of faculty and staff in November 2014 indicated that internal groups wanted more concise and curated information. Increased open rates, combined with relatively level engagement (measured as average click rate), indicate that these changes were successful in meeting the needs of our internal audience.

Figure 8.1a **U of T Engineering Media Stories and Potential Impressions, 2012–2013 to 2014–2015**



Note 8.1a: Impressions are the estimated number of people who may have interacted with a story, based on circulation (newspaper/magazines), viewers (TV), listeners (radio) and unique monthly visitors (online).

Media Coverage

The Faculty secured 12,985 media stories between May 1, 2014 and April 30, 2015, an increase of 38 per cent over 2013–2014. Impressions — the estimated number of people who may have interacted with a story based on circulation (newspaper/magazines), viewers (TV), listeners (radio) and unique monthly visitors (online) — reached 6.6 billion, an increase of 62 per cent over the previous year. This media coverage helped build the Faculty's and University's national and international reputation in strategic areas of focus. Sixty per cent of these stories appeared in non-Canadian media outlets, up from 47 per cent in 2013–2014, significantly increasing the Faculty's international presence (Figure 8.1c).

The following list includes selected highlights of our media coverage:

Bioengineering/Health

- ECE researchers published a paper in *Science* on decoding the human genome using machine learning (Globe and Mail, Scientific American, WIRED Magazine, National Post, Ottawa Citizen, Vancouver Sun)
- Two IBBME PhD students won the Canadian James Dyson Award for a 3D skin bio-printer (CBS News, Fast Company, Huffington Post, CBC News Online)

Sustainability

- A civil engineering professor published two different papers, one in *Nature Climate Change* that demonstrated how electricity must come from low carbon sources for green technologies to lower emissions, and another in the *Proceedings of the National Academy of Sciences* that tracked resource use in megacities (BBC World Service, Quartz, NBC News, The Atlantic CityLab, NU.nl, Tendencias21, Globe and Mail, CBC Radio One, Smithsonian Magazine, Discovery News)
- ChemE researchers demonstrated that air pollution from vehicles travels farther than thought (CBC The National, VICE Motherboard, Toronto Star, CP24, 680 News, Huffington Post Canada)
- An ECE postdoctoral researcher designed technology that could enable spray-on solar cells (UK Daily Mail, Popular Science, Fast Company, GigaOm, Futurism, Gizmag, CBC News, Discovery Channel, Space Channel)

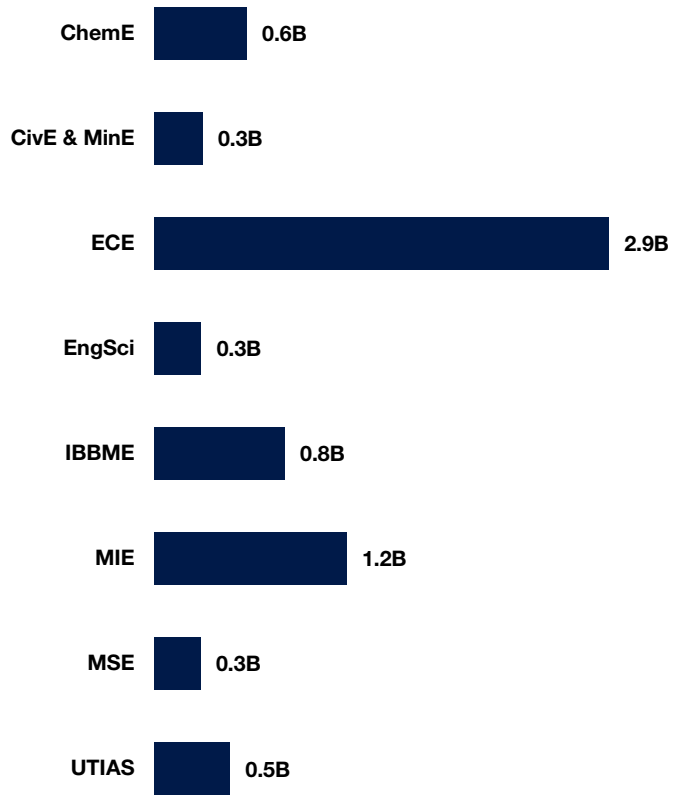
Engineering Experiential Learning

- Engineering students design fuel-efficient car and win international Eco-Marathon (FOX News, Fast Company, About.com, CBC News)
- Engineering students design, build and race concrete canoes across Toronto's waterfront in the 2015 Canadian National Concrete Canoe Competition (Global News National, CTV News National, CBC Radio One, CP24 Toronto, Fairchild TV)

Entrepreneurship/Commercialization

- U of T Engineering startup OTI Lumionics expands with organic LED manufacturing (Financial Post, TreeHugger, Forbes, Canadian Manufacturing, Ottawa Business Journal, Gizmag)
- Engineering alumni startup Bionym continues to develop and expand Nymi, its wearable, encrypted, bracelet-like device (Forbes, Business Insider, Tech Crunch, Denver Post, CNET, Globe and Mail, BC's The Province)

Figure 8.1b **Proportion of U of T Engineering Impressions by Academic Area, 2014–2015**



Note 8.1b One media story can reference multiple departments. The impressions for one story may be included in the counts of multiple departments.

Figure 8.1c **Proportion of U of T Engineering Media Stories by Outlet Location, 2014–2015**

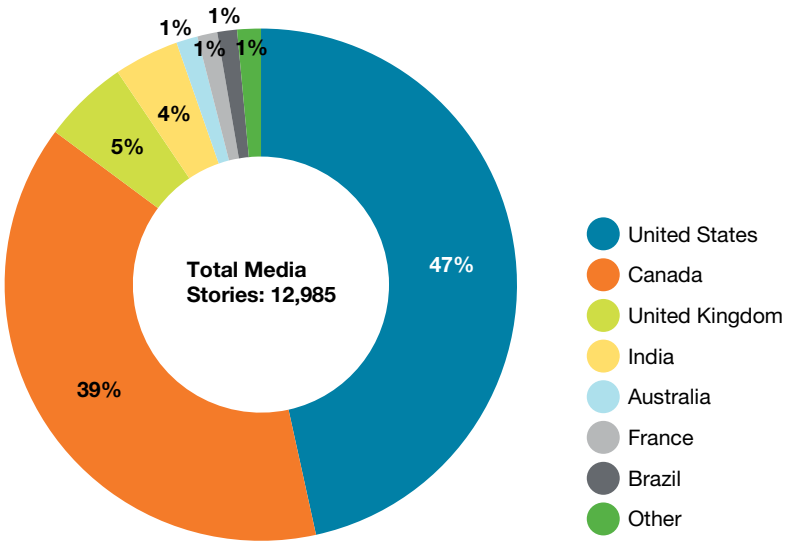
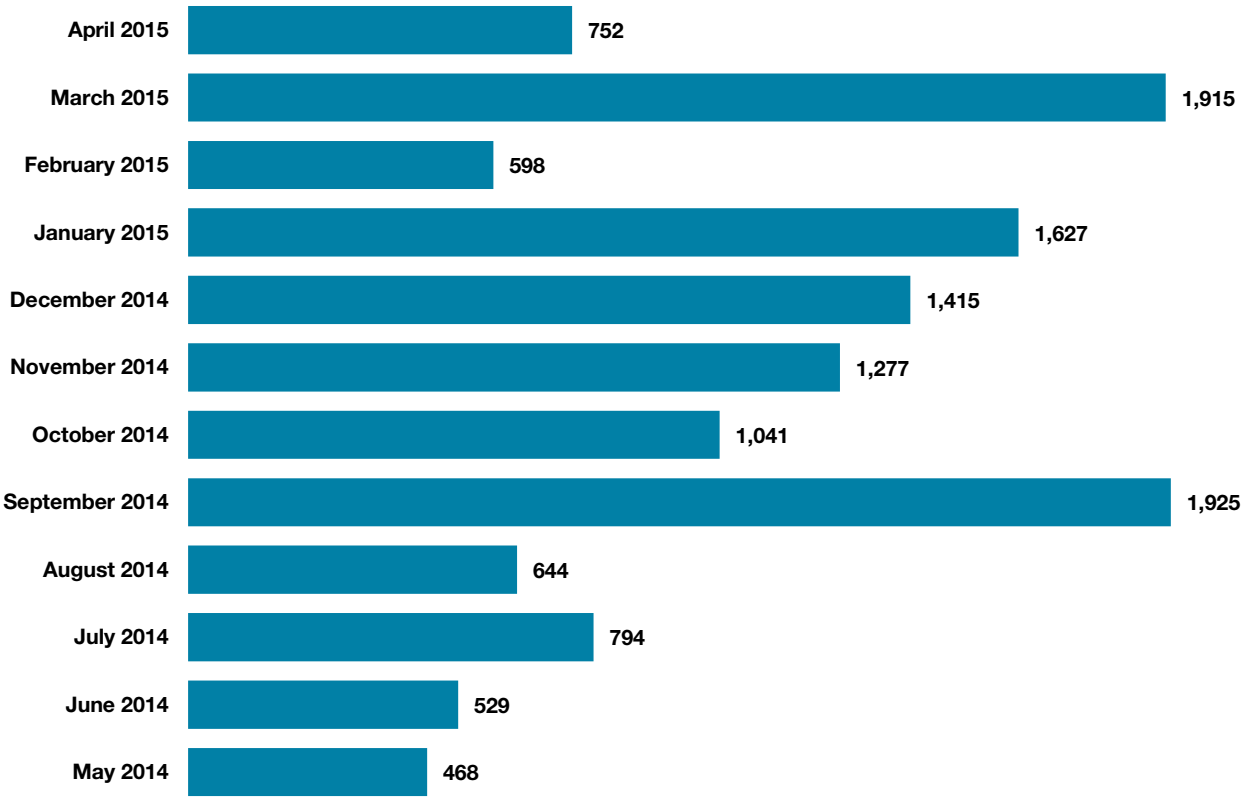


Figure 8.1d **Media Stories by Month, 2014–2015**



Note 8.1c: One media story can reference multiple countries. The impressions for one story may be included in the counts of multiple countries.

Engineering News at U of T

Since the launch of the new Engineering News website in August 2014, our news stories have been reaching more people around the world. Pageviews this year grew to 125,874, up nearly 70 per cent from 74,661 in 2013–2014. Pageviews per story increased by more than 70 per cent. International interest in our stories grew, with pageviews from the United States reaching 14,106, up more than 140 per cent from a year earlier, and pageviews from outside North America reaching 17,554, up 57 per cent from 11,199 a year earlier.

Figure 8.2 **Top Stories on the Engineering News and U of T News Websites, 2014–2015**

Story Title	Date Posted	Reads on Engineering News site*	Reads on U of T News site*	Total Reads*
Machine learning reveals unexpected genetic roots of cancers, autism and other disorders	Dec. 18, 2014	686	12,476	**13,162**
New technique offers spray-on solar	Dec. 5, 2014	12,999	-	**12,999**
U of T Engineering celebrates record number of female first-year students	Jan. 28, 2015	6,149	6,005	**12,154**
Historic $130-million gift to establish the Ted Rogers Centre for Heart Research	Nov. 20, 2014	1,314	6,617	**7,931**
U of T engineer takes L'Oréal-UNESCO honour for 'stem cell space suits'	Mar. 3, 2015	1,683	5,247	**6,930**
Why this U of T biotech entrepreneur made MIT's Innovators Under 35 list	Aug. 20, 2014	410	6,083	**6,493**
New family of light-converting materials points to cheaper, more efficient solar power and LEDs	Jan. 29, 2015	5,089	1,049	**6,138**
Could this first-year undergrad be the (next) Einstein?	Jul. 3, 2014	375	5,512	**5,887**
Eco-alternatives could do more harm than good, it depends where you live	Mar. 4, 2015	1,045	2,081	**3,126**
Eight female engineering alumnae on the rise	Mar. 3, 2015	2,709	-	**2,709**
Portable HIV testing device developed at U of T Engineering receives $5 million in venture capital	Mar. 19, 2015	473	2,020	**2,493**
Engineering a bright future: Ten female students to watch	Mar. 5, 2015	2,467	-	**2,467**
This car travels 1,152 kilometres on one litre of fuel	May 22, 2014	782	1,587	**2,369**
3D skin printer wins engineering students Canada Dyson Award	Sep. 19, 2014	418	1,771	**2,189**
16 U of T Engineering students receive Cressy Awards	Apr. 17, 2015	2,122	-	**2,122**
Micah Stickel named to Top 20 Under 40 by American Society for Engineering Education	Sep. 22, 2014	2,001	-	**2,001**
A glimpse into collaborative learning at the CEIE	May 1, 2014	526	1,379	**1,905**
Engineering alumni build the world's first consumer-ready OLED lamp	Oct. 9, 2014	414	1,432	**1,846**
Traffic emissions may pollute 1 in 3 Canadian homes	Apr. 21, 2015	1,814	-	**1,814**
U of T engineers use "Sperm Olympics" to help couples get pregnant faster	May 12, 2014	298	1,514	**1,812**
Malaysian Airlines Flight MH17: Examining the evidence	Jul. 23, 2014	335	1,465	**1,800**
PEY: what students and employers are saying about Canada's largest paid engineering internship program	Apr. 28, 2015	1,740	-	**1,740**

* Measured as total pageviews

Online Activity

The new Faculty website continues to be a hub for information and news about U of T Engineering that serves our diverse audiences, including current and prospective students, alumni, donors, faculty, industry partners, staff, media and the general public. While the total number of visits to the Faculty website decreased in 2014–2015 with the creation of a separate Engineering news website, the number of unique visitors increased. The total number of visits to both websites in 2014–2015 was more than 439,000, significantly more than the 379,915 visits the main Faculty website attracted the previous year.

Nearly 17 per cent of visitors to the main Faculty website now access it on mobile devices, such as smartphones and tablets, up from 12.7 percent in 2013–2014. This growth reinforces our objective to upgrade our websites to more mobile-friendly platforms.

The "Say Yes to U of T Engineering" site (women.engineering.utoronto.ca) received more than 3,800 pageviews when it launched in March 2015 until the end of April 2015. The site also reached its target demographic; more than half of Google users who visited the site during that period were women, and nearly 40 per cent were between the ages of 18 and 24. Top pages included:

- Homepage (women.engineering.utoronto.ca)
- 10 Students to Watch (women.engineering.utoronto.ca/10-students-watch)
- Why Engineering (women.engineering.utoronto.ca/why-engineering)

Our recruitment website (discover.engineering.utoronto.ca) drew more than 115,000 unique visitors in 2014–2015. More than one-third of visitors came from outside Canada, supporting the Faculty's efforts to recruit students in strategic locations (Figure 8.4).

We continue to expand our social media presence, particularly as a strategy to steer audiences to our online content. We increased our average monthly Twitter impressions by 14 per cent to 50,000, up from 44,000 in 2013–2014, and doubled our engagement to 2 per cent, up from 1.1 per cent in 2013–2014. Our Facebook followers doubled to 2,043, up from 999 in 2013–2014. The Faculty's Instagram account gained more than 300 followers in its first six months, a number that is growing steadily.

Figure 8.3a Summary of Analytics for engineering.utoronto.ca and news.engineering.utoronto.ca, 2013–2014 to 2014–2015

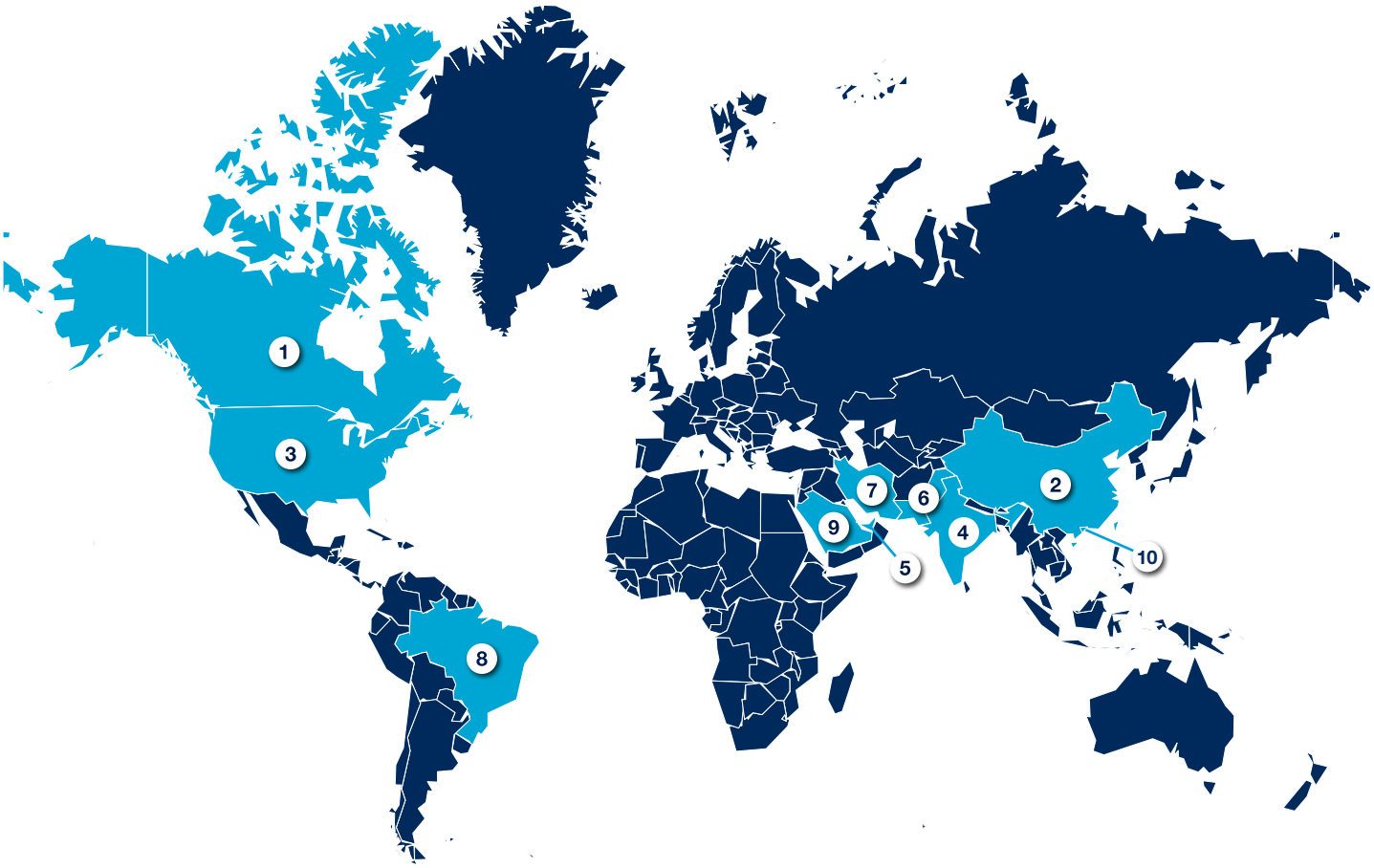
	2013–2014	2014–2015	
	Faculty Site	Faculty Site	News Site
Total number of visits	379,915	363,470	75,957
Number of unique visitors	237,134	241,618	57,659
Average number of pageviews per visit	2.20	2.02	1.51
Average amount of time spent on site	2:47 min	2:29 min	1:08 min
Cities of origin	8,104	9,113	5,145
Countries of origin	212	219	182

Figure 8.3b Summary of Analytics for women.engineering.utoronto.ca, March 1, 2015 to April 30, 2015

	Say Yes to Engineering Website
Total number of visits	3,844
Number of unique visitors	3,170
Average number of pageviews per visit	1.84
Average amount of time spent on site	2:05 min
Cities of origin	538
Countries of origin	90

Note 8.3b: These numbers represent the first two months of activity.

Figure 8.4 **Visitors to discover.engineering.utoronto.ca: Top 10 Countries, 2014–2015**



1. Canada: 63.7%
2. China: 5.6%
3. United States: 4.3%
4. India: 4.0%
5. United Arab Emirates: 1.6%
6. Pakistan: 1.3%
7. Iran: 0.9%
8. Brazil: 0.9%
9. Saudi Arabia: 0.9%
10. Hong Kong: 0.9%

During the past year, U of T Engineering launched several new sites across the Faculty, including:

- Engineering News (news.engineering.utoronto.ca)
- Say Yes to Engineering (women.engineering.utoronto.ca)
- Engineering Communication Program (ecp.engineering.utoronto.ca)
- Centre for Healthcare Engineering (che.utoronto.ca)

We also renovated and re-launched websites for:

- Faculty website (www.engineering.utoronto.ca)
- Graduate Studies (gradstudies.engineering.utoronto.ca)
- Discover Engineering (discover.engineering.utoronto.ca)

9

Around the world, engineers contribute to economic prosperity, drive innovation and solve technical challenges to improve lives. At U of T Engineering, we give our students the global outlook and technical and professional competencies they need to succeed and lead positive change.

More than one-quarter of our total undergraduate and graduate student population comes from outside Canada, providing an international perspective that enriches our Faculty and student experience. Several targeted programs draw international students to the Faculty. In 2014–2015, we welcomed 258 students in the fall term and 79 in the winter term through Science without Borders (SwB), a program funded by the Government of Brazil and private industry that sends Brazilian students abroad to study science, technology, engineering and mathematics. In addition, a total of nearly 50 engineering students participated in the International Foundation Program and Graduate International Foundation Program, two pathways that provide intensive English-language instruction to academically strong international students to prepare them to study at the Faculty.

At the same time, we share our talent and expertise with other countries through programs that enable our students to learn, advance research and gain professional experience abroad. International Professional Experience Year placements have doubled in the past 10 years, and nearly 100 students participated in 2014–2015 in research internships or pursued academic courses at partner institutions abroad. These opportunities give our students valuable new insights into complex challenges and help them find solutions.

Engineering challenges know no borders. For this reason, we embed global perspectives in our learning and research activities. Capstone projects in many courses challenge our students to think about solving problems in both developed and developing countries. Our research institutes strengthen partnerships with institutions in other countries — including China, Japan and India — to deliver results with worldwide impact.

Global engineering research focuses on making a difference. This year our Faculty joined more than 120 engineering schools in the United States that have committed to educate “Grand Challenges Engineers” who will be prepared to meet the global needs of the 21st century. We already have several projects underway, funded through Grand Challenges Canada and conducted through our Centre for Global Engineering, that are seeking solutions in health care, sanitation, infrastructure and more. Working on these collaborative projects will enrich our graduates’ personal and professional lives and empower them to become catalysts for global change.

International Students and Exchanges

In 2014–2015, international students made up 25.8 per cent of our undergraduate population, in line with our Academic Plan goal of 25 per cent by 2015 (see Chapter 1: Undergraduate Studies for further detail). Among graduate students, 27.1 per cent now come from abroad (see Chapter 2: Graduate Studies). These students provide valuable perspectives and enhance our international reputation for excellence.

Several targeted programs bring international students to the Faculty and enrich the diversity of our student population (see Figure 9.1a). We also offer numerous opportunities for our students to gain international experience (see Figure 9.1b).

Figure 9.1a **Selected Opportunities for International Students to Study at U of T Engineering**

Program	Description	2014–2015 U of T Engineering Participants
Science without Borders (SwB)	Funded by the Government of Brazil and private industry, SwB sends Brazilian students abroad to study science, technology, engineering and mathematics.	258 (Fall term) 79 (Winter term)
International Foundation Program (IFP)	IFP allows academically strong students who do not meet the University's minimum English proficiency requirements to receive a conditional offer of admission as non-degree students. After completing an intensive eight-month English language program as well as the Engineering Strategies & Practice course series, these students can continue in a program of study in our Faculty.	33
Graduate International Foundation Program (G-IFP)	G-IFP is similar to IFP but aimed at graduate students. Upon completion of English classes and one ELITE course (APS1012), they move into the MEng program in the winter term.	16
MasterCard Foundation Scholarships Program (MFP)	MFP provides talented young people from economically disadvantaged communities, particularly in sub-Saharan Africa, with access to quality and relevant education.	5

Figure 9.1b **Selected Opportunities for U of T Engineering Students to Study or Work Abroad**

Program	Description	2014–2015 U of T Engineering Participants
Professional Experience Year (PEY)	PEY places second- and third-year students in 12- to 16-month internships with large, medium and small companies in Canada and worldwide.	61 international placements (19 U.S. placements and 42 other international placements)
Summer Research Abroad, Structured Exchange Pathways and other exchange programs	Programs administered by U of T's Centre for International Experience or coordinated by the Faculty allow students to conduct research internships or pursue academic courses at partner institutions abroad.	93 (29 course and 64 research exchanges)
Global Educational Exchange (Globex)	Globex brings professors and students from engineering schools around the world to Peking University in Beijing, China, each summer for a three-week program. MIE became the first Canadian partner in 2012.	6 students, 1 faculty member

Global Engineering: Case Studies

Our research institutes are engines of innovation that develop creative solutions and provide unique learning opportunities for students. International partnerships enable our research institutes to multiply their resources and access complementary expertise. At the same time, such partnerships allow us to share our capabilities with those who will benefit from them the most, both in the developing and developed world. Here are two examples of research institutes in our Faculty that strengthened our global impact in the past year:

Centre for Global Engineering (CGEN)

We created the Centre for Global Engineering (CGEN) in 2009 to provide an environment for our faculty and students to think more creatively about some of the world's most important challenges. Directed by Yu-Ling Cheng, U of T Distinguished Professor in Global Engineering, CGEN has led several key projects with international partners. These include: engineering an iron-fortified tea to fight malnutrition; optimizing a more efficient system for dispatching ambulances in Dhaka, Bangladesh; and creating a new waterless toilet prototype that recently earned its third round of funding from the Bill and Melinda Gates Foundation's Reinvent the Toilet Challenge. This final project is making significant progress toward providing very low-cost, off-grid sanitation for billions of people in developing countries.

To bring global engineering to the classroom, CGEN has developed four courses that cover topics from energy generation to the role of engineering in international development. CGEN also offers certificates in Global Engineering to both undergraduate and graduate students.

In January 2015, a multidisciplinary team of engineers — composed of Professors Constantin Christopoulos (CivE), Mark Fox (MIE), Yu-Ling Cheng (ChemE) and Stewart Aitchison (ECE) — joined U of T President Meric Gertler on a visit to India as part of an initiative aimed at expanding the role of universities in city-building. The team met with charitable organizations such as the Tata Trusts as well as potential industrial partners. Members also participated in a roundtable on sustainable urbanization at the Indian Institute of Technology-Bombay.

Collaborations between this team and its Indian counterparts will bring about innovative solutions to key challenges, from water and sanitation to shelter, clean air, and food production and distribution. For example, the rapid growth of cities provides opportunities to incorporate advanced building technologies developed by Professor Christopoulos. These technologies improve seismic safety and save lives. Because cities in India are constructing new buildings faster than most cities in the developed world, international partnerships can allow these technologies to be implemented more quickly.

University of Toronto Transportation Research Institute (UTTRI)

More than half the world's population now lives in cities. By centralizing resources, urbanization has the potential to reduce per-capita environmental impact greatly. However it can also lead to gridlock, air pollution and other problems that threaten our health. The University of Toronto Transportation Research Institute (UTTRI), directed by Professor Eric Miller (CivE), provides solutions to these problems that are helping cities grow in a more logical, sustainable way.

In 2014–2015, UTTRI established two key agreements with international partners. In September 2014, a delegation from CAF–Development Bank of Latin America, an organization that invests primarily in infrastructure, visited the Faculty for a day of knowledge-sharing and facility tours. CAF President Enrique Garcia and Dean Cristina Amon signed a memorandum of understanding, promising collaborations in transportation and resilient infrastructure research. In February 2015, Juan Antonio Sosa, vice-president of infrastructure at CAF, along with other senior transportation specialists visited UTTRI to explore further opportunities for partnership.

In December 2014, UTTRI hosted a group from Poland, including an undersecretary of state and researchers from the Warsaw University of Technology (WUT). We signed a memorandum of understanding with the WUT that will facilitate joint research collaborations, international conferences and the exchange of faculty and students. These programs will increase the international impact of UTTRI's research in urban infrastructure.

Selected Educational and Research Partnerships Abroad

"Water for Health" Grows Technological Collaboration with India

In May 2014, the Indian Government's Department of Biotechnology and the India-Canada Centre for Innovative Multidisciplinary Partnerships to Accelerate Community Transformation and Sustainability (IC-IMPACTS) created the "Water for Health" initiative. Under the agreement, each party committed $1.5 million to fund innovative partnerships between researchers working in both countries. Co-founded by Professor Stewart Aitchison (ECE), IC-IMPACTS also supports researchers from U of T Engineering, as well as from the University of Alberta and the University of British Columbia. For example, CivE professors Shamin Sheikh and Frank Vecchio are collaborating with researchers at the Indian Institute of Technology-Roorkee to develop forms of concrete that last longer and have lower environmental footprints than the current industry standards.

U of T Engineers Explore Sustainable Materials at University of Tokyo

An ongoing partnership between U of T Engineering and counterparts at the University of Tokyo brings students from both institutions together each summer to share cutting-edge insights in materials science. Eleven graduate students and six faculty members from MSE, ChemE and MIE travelled to Japan for the 2014 Tokyo/Toronto–Consortium on Sustainable Materials–Global Centre of Excellence in Mechanical Systems Innovation (UT2-COSM-GMSI) Graduate Student Workshop. Under the theme "Materials for Sustainability," the students presented their research on a wide range of materials science topics. These included: extracting useful materials from waste, developing better anti-ice coatings for airplane wings and more.

New Agreements with Asia-Pacific Universities

The Faculty entered several international agreements that further strengthen our ties to other top institutions in China and Japan. In October 2014, U of T President Meric Gertler signed an agreement with President Jie Zhang of Shanghai Jiao Tong University (SJTU) that will:

- establish the Shanghai–Toronto Express Program in Aerospace Engineering (STEP), a collaborative program for graduate and undergraduate students
- create the SJTU–U of T Green Aerospace Joint Research Centre, a platform for future projects developed by both universities
- encourage further collaborations, including co-published scientific papers

In January 2015, MSE signed a memorandum of understanding with the International Center for Materials Nanoarchitectronics at the National Institute for Materials Science (NIMS) in Tskuba, Japan. The agreement involves four faculty members from MSE and two from NIMS. A researcher from NIMS came to U of T in the summer of 2015 for a one-year research exchange, and further collaborations between the two institutions are underway.

Selected Highlights of Global Impact

Helping to Improve Language Skills of Underprivileged Children

A team of alumni from U of T Engineering and the Rotman School of Management has reached the global final of the Hult Prize competition with a handheld device and talking stickers that could improve the vocabulary and communication skills of children in impoverished communities. The stickers, which feature illustrations of familiar objects and pre-programmed quick response (QR) codes, can be customized by parents to talk, sing and read in any language and can turn any household item into an educational toy. Aisha Bukhari (ElecE 0T8 and Rotman MBA), Peter Cinat (CompE 0T2 and Rotman MBA), and fellow recent Rotman MBA graduates Jamie Austin and Lak Chinta, founders of Attollo Social Enterprise, developed the technology to help the more than 100 million impoverished children around the world who are at risk of cognitive deficits due to lack of exposure to adults who talk, sing and read to them. Attollo, which won both the U of T and regional rounds of the Hult Prize competition, will compete in September 2015 in the final round against five other teams from universities in Europe, Asia and America for $1 million (U.S.) in seed capital. Designed to foster social entrepreneurship, the Hult Prize bills itself as the world's largest student competition.

Engineering Better Stoves for South India

Prakti Design Lab is an award-winning enterprise located in Pondicherry, India, that manufactures energy-efficient cookstoves that reduce fuel consumption by as much as 80 per cent compared with traditional fires. In July 2014, Prakti invited U of T's Global Innovation group, a multidisciplinary team with members from many Faculties, to investigate the impact of these stoves in south India. The team included Professor Yu-Ling Cheng (ChemE) and undergraduate Tameka Deare (ChemE 1T3 + PEY). Their research looked at how the benefits of the new technology, such as less fuel-gathering and lower emissions, weigh against the barriers to entry, such as high cost. They also considered potential design changes that could improve the cost-benefit equation, such as making the stoves more durable and easier to use.

Global Investments in Sustainable Lighting Startup

Nanoleaf is a sustainable lighting company based in Shenzen, China, that was founded by U of T Engineering alumni Gimmy Chu (ElecE 0T6), Tom Rodinger (BioMedE PhD 0T7) and Christian Yan (ElecE 0T6). The company's flagship Nanoleaf One product is made of LEDs and printed circuit boards that fit into a standard light fixture, but uses about one-tenth the power of a traditional incandescent bulb. After a Kickstarter campaign in spring 2013 raised $200,000 — 10 times the company's goal — investors lined up to join the Nanoleaf team. In the spring of 2014, Li Ka Shing, the Hong Kong philanthropist and head of Cheung Kong Group, added his name to the list of funders. The money was enough to start mass production of the Nanoleaf One, which is now available for sale through the company's website.

$1 Detection of Deadly Diseases

The DropBot is designed to provide quick, inexpensive testing for measles, rubella and other infectious diseases in the developing world. It was created by PhD candidates Alphonsus Ng (BioMedE), Ryan Fobel (BioMedE) and others, and supervised by Professor Aaron Wheeler (IBBME). To perform a test, a single drop of blood is added to a "chip" — a piece of paper printed with circuit-like patterns using a standard inkjet printer — which can be created for less than $1. DropBot then digitally manipulates the fluids in the sample and runs four separate tests simultaneously. The whole process takes only 35 minutes and can greatly speed up the diagnosis of diseases or the detection of immunity. Supported by a $112,000 grant from Grand Challenges Canada, the team plans to field-test the system in Vietnam, which currently has only two testing laboratories for its 90 million inhabitants.

Combatting Counterfeit Drugs in Ghana

Professor Peter Zandstra (IBBME) and PhD students Yonatan Lipsitz (BioMedE) and Nimalan Thavandiran (ChemE) are working on a system that could quickly and efficiently detect whether substances are cardiotoxic, or have a negative effect on the heart. Cardiotoxicity is a common problem in developing countries, where up to half of malaria drugs can be counterfeit. The technique involves growing a large number of heart cells from stem cells and then seeding the heart cells into tiny wells on plastic plates. With 96 wells per plate, the platform allows dozens of substances to be tested for negative effects simultaneously and quickly determine if a drug sample is genuine or contaminated with cardiotoxic material. With funding from Grand Challenges Canada, the team is collaborating with the Center for Pharmaceutical Advancement and Training in Accra, Ghana, to advance the technology.

Creating 20,000 "Grand Challenges Engineers"

In March 2015, U of T Engineering became the only Canadian engineering school to join a transformational North American education program designed to create 20,000 "Grand Challenges Engineers." The initiative involves more than 120 other engineering schools in the United States, and was described in a letter presented to President Barack Obama during the annual White House Science Fair. Using the White House Strategy for American Innovation, the National Academy of Engineering (NAE) Grand Challenges for Engineering, and the United Nations Millennium Development Goals, the signatories to the letter identified complex yet achievable goals for the 21st century. These goals include engineering better medicines, making solar energy cost-competitive with coal, securing cyberspace, and advancing personalized learning tools to deliver better education to more individuals. The signatories pledged to graduate a minimum of 20 students per year who have been specially prepared to lead the way in solving such large-scale problems. Over the course of a decade, this program will develop more than 20,000 Grand Challenges Engineers who will have a direct impact on improving the lives of people around the world.

10

Diversity deepens the engineering creative process, enhances our student experience and enriches the profession with different perspectives and ideas. At U of T Engineering, we lead the way in recognizing and encouraging greater diversity among our student population, our faculty, our programs and our engineering practice.

The growth in the number of women choosing our undergraduate and graduate programs is in part a testament to the welcoming and open environment we have cultivated in our Faculty. In 2014–2015, nearly one-third of our first-year class was made up of women, the largest proportion of any entering engineering class in Canada. Women now comprise more than one-quarter of both our undergraduate and graduate students. Our success in recruiting female students is due in part to the many strong role models among our students, alumni and our growing number of female faculty members. It also speaks to the positive impact of our outreach initiatives, such as Girls' Leadership in Engineering Experience (GLEE), which are designed to cultivate interest in engineering and inspire more young women to choose our Faculty.

As outlined in Chapter 9: International Initiatives, our Faculty strives to attract students from all over the world, creating a truly multicultural environment befitting a leading global engineering school. In 2014–2015, our students came from 109 countries and international students comprised more than one-quarter of our undergraduate and graduate student populations. We continue to advance strategic recruitment initiatives in targeted regions to enrich our community and prepare our students to lead in a global engineering environment. Our student clubs and other co-curricular activities reflect this rich diversity and offer further opportunities for our students to engage with a variety of perspectives.

We also offer awareness-building events to support gender and sexual diversity in our faculty and profession, such as a panel discussion on LGBTQ experiences in the engineering profession, which was held in association with World Pride 2014. Future initiatives will continue to raise awareness of LGBTQ perspectives in engineering.

While we have made tremendous progress in increasing diversity in our Faculty, we continue to strengthen our engagement with traditionally underrepresented groups and bolster strategic recruitment initiatives. These initiatives will become even more important as competition from other Canadian engineering schools increases, particularly for the small but growing number of talented Canadian female high school students who are interested in pursuing engineering.

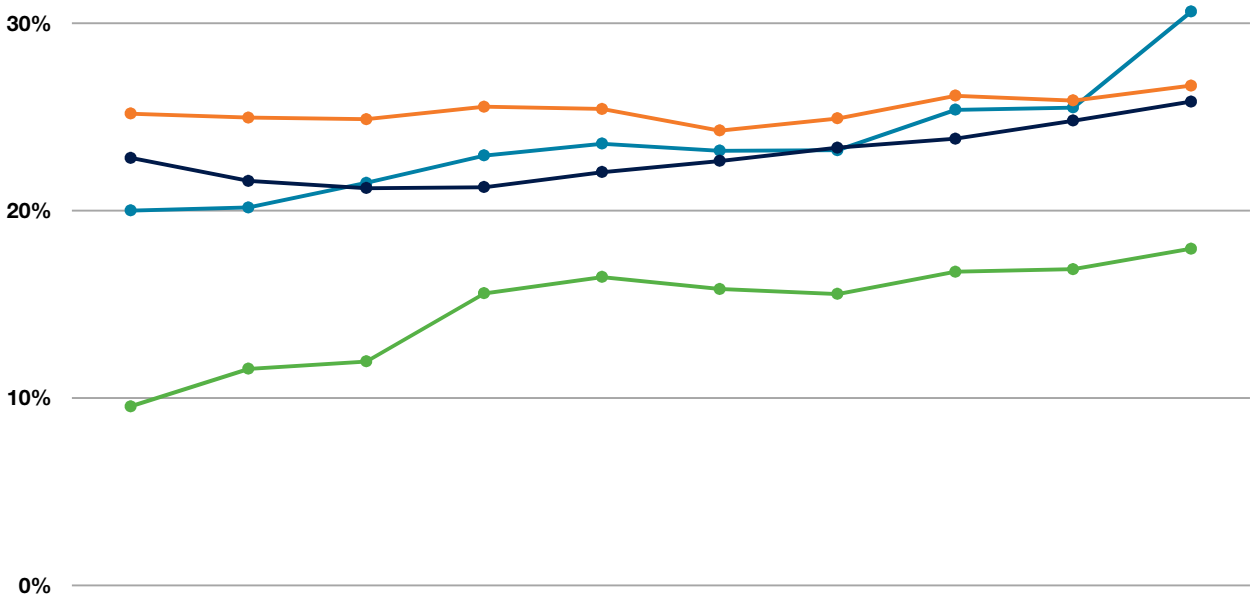
Diversity: Measures of Progress

One of the goals of our Academic Plan is to "continue to attract and retain diverse, outstanding students from a wide range of backgrounds in order to provide an exceptional education for future global engineers and leaders. In particular, we must strive to attract more female students into our programs."

In 2014–2015, we achieved tremendous success in female undergraduate recruitment: women accounted for nearly one-third of our first-year undergraduates, the highest proportion of any entering engineering class in Canada. The proportion of women across our entire undergraduate population has continued to trend upward over the past decade and now stands at 25.8 per cent. Women make up 26.7 per cent of our graduate students.

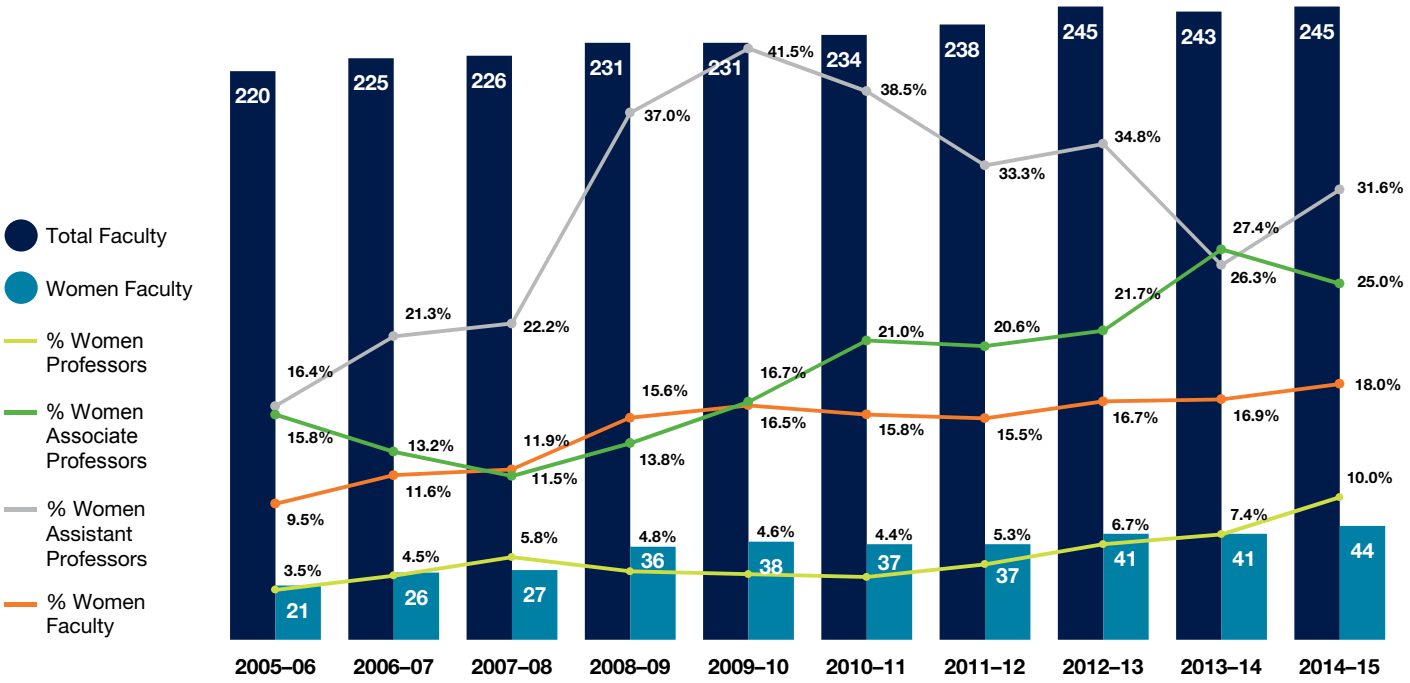
The increase in female representation reflects a strong portfolio of U of T Engineering initiatives that aim to cultivate an interest in science, engineering, technology and math among women. For example, in the past year alone, we reached more than 1,000 female pre-university students through outreach programs such as DEEP Summer Academy and Girls' Jr. DEEP, and hundreds more through in-school workshops. Initiatives such as the Girls' Leadership in Engineering Experience (GLEE) and the Young Women in Engineering Symposium (YWIES) inspired more young women to apply and accept their offers of admission. Our "Women in Engineering" media campaign leveraged both traditional and social media to expand our outreach to aspiring female engineers across Canada and around the world. These efforts ignited a national dialogue on women in engineering and positioned the Faculty as a leading voice in local and national media.

Figure 10.1 **Percentage of Women Students and Faculty, 2005–2006 to 2014–2015**



	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
First Year Undergrad	20.0%	20.2%	21.5%	22.9%	23.6%	23.2%	23.2%	25.4%	25.5%	30.6%
All Undergrad	22.8%	21.6%	21.2%	21.3%	22.1%	22.6%	23.4%	23.8%	24.8%	25.8%
Graduate Students	25.2%	25.0%	24.9%	25.5%	25.4%	24.3%	24.9%	26.1%	25.9%	26.7%
Faculty	9.5%	11.6%	11.9%	15.6%	16.5%	15.8%	15.5%	16.7%	16.9%	18.0%

Figure 10.2 **Total Number of Faculty with Percentage of Women, 2005–2006 or 2014–2015**

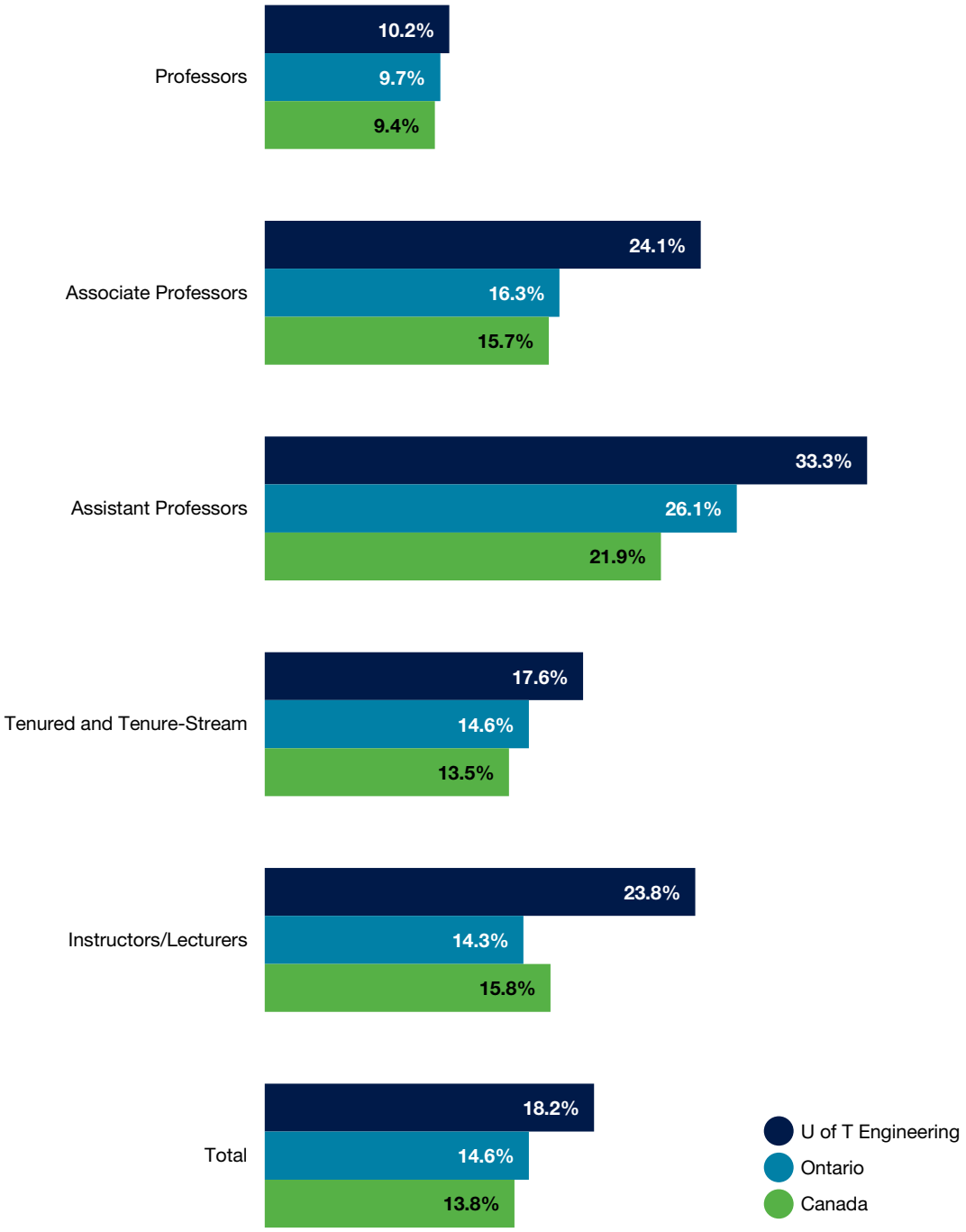


As a leader in engineering education and research, U of T Engineering continues to attract world-class faculty. Since 2005-2006, the number of female faculty members has more than doubled from 21 to 44, and the proportion of faculty members who are women has grown from 9.5 to 18.0 per cent. About one-third of our assistant professors and one-quarter of our associate professors are women, significantly higher than both the Ontario and Canadian averages (Figure 10.3). As other institutions have also corroborated, there is a strong correlation between an increase in women faculty and the recruitment of more women students.

Despite the tremendous efforts and the significant progress illustrated in this report, there is much more to do, particularly with the challenge of vigorous competition from our peers in Ontario for the best and brightest women students. York University's Lassonde Faculty of Engineering recently launched its 50:50 Challenge, a campaign to become the first Canadian engineering school to reach a 50:50 gender balance. The University of Waterloo's Faculty of Engineering has joined the United Nations Women's He for She Campaign, which engages men and boys as advocates for gender equality and women's rights. We anticipate greater competition for the small but growing number of Canadian women who are applying to engineering programs out of high school.

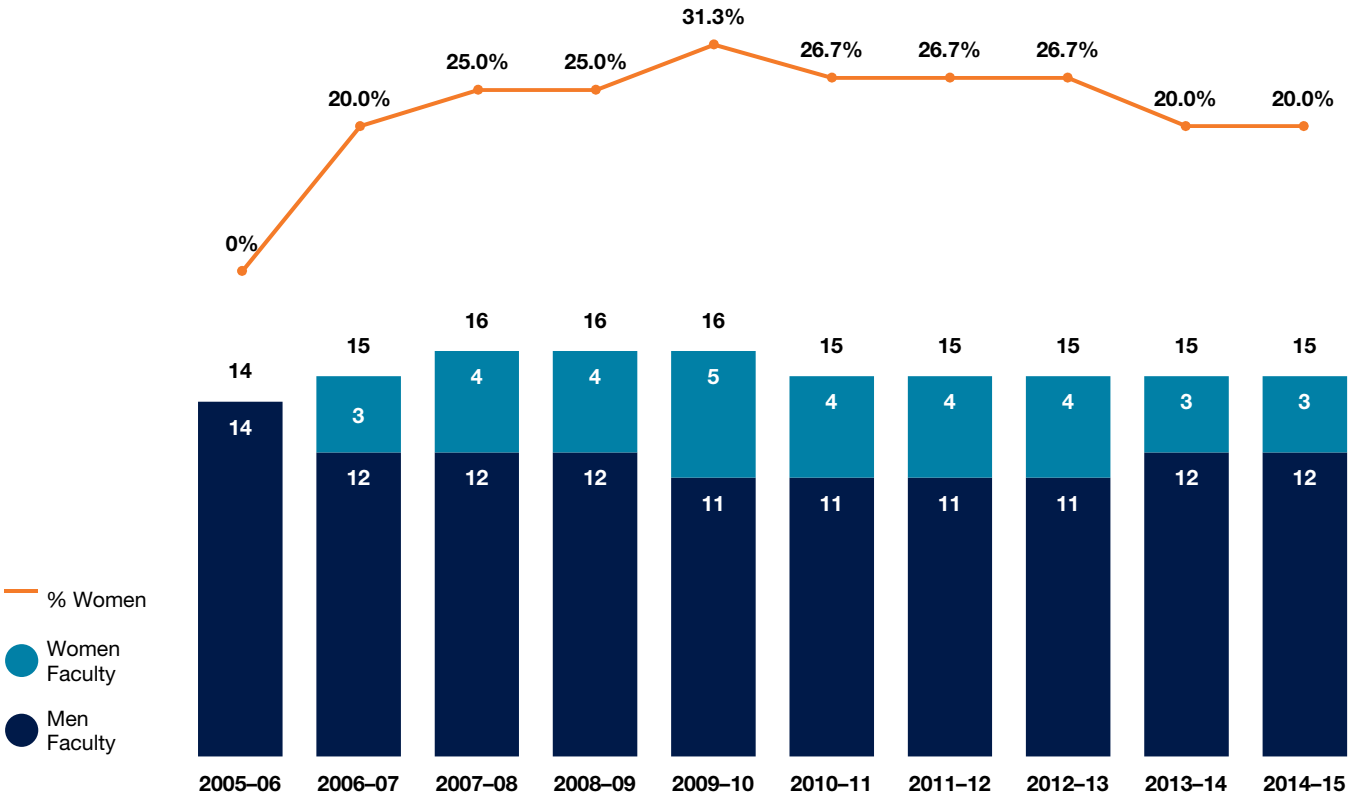
Note 10.2: Counts are based on headcount.

Figure 10.3 **Percentage of Women Faculty at U of T Engineering compared with Women Faculty in Ontario and Canadian Engineering Faculties, 2014–2015**



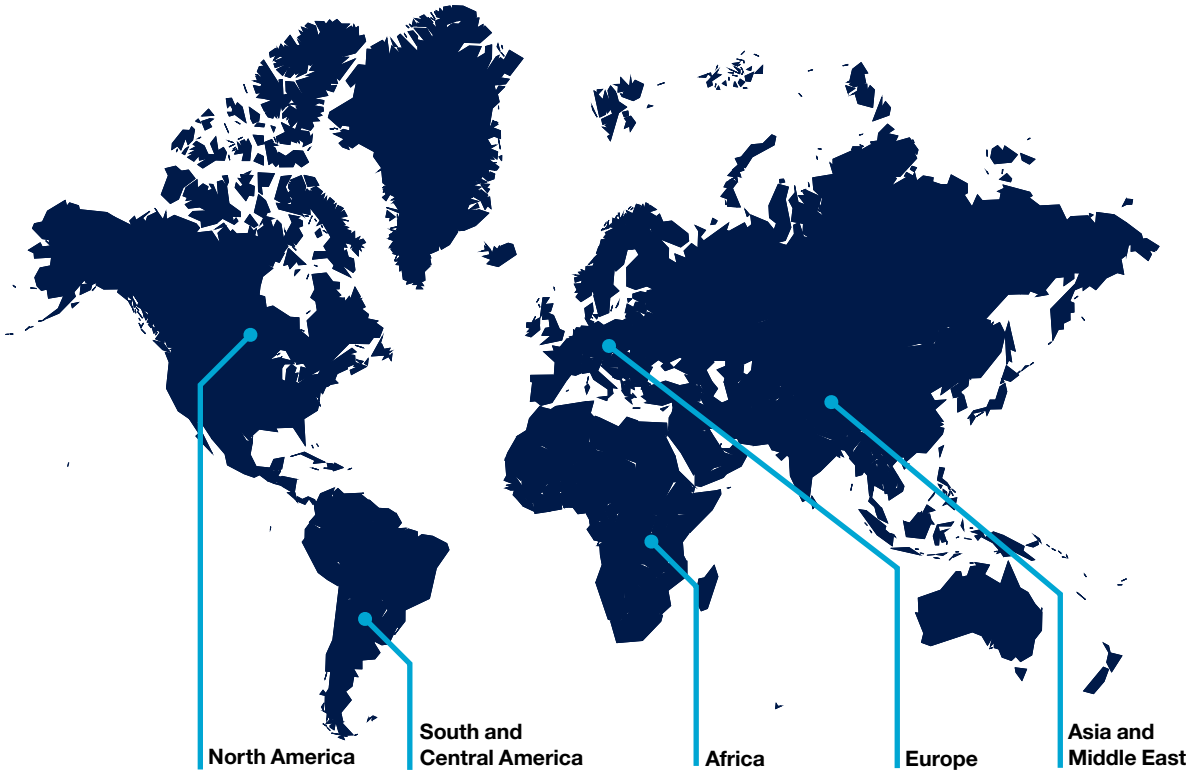
Note 10.3: Source = Engineers Canada. Counts are based on full-time equivalent (FTE) faculty.

Figure 10.4 **Proportion of Women in Academic Leadership Roles, 2005–2006 to 2014–2015**



Note 10.4: Positions included in the total number of academic administrative roles: Dean; Vice-Deans of Undergraduate, Graduate and Research; Associate Dean, Cross-Disciplinary Programs; Chair, First Year; Chairs/Directors of ChemE, CivE, ECE, EngSci, MIE, MSE, UTIAS, IBBME; and Faculty Council Speaker.

Figure 10.5 **Student Continents of Origin, 2014–2015**



	North America	South and Central America	Africa	Europe	Asia and Middle East
Undergraduate Studies	54.0%	0.8%	2.0%	1.5%	41.6%
Graduate Studies	51.5%	1.4%	3.6%	3.4%	40.1%
Overall	53.3%	1.0%	2.5%	2.0%	41.2%

In 2014–2015, our students came from 109 countries representing every continent except Antarctica. This cultural diversity results in a rich intellectual conversation among our students that prepares them for careers in the global workplace.

For more details on programs that bring international students to U of T Engineering, please see Chapter 9: International Initiatives.

Note 10.5: Not shown—0.1 per cent of undergraduate students and 0.1 per cent of 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.

Diversity: Selected Highlights

Our Faculty provides a safe, inclusive and positive space for all students, especially those from traditionally underrepresented populations in the engineering profession. The U of T Engineering community has a rich complement of successful female students, faculty and alumnae who are actively engaged in recruiting more women into the engineering profession.

Natalie Enright Jerger, Associate Professor (ECE)

Professor Natalie Enright Jerger, who joined the Faculty in 2009, has already established herself as a key researcher in computer architecture. Her research looks at ways to fit increasing amounts of processing power into ever-smaller central processing units, or CPUs. In 2014–2015, Enright Jerger won a prestigious Fellowship from the Alfred P. Sloan Foundation and the 2014 Ontario Professional Engineers Young Engineer Medal. She was the first role model featured in this year's #30in30 project, a list created by the NSERC/ Pratt & Whitney Chair for Women in Science and Engineering for Ontario of 30 women who are making their mark across the province as leaders, designers, researchers and entrepreneurs in engineering. Enright Jerger also received the Borg Early Career Award from the Computing Research Association's Committee on the Status of Women in Computing Research, which recognizes a woman in computer science and/ or engineering who has made significant research contributions and who has contributed to her profession, especially in outreach to women.

Angela Schoellig, Assistant Professor (UTIAS)

Professor Angela Schoellig joined U of T Engineering in 2013 and has rapidly made a name for herself as a leading researcher in robotic flying systems. She was a 2015 finalist in *MIT Technology Review's* "35 Innovators Under 35" and in 2013 was named one of "25 women in robotics you need to know about" by Robohub.org, a leading professional robotics online platform. For the past two years, she has been the keynote speaker at the Girls' Leadership in Engineering Experience (GLEE), inspiring young women by demonstrating her research and connecting with them individually to share her experiences in engineering.

Molly Shoichet, Professor (ChemE and IBBME)

On the Faculty since 1995, Professor Molly Shoichet was appointed University Professor in 2014, an honour conferred on fewer than 2 per cent of tenured faculty. In September 2014, President Meric Gertler appointed Shoichet as his senior advisor on science and engineering engagement, overseeing outreach activities such as Science Literacy Week. This outreach work, combined with widespread media coverage of Shoichet's accomplishments, is helping inspire more young women to pursue science and technology careers. In March 2015, she also became the L'Oréal-UNESCO For Women in Science Laureate for North America. The $140,000 prize supports her research in tissue engineering, including the possibility of using stem cells to repair damaged spinal chords.

Samantha Espley (Geo 8T8)

Since completing her degree at U of T Engineering, Samantha Espley has moved quickly through roles of increasing responsibility and currently leads a multidisciplinary group of more than 200 engineers, geologists, metallurgists and technologists at mining company Vale. She has also published and presented more than 60 papers, reports and publications on topics ranging from underground mine designs and automation systems to the role of women in the mining industry. Espley is a founding member of Women in Science and Engineering (WISE). She has also been a keynote speaker at numerous events, such as the Ontario-wide university initiative Go ENG Girl (for young women in grades seven to 10), WISE Gearing Up sessions (for high school students), Science North and WISE Fireball events, as well as Science Olympics (for girls in grades four to eight) and Professional Engineers of Ontario Job Shadowing events. She has received the International Women's Week Award, the Trailblazer Award from Women in Mining Canada, and the Award for the Support of Women in the Engineering Profession from Engineers Canada.

Hannah Janossy (IndE 1T3 + PEY, MEng 1T5)

Hannah Janossy received the Gold Medal Student Award from Engineers Canada for her efforts to revitalize the University of Toronto chapter of Women in Science and Engineering (WISE). During her term as president, she raised more than $20,000, hired 20 members of the executive team and launched three new programs. She

also laid the foundation for the annual WISE National Conference. This conference has been hosted in Toronto since 2013 and has grown to include more than 250 students from across Canada. This year's plenary speakers included Anne Sado (IndE 7T7), president of George Brown College, as well as Diane Freeman, Councillor for the City of Waterloo and senior manager at Conestoga-Rovers & Associates.

Natalie Panek (AeroE MASc 0T9)

Natalie Panek is an aspiring astronaut and a passionate advocate for women in science. As a mission systems engineer with MacDonald Dettwiler and Associates Ltd.'s Robotics and Automation division, Panek is helping develop the next generation of technologies to support Canadian and international space missions. She has been recognized as one of Forbes' 30 Under 30 for 2015, and is a popular speaker on female empowerment. She is involved with Cybermentor, an online program through the University of Calgary that allows young women to ask questions and engage with female mentors in science, technology, engineering and mathematics (STEM) fields.

Samantha Stuart (Year 2 MSE)

In May 2015, Samantha Stuart was one of only five women across Canada to receive an Engineering Ambassador Scholarship from the Canadian Engineering Memorial Foundation (CEMF). Stuart has been heavily involved in Science Expo Youth Empowerment Group, a not-for-profit organization that helps connect students interested in STEM with mentors, enrichment programs and other opportunities to learn more about the field. She was also recently elected the Engineering Society's Director for Hi-Skule, which runs design competitions to promote the study of engineering in high school and elementary schools. Stuart plans to add a mentorship program to the work of Hi-Skule to inspire more talented students to choose engineering.

Women in Engineering Media Campaign

In February 2015, we launched a coordinated media campaign to inspire more young women to explore and pursue engineering. Our Faculty takes great pride in having the highest percentage of incoming female engineering undergraduates in Canada in 2014. We leveraged this achievement into proactive media outreach, resulting in national and international coverage in print, broadcast and online. A new microsite — "Say Yes to U of T Engineering" (women.engineering.utoronto.ca) — profiles inspiring female role models as well as students, faculty and alumnae. Launched on International Women's Day, the microsite provides an enhanced gateway into our student recruitment pages. We also sent informational posters outlining the diverse career opportunities available to engineers to high school guidance counsellors across Canada and the United States to further encourage women students to apply to our programs. For more details regarding our innovative communications campaigns in 2014–2015, see Chapter 8: Communications.

LGBTQ Panel

As part of World Pride 2014 in Toronto, we held a first-of-its-kind panel discussion on LGBTQ experiences in the engineering profession. The event was moderated by Paul Cadario (CivE 7T3, LLD 2013), former senior director at the World Bank and U of T Distinguished Senior Fellow in Global Innovation. Eight panellists from the U of T Engineering community addressed more than 100 alumni, students and faculty.

Pink Shirt Day

The Engineering Positive Space committee organized the Faculty's third annual Pink Shirt Day to raise awareness about bullying and discrimination. The event, which is held across Canada, began in 2007 when two students at a Nova Scotia high school wore pink shirts to show solidarity with a student who was being bullied. This year, the event, which was held in the atrium of the Sandford Fleming Building, included a photo booth where people could record a statement about diversity.

Community Affairs & Gender Issues Committee

The Community Affairs and Gender Issues Committee, chaired by Professor Edgar Acosta (ChemE) and vice-chaired by Professor Tobin Filleter (MIE), has as its main goal to improve recruitment, outreach and quality of life within the Faculty community. In February 2015 this committee met to discuss a new survey on gender issues. This survey will be more detailed than the National Survey of Student Engagement conducted by the Indiana University School of Education, and it will establish a baseline of the Faculty's current climate so we can measure our progress and enhance our programs.

11

Financial and Physical Resources

We continue to use all our resources efficiently and strategically to achieve the ambitious goals we set in our Academic Plan. These resources include funding, space, infrastructure and personnel.

Total revenue in 2014–2015 grew by 7.5 per cent over the previous year, due primarily to rising enrolment of international students and tuition increases. Growing revenue, combined with prudent budgeting and careful fiscal management, facilitated ongoing infrastructure upgrades as well as investments in strategic initiatives and funding for reserves for planned future priorities.

The Dean's Strategic Fund (DSF) continues to offer startup funding for strategic projects and collaborations that have a broad impact in the Faculty. In 2015, it awarded more than $4.5 million to a variety of initiatives that support the Academic Plan. The Engineering Instructional Innovation Program (EIIP), an extension of the DSF, continues to foster curriculum innovation through strategic investments aimed at improving learning, pedagogies and the overall student experience.

The most significant capital project the Faculty is undertaking is the Centre for Engineering Innovation & Entrepreneurship (CEIE), the cornerstone of the Faculty's $200-million goal for Boundless: The Campaign for the University of Toronto. The CEIE, which broke ground on June 24, 2015, will set a new standard for engineering education and research. It will also be a vibrant, multidisciplinary hub that enables us to further drive innovation, facilitate entrepreneurship and cultivate global engineering leaders.

Other new facilities that are under construction include the laboratory for the Translational Biology and Engineering Program (TBEP) in the MaRS Centre Phase 2. We also continue to maximize our facilities through thoughtful renovations and repurposing. Examples include a Technology Enhanced Active Learning (TEAL) room in the Sandford Fleming Building, which serves as a prototype for active and collaborative learning spaces in the CEIE, and new study spaces in the Bahen Centre. We conduct regular space audits to determine our infrastructure needs and the most efficient use of space.

Total Revenue and Central Costs

The Faculty's total revenue and associated costs are reflected in Figures 11.1 and 11.2. Revenue in 2014–2015 grew to $197.6 million, an increase of 7.5 per cent over 2013–2014, with a compound annual growth rate of 6.6 per cent since 2006–2007.

Total central costs rose to $89.9 million, a 6.1 per cent increase over 2013–2014, with a compound annual growth rate of 5.4 per cent since 2006–2007. Central costs are composed of the student aid levy, university fund contribution and university-wide costs, which experienced year-over-year increases of 4.4 per cent, 7.9 per cent and 5.9 per cent respectively (Figures 11.2 and 11.3).

The rise in the 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, human resources, student services, information technology, central library, advancement and research services to name a few, also increased. Factors included: rising utility prices; central information technology upgrades; business process improvements and automation of key research and innovation financial processes; MaRS Centre Phase 2 innovation; central library improvements; and higher pension fund deficit obligations brought about by a volatile investment environment.

As a result, net revenue (Figure 11.3) increased 8.7 per cent to $107.6 million in 2014–2015 over 2013–2014, with a compound growth rate of 7.6 per cent since 2006–2007.

Figure 11.1 **Total Revenue, 2006–2007 to 2014–2015**

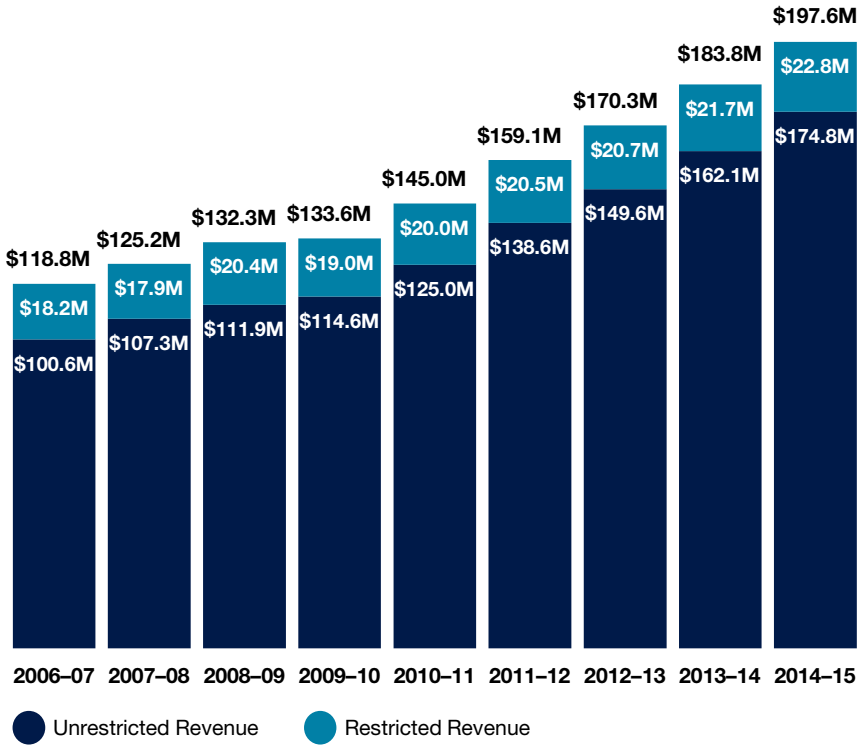
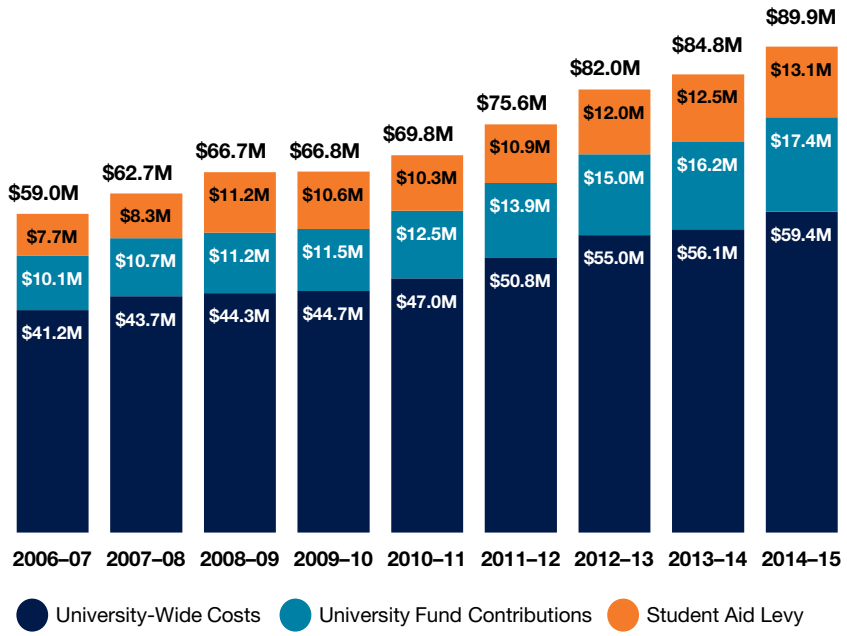


Figure 11.2 **Total Central Costs, 2006–2007 to 2014–2015**



Note: Data are shown by fiscal year (May to April).

Figure 11.3 **Budget Data, 2006–2007 to 2014–2015**

	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Total Revenue	**$118,826,327**	**$125,233,418**	**$132,333,400**	**$133,571,789**	**$144,976,282**	**$159,081,170**	**$170,342,629**	**$183,785,352**	**$197,570,871**
Unrestricted Revenue	$100,663,690	$107,347,671	$111,937,605	$114,602,697	$124,966,518	$138,597,605	$149,615,656	$162,048,175	$174,819,446
Restricted Revenue	$18,162,637	$17,885,747	$20,395,795	$18,969,092	$20,009,764	$20,483,566	$20,726,973	$21,737,177	$22,751,425
Total Central Costs	**$58,976,711**	**$62,755,042**	**$66,667,514**	**$66,768,403**	**$69,837,572**	**$75,536,585**	**$81,984,923**	**$84,796,193**	**$89,927,727**
University-Wide Costs	$41,180,986	$43,698,011	$44,307,203	$44,693,620	$47,027,056	$50,817,454	$55,028,273	$56,089,556	$59,390,462
University Fund Contributions	$10,066,369	$10,734,767	$11,193,761	$11,460,270	$12,496,652	$13,859,760	$14,961,566	$16,167,220	$17,443,377
Student Aid Levy	$7,729,356	$8,322,264	$11,166,550	$10,614,513	$10,313,864	$10,859,371	$11,995,084	$12,539,417	$13,093,888
Net Revenue	**$59,849,616**	**$62,478,376**	**$65,665,886**	**$66,803,386**	**$75,138,710**	**$83,544,584**	**$88,357,706**	**$98,989,159**	**$107,643,144**

Budget Overview

Our revenue sources, attributed central costs and budget breakdown for 2014–2015 are shown in Figures 11.4, 11.5 and 11.6 respectively. Revenues increased year over year, primarily due to rising enrolments of international undergraduate and graduate students and tuition increases. Government grant revenues have remained relatively stagnant because the grant per domestic student has not changed for a number of years.

The ability to consistently increase net revenue at the Faculty level allows us to pursue renewal objectives, including major strategic initiatives such as the Centre for Engineering Innovation & Entrepreneurship (CEIE). Further prudent budgeting and fiscal management across the Faculty has allowed us to fund reserves to meet future commitments, upgrade existing classrooms and laboratories and invest in Dean's Strategic Fund (DSF) initiatives.

Figure 11.4 **Revenue Sources, 2014–2015**

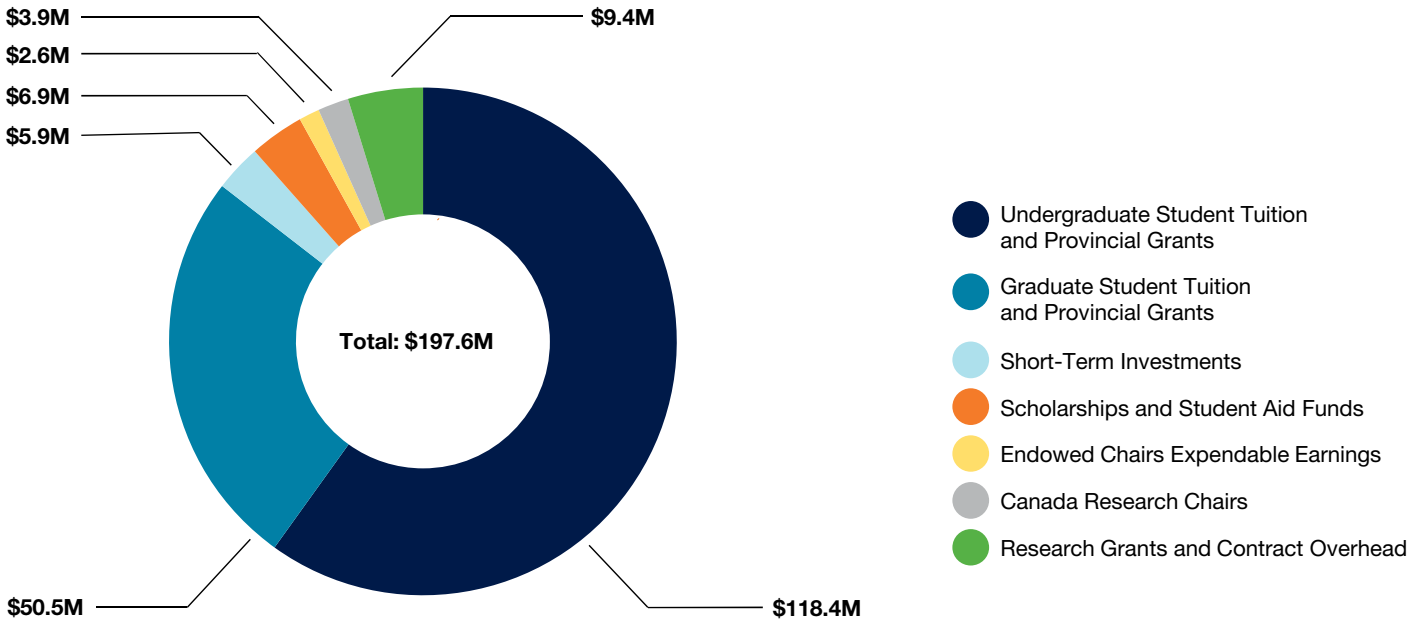


Figure 11.5 **Revenue Distribution, 2014–2015**

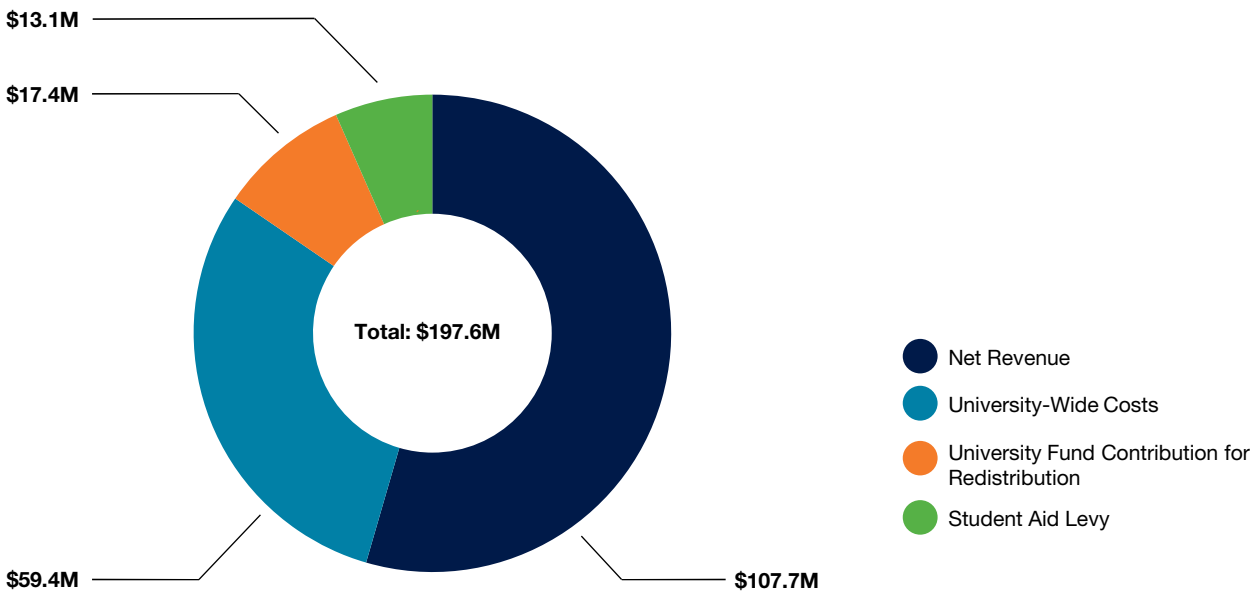
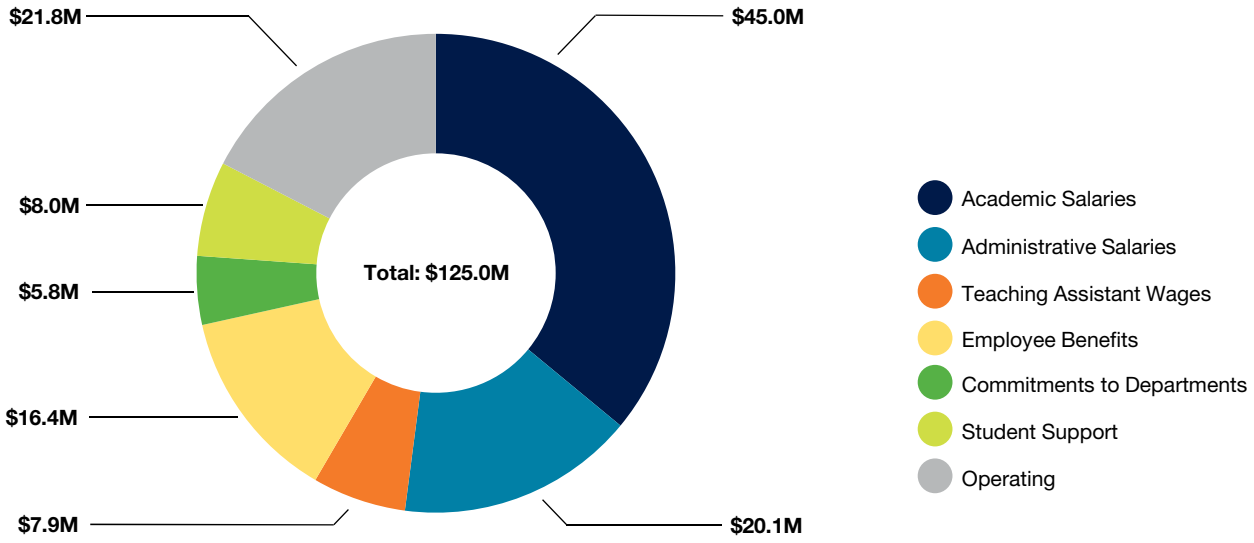


Figure 11.6 **Total Operating Budget: Breakdown by Expense, 2014–2015**



Dean's Strategic Fund

The Dean's Strategic Fund (DSF) was launched in 2010 to provide seed funding for initiatives that will have a broad impact within the Faculty.

In 2014, the DSF awarded $4.9 million to support projects designed to further goals identified in the Faculty's Academic Plan, such as developing multi-departmental and collaborative initiatives. These projects included:

- The Centre for Healthcare Engineering, a new centre for researchers working with partners in the sector and government agencies to improve the performance of health-care systems through data-driven decision-making.
- The Toronto Institute of Advanced Manufacturing, a multidisciplinary institute that will expedite the research and development of advanced manufacturing technologies by creating a multi-departmental network focused on sharing knowledge, ideas and resources.

In 2015, the DSF allocated more than $4.5 million for projects including: the Collaboratory for Advanced Learning and Innovation in Bioengineering Research and Education; Precision Machining Equipment for Engineering Capstone Projects and Research; the Engineering Food and Nutritional Security Initiative; and the Admissions Process Enhancement.

Engineering Instructional Innovation Program

The Engineering Instructional Innovation Program (EIIP), which was launched in 2013, makes strategic investments that will lead to better pedagogy in selected courses and improvements in the learning experience for our students. Projects can include: the redesign of a course or closely related group of courses; assessment of student learning outcomes; and instructor training and development to enable and sustain a project.

The EIIP, which is funded through an ancillary reserve of the DSF, has supported projects ranging from digital course enhancements to lab renovations. Preference is given to projects that have the potential to make significant and sustainable improvement in student engagement and learning outcomes.

In the most recent call for proposals, EIIP supported projects that included:

- **Parallel Classrooms:** This project will enable UTIAS and MIE to offer integrated and complementary courses to MEng students in both programs by renovating two classrooms — one at UTIAS's Downsview location and one in the Mechanical Engineering Building on the downtown campus — with leading-edge tools and equipment that will allow students to participate in lectures delivered from either location. A pilot graduate course designed specifically for "parallel classrooms" will be developed with content from both fields.
- **Re-engineering Mathematics Education:** The objective of this project is to enhance engineering education and re-energize engineering mathematics instruction through improved and focused teaching techniques.

Infrastructure and Facilities

Figure 11.7 **Summary of Buildings Occupied by Engineering, 2014–2015**

Code	Building	Office of the Dean	EngSci	UTIAS	ChemE	CivE & MinE	ECE	IBBME	MIE	MSE	Total NASMs
AS	**Aerospace (Downsview)**			5,289							5,289
BA	**Bahen Centre**	1,139	575		67		5,741		1,349		8,871
DC	**CCBR**				667			889			1,556
EA	**Annex**	237					946		91		1,274
EL	**Electrometal**									149	149
FI	**Fields Institute**	340									340
GB	**Galbraith**	1,667				4,869	4,174				10,710
HA	**Haultain**				198	110			639	721	1,668
MB	**Lassonde Mining**					1,205		1,379	1,885	830	5,299
MC	**Mechanical**	63							5,391		5,454
PT	**Pratt**						1,330			1,491	2,821
RS	**Rosebrugh**							814	2,110		2,924
SF	**Sandford Fleming**	766		692		1,559	3,556				6,573
WB	**Wallberg**	375			8,135		130			1,327	9,967
RM	**256 McCaul**	528									528
	Total Area	**5,115**	**575**	**5,981**	**9,067**	**7,743**	**15,877**	**3,082**	**11,465**	**4,518**	**63,423**
		63,423 NASMs									

Projects Completed

Prototype TEAL Room — Sandford Fleming Building

Spaces that encourage active learning and support dynamic collaboration are critical to the design work that has become integral to many engineering courses. These spaces — known as Technology Enhanced Active Learning (TEAL) rooms — will be a centrepiece of the Centre for Engineering Innovation & Entrepreneurship (CEIE). These unique spaces will encourage dynamic group work, which will be critical to supporting blended modalities of teaching and design. They will also feature movable chairs and group tables with multiple screens that allow for a variety of configurations and facilitate engagement.

As a pilot for the planned TEAL rooms in the CEIE and in partnership with Academic and Campus Events, we installed a prototype room in the Sandford Fleming Building. Through this prototype, we are testing various layouts and technologies and gathering feedback to determine the most effective design.

Electrical Energy Systems Lab — Galbraith Building

In the first phase of construction, we redesigned and replaced the high-voltage electrical infrastructure that supports the lab. These changes were made to improve safety and support new courses and research by enhancing facilities for faculty and students who are creating micro-grids, studying renewable energy and enabling smart grids.

The second phase of this project, which will involve replacing the stations in the lab, is expected to be completed by September 2015. The third phase of the project will develop new experimental systems to teach undergraduate and graduate courses in the lab.

OCCAM Lab Renovation — D.L. Pratt Building

Opened in July 2014, the Ontario Centre for Characterization of Advanced Materials (OCCAM) offers highly specialized tools to understand and manipulate matter at the atomic scale. The centre also emphasizes collaborative and multidisciplinary investigations and expects to facilitate more than 350 different research programs annually involving academic researchers and private companies. To support these programs, we converted existing research labs to support a suite of electron microscopes and installed both active and passive electromagnetic shielding systems.

Study Seating — Bahen Centre

In 2014, we installed hallway study seating in the Bahen Centre, which can accommodate 87 students. This space gives Engineering students opportunities to study and complete assignments between classes and is part of our commitment to improve the student experience.

Other completed projects include:

- Renovations to washrooms on the second and third floors of the Galbraith Building that provide additional capacity and improve the distribution of men's and women's facilities.
- An electronic access control system for the Wallberg Building/D.L. Pratt Building complex to improve security for students, faculty and staff.
- Established The Entrepreneurship Hatchery 3D Printer Showcase at 256 McCaul St.

Projects Underway

Centre for Engineering Innovation & Entrepreneurship (CEIE)

The CEIE continues to be a major focus of our resource planning. The CEIE reached significant milestones in 2015 with the groundbreaking on June 24th and the start of construction.

This project has required considerable planning work to reach this exciting stage. Toronto-based Montgomery Sisam and Associates, in a joint venture with Feilden Clegg Bradley Studios (U.K.), designed the building. We retained an audio-visual consultant to provide the infrastructure requirements for the base building design and work on the development of audio-visual equipment that will support the various building functions. Facilities & Services and other internal university groups reviewed the detailed design documents to ensure they comply with standards. We also hired a commissioning agent to help ensure a well coordinated and implemented mechanical systems design for the building.

Other key work completed in 2015 included:

- demolishing the existing structure on the site (February)
- rezoning by the City of Toronto (May) and receiving an excavation permit (June)
- tendering (March) and awarding (June) the construction contract

For more information about the CEIE, please see Chapter 7: Advancement. You can also visit uoft.me/CEIE for details.

Laboratory for the Translational Biology and Engineering Program (TBEP) — MaRS Centre

In conjunction with the establishment of the Ted Rogers Centre for Heart Research, we began construction in March 2015 of the laboratory for the Translational Biology and Engineering Program (TBEP) in leased space in the MaRS Centre Phase 2. The lab, which will provide further opportunities for researchers to collaborate across fields such as stem cell technology and tissue engineering, is expected to be operational in October 2015.

Nano for Energy Lab Renovation — Galbraith Building

We are converting a former undergraduate teaching lab on the fourth floor of the Galbraith Building to a clean, high-tech research laboratory that will include four fume hoods, a wet bench and a dedicated HVAC system. This renovated lab will support leading-edge research in colloidal quantum dot photovoltaic cells, facilitating characterization of energy and biological materials with a large variety of techniques. Funding for this project was obtained through successful submissions to the Canada Foundation for Innovation (CFI) and Ontario Research Fund (ORF).

Gas Turbine Combustion Research Lab Renovation — UTIAS Downsview

A new research lab is being designed in tandem with an associated combustion blow-down tunnel, the main piece of equipment for the lab. This research facility will provide the means to advance combustion science and facilitate the development of technologies that can revolutionize the future design of gas turbines. The anticipated advancement of gas turbine technology will directly benefit aircraft propulsion systems as well as industrial energy production. This project is also the result of successful CFI/ORF competition.

Other ongoing projects include:

- Renovating the Chemical Engineering Operations Lab in the Wallberg Building. Plans are in the design stage.
- Relocating our Human Resources group to the Fields Institute, where staff will share space with PEY/Engineering Career Centre.
- Installing study seating for 63 more students in the Bahen Centre by September 2015.
- Installing study seating for 20 students in the hallways of the Wallberg Building.
- Renovating a space in the Lassonde Mining Building for a study space and conferencing centre.

Space Audits

We conduct regular audits to determine our infrastructure needs and the most efficient use of space. Over the past year, we undertook the following audits:

- Project planning report for the TBEP laboratory at the MaRS Centre Phase 2 project (completed in August 2014)
- Undergraduate teaching labs space audit (final report expected by December 2015)
- Review of Civil Engineering space in the Lassonde Mining Building, with options to repurpose and rationalize space use (underway)

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.
General First Year	General first-year undergraduate studies in Engineering, formerly known as TrackOne. Upon successful completion of General First Year, 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 Institute of Health Research
CRC	Canada Research Chair
CREATE	NSERC Collaborative Research and Training Experience
DEEP	Da Vinci Engineering Enrichment Program
DSF	Dean's Strategic Fund
ECN	Engineering Communications Network
ECP	Engineering Communication Program
EDU	Extra-Departmental Unit
EFTE	Eligible Full-Time Equivalent
EIIP	Engineering Instructional Innovation Program
ELITE	Entrepreneurship, Leadership, Innovation & Technology in Engineering
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
GCC	Grand Challenges Canada
G-IFP	Graduate International Foundation Program
GLEE	Girls' Leadership in Engineering Experience
Graditude	Fundraising campaign for students
H-index	A measurement of both the productivity and impact of published work based on citations
HC	Headcount, or number of degree-seeking students
IFP	International Foundation Program
ILead	Institute for Leadership Education in Engineering
IRC	Industrial Research Chair
ISE	Institute for Sustainable Energy
MASc	Master of Applied Science
MCP	Multidisciplinary Capstone Projects
MEng	Master of Engineering
MEngCEM	MEng in Cities Engineering & Management
MEngDM	MEng in Design and Manufacturing
MEng, SCFI	MEng program for the Stronach Centre for Innovation
MFP	MasterCard Foundation Scholarship Program
MOOC	Massive Open Online Course
NASM	Net Assignable Square Metre
NCE	Networks of Centres of Excellence
NSERC	Natural Sciences and Engineering Research Council of Canada
NTU	National Taiwan University
OCCAM	Ontario Centre for Characterization of Advanced Materials
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
PhD	Doctor of Philosophy
PPIT	Prospective Professors in Training Program
QS	QS World Rankings
RENEW	Remediation Action Network
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-Council	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
UT-IMDI	University of Toronto Institute for Multidisciplinary Design & Innovation
UTAPS	University of Toronto Advanced Planning for Students
UTTRI	University of Toronto Transportation Research Institute
WISE	Women in Science & Engineering
YWIES	Young Women in Engineering Symposium

Appendices

Appendix A: Outreach Programs

Between July 2014 and June 2015, we offered the following pre-university outreach programs, reaching more than 7,000 students from across Ontario, Canada and the world.

Program	Date	Total # of Participants	Female	Male	Audience
DEEP Summer Academy	July 7-August 1, 2014	886	252	634	Grades 9-12
DEEP Leadership Camp	July 6-July 26, 2014	37	11	26	Grades 9-12
Girls' Jr. DEEP	July 14-18, 2014	69	69	0	Grades 3-8
Jr. DEEP	July 21-August 15, 2014	748	267	481	Grades 3-8
ENGage	July 14-18, 2014	44	19	25	Grades 3-8
Go ENG Girl	October 18, 2014	103	103	0	Grades 7-10
Girls' Jr. DEEP Saturday Fall	October 25 - November 8, 2014	66	66	0	Grades 3-8
Jr. DEEP Saturday Fall	November 15-29, 2014	72	15	57	Grades 3-8
Girls' Jr. DEEP Saturday Winter	January 17-31, 2015	73	73	0	Grades 3-8
Jr. DEEP Saturday Winter	February 7-28, 2015	71	10	61	Grades 3-8
Go CODE Girl	February 21, 2015	50	50	0	Grades 7-11
Jr. DEEP at March Break	March 16-20, 2015	73	26	47	Grades 3-8
DEEP Leadership at March Break	March 16-20, 2015	24	7	17	Grades 9-12
In-School and On-Campus Workshops	May & June 2014	4,840	2,420	2,420	Grades 3-8
Skule™ Kids	May 30 & June 20 2015	123	53	70	Grades 3-8
Total		**7,279**	**3,441**	**3,838**	

Appendix B: Engineering 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
- Brass Ring
- Skule Arts Festival
- Skule Orchestra
- Skule Stage Band
- Tales of Harmonia
- U of T Music Clubs Initiative

Athletics

- 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
- Eyes of Hope
- International Within Borders
- LGBTQ & Allies in Applied Science and Engineering
- Power to Change U of T
- Promise to Future Generations
- Skule Stress Release
- Suits U
- Take Action! Organization
- Tetra Society
- TrackOne Mentorship Program
- Women in Science and Engineering

Cultural

- Arabs in Engineering
- Bangladeshi Engineering Students' Association
- Chinese Engineering Students' Association
- Indian Engineering Students' Association
- Indian Students' Society
- Malaysian Student Association of University of Toronto
- Middle Eastern Students' Association
- Muslim Students Association
- Sikh Students Association
- U of T Engineering Chinese Club
- U of T Mandarin Chinese Christian Fellowship

Design & Competition

- Biomolecular Design Club
- Blue Sky Solar Racing
- Canadian National Concrete Canoe Competition 2015 Organizational Committee
- Human-Powered Vehicle Design Team
- Mechatronics Design Association
- Multidisciplinary Analytical Kinesthetic Education
- Robotics for Space Exploration
- Spark Design Club
- Supermileage Team
- U of T Aeronautics Team
- U of T Baja 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 Space Design Contest

Hobby & Special Interest

- Engineering Magic Club
- Fly with Origami, Learn to Dream
- Foodie Nation
- H2O Innovate
- Hacker Academy
- LeadingGreen
- Peer Wellness Group
- Skule Dance Club
- University of Toronto Energy Fair
- Skule's Got Talent
- Skule Improv
- Skule Smash Bros.
- U of T Emergency First Responders
- U of T Engineering Toastmasters

Professional Development & Industry

- American Society of Mechanical Engineers
- ASHRAE U of T
- Bayesian Basketball
- 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
- Club for Undergraduate Biomedical Engineering
- Galbraith Society
- Institute of Electrical and Electronics Engineers — University of Toronto Student Branch
- Institute of Transportation Engineers
- MIE Mentorship Program
- National Society of Black Engineers
- Nsight Mentorship
- Rational Capital Investment Fund
- Skule Labs
- Society of Petroleum Engineers at the University of Toronto
- Sustainable Engineers Association
- U of T Business Association
- U of T Consulting Association
- U of T Developers
- University of Toronto Engineering Finance Association
- University of Toronto Ontario Water Works Association — Student Chapter
- Water Environment Association of Ontario Student Chapter

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 graduation 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 and part-time MEng students provides greater clarity.

Figure C.1 University of Toronto Institute for Aerospace Studies Time to Completion for Graduate Students, 2005–2006 to 2014–2015

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
PhD	4.3	4.5	5.2	5.3	6.0	7.0	4.7	5.3	5.3	5.7
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0
MEng (FT)	1.3	1.3		1.3	1.2	1.3	1.3	1.0	1.0	1.0
MEng (PT)		1.7	1.7	1.0	1.8			1.7	1.3	2.0

Figure C.2 Institute of Biomaterials & Biomedical Engineering Time to Completion for Graduate Students, 2005–2006 to 2014–2015

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
PhD	4.7	5.2	3.3	4.3	4.3	6.0	5.7	5.0	5.0	6.0
MASc	2.0	2.3	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.3
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, 2005–2006 to 2014–2015

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
PhD	5.3	5.7	4.7	5.0	5.3	6.0	5.3	5.2	5.5	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)	1.2	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MEng (PT)	2.7	3.3	2.0	3.7	2.2	1.8	1.3	2.0	2.0	1.8

Figure C.4 Department of Civil Engineering Time to Completion for Graduate Students, 2005–2006 to 2014–2015

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
PhD	5.0	4.8	4.7	5.0	5.0	5.3	5.3	5.3	5.0	5.3
MASc	2.0	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng (FT)	1.5	1.3	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.0
MEng (PT)	2.0	1.8	1.7	1.7	2.0	2.3	1.8	2.0	2.0	1.7
MEngCEM (FT)										1.3

Figure C.5 The Edward S. Rogers Sr. Department of Electrical & Computer Engineering Time to Completion for Graduate Students, 2005–2006 to 2014–2015

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
PhD	4.7	5.3	4.7	4.7	4.7	5.0	5.2	5.5	5.3	5.0
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
MEng (FT)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MEng (PT)	2.7	2.0	2.0	2.0	3.0	2.7	2.0	2.2	2.0	2.0

Figure C.6 Department of Mechanical & Industrial Engineering Time to Completion for Graduate Students, 2005–2006 to 2014–2015

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
PhD	4.3	4.5	4.7	4.7	4.0	4.7	5.0	5.7	5.0	4.8
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	1.3	1.0	1.0	1.0
MEng (PT)	2.0	2.0	2.3	2.3	2.3	2.0	2.0	2.0	2.0	2.0
MEngDM (PT)	2.2	2.7	2.2	3.3	2.7	2.3	2.7	2.5	2.7	2.3

Figure C.7 Department of Materials Science & Engineering Time to Completion for Graduate Students, 2005–2006 to 2014–2015

	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
PhD	4.0	5.8	5.3	4.0	5.3	6.0	6.3	5.7	4.7	5.3
MASc	2.3	2.0	2.0	1.7	2.0	2.0	2.0	2.0	2.3	2.0
MEng (FT)	1.0			1.5	1.7		0.8	1.0	1.0	1.0
MEng (PT)	2.5	2.7		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. Leaves, lapses and the term in which 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- and part-time MEng students are included for greater accuracy.

Appendix D: Research Chairs

Our Faculty is home to 71 research chairs held by 63 individual chairholders. The list below reflects five types of Chairs:

- **Canada Research Chair (CRC):** The Government of Canada invests a total of $300 million per year in two types of CRCs:
  1) Tier 1 — a renewable title held for seven years; and
  2) Tier 2 — a junior chair held for five years and is eligible for renewal once.
- **Endowed Research Chair:** Created through donor support. Holders are considered to be of great distinction and are typically tenured professors. Each position is held for a fixed term.
- **Industrial Research Chair:** Jointly funded by NSERC and industry to help universities build on existing strengths or develop major research capacity in areas of interest to industry.
- **U of T Distinguished Professor:** Designed to advance and recognize faculty with highly distinguished accomplishments. This Chair is limited to no more than 3 per cent of tenured professors within a Faculty.
- **University Professor:** The highest possible rank at the University. This title is awarded to a maximum of 2 per cent of tenured faculty at U of T.

Figure D.1 Research Chairs, 2014–2015

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 University Labs Chair in Computer Engineering	Baochun Li	Endowed		ECE
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 of Biotechnology	Warren Chan	NSERC	Tier 2	IBBME
Canada Research Chair in Cellular Hybrid Materials	Glenn Hibbard	NSERC	Tier 2	MSE
Canada Research Chair in Computational Aerodynamics and Environmentally Friendly Aircraft Design	David Zingg	NSERC	Tier 1	UTIAS
Canada Research Chair in Computational Modeling 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 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 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 Microcellular Plastics	Chul Park	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 Lu	NSERC	Tier 1	MSE
Canada Research Chair in Robots for Society	Goldie Nejat	NSERC	Tier 2	MIE

Title	Chairholder	Sponsor	Tier	Dep't
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 Smart and Functional Polymers	Hani Naguib	NSERC	Tier 2	MIE, MSE
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
Celestica Chair in Materials for Microelectronics	Doug Perovic	Endowed		MSE
Chair in Computer Networks and Enterprise Innovation (Skoll)	Elvino Sousa	Endowed		ECE
Chair in Information Engineering	Joseph Paradi	Endowed		MIE
Chair in Software Engineering (Skoll)	Jason Anderson	Endowed		ECE
Clarice Chalmers Chair of Engineering Design	Greg Jamieson	Endowed		MIE
Dusan and Anne Miklas Chair in Engineering Design	Paul Chow	Endowed		ECE
Edward S. Rogers Sr. Chair in Engineering	Brendan Frey	Endowed		ECE
Eugene V. Polistuk Chair in Electromagnetic Design	Costas Sarris	Endowed		ECE
Frank Dottori Chair in Pulp and Paper Engineering	Honghi Tran	Endowed		ChemE
Gerald R. Heffernan Chair in Materials Processing	Mansoor Barati	Endowed		MSE
J. Armand Bombardier Foundation Chair in Aerospace Flight	David Zingg	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
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 Urban Systems Engineering	Mark Fox			MIE
University Professor	Molly Shoichet			ChemE, IBBME
University Professor	Edward Sargent			ECE
University Professor	Michael Sefton			ChemE
University Professor	Michael Collins			CivE
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

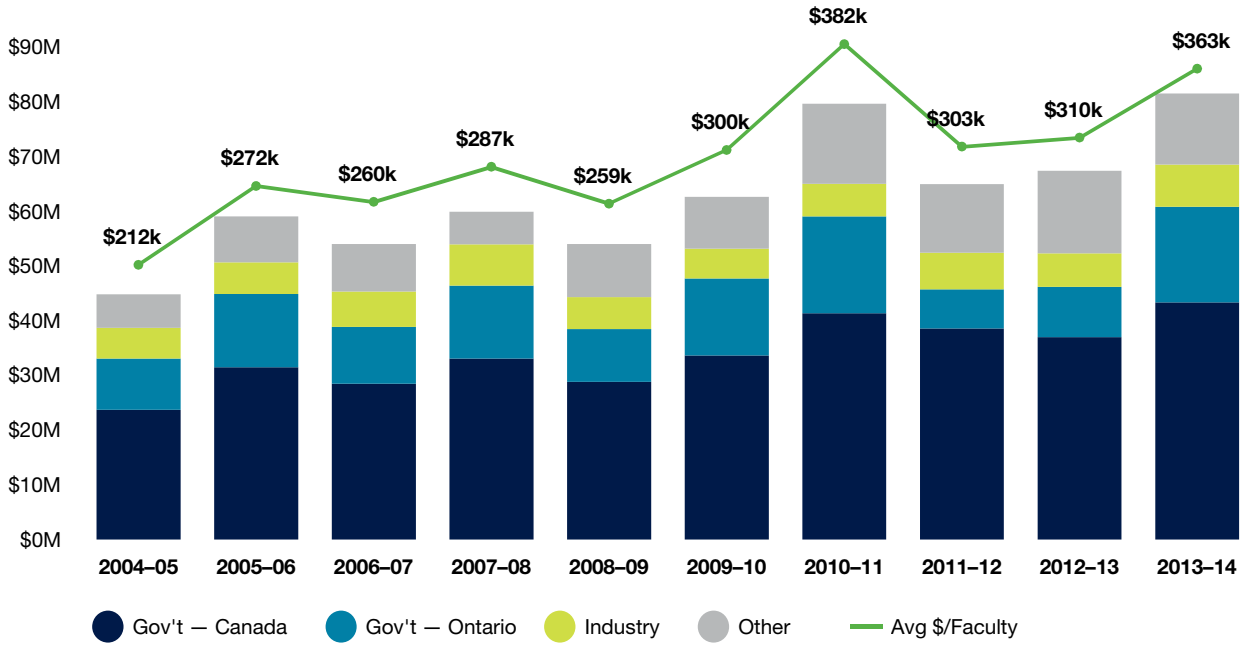
Figure E.1 shows our Faculty's total research funding, including operating and infrastructure.

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

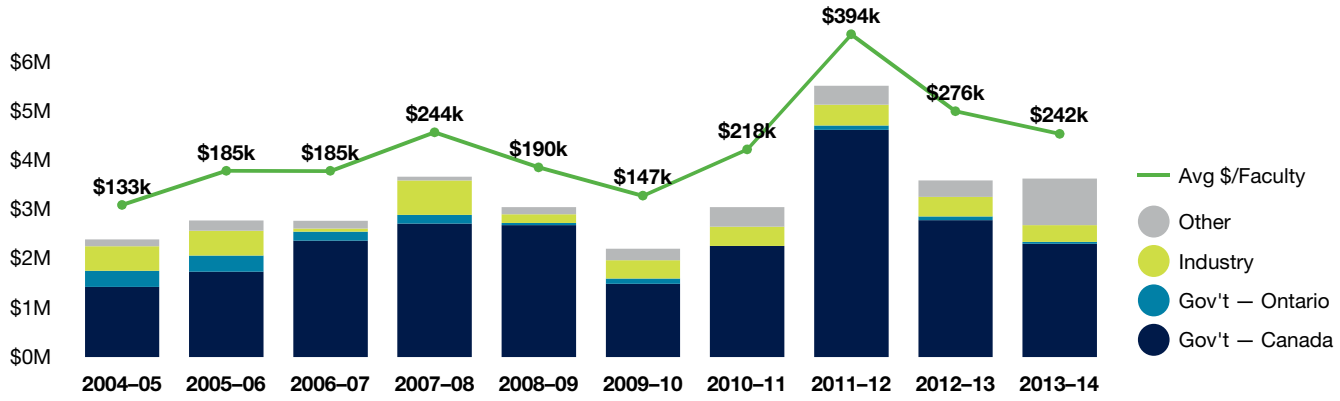
Data is based on grant years (April to March). For example, 2012–13 represents the granting cycle starting in April 2012 and ending in March 2013.

Figure E.1 University of Toronto Faculty of Applied Science & Engineering Total Research Funding by Source and Average Funding per Faculty Member, 2004–2005 to 2013–2014



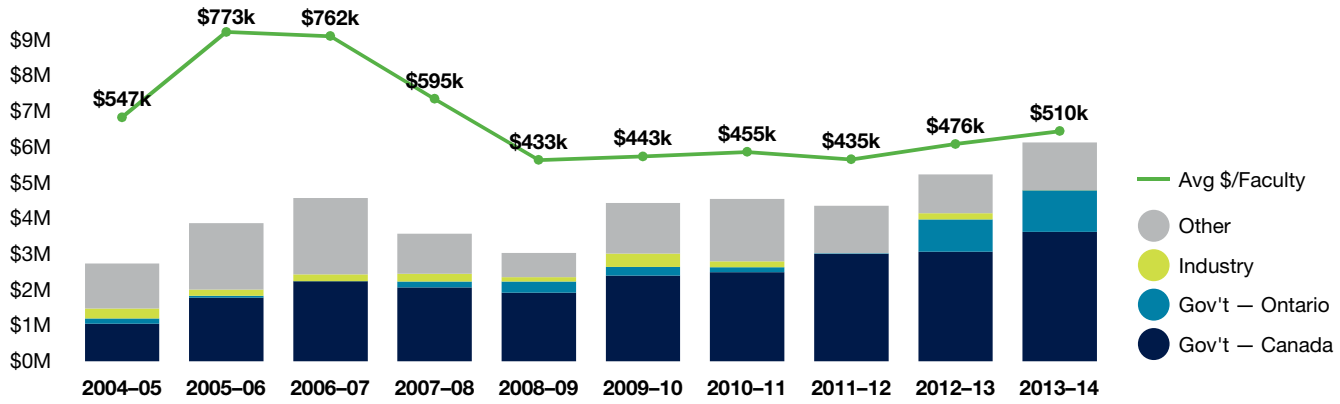
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2004–05	$23,741,663	$9,371,903	$5,605,287	$6,149,095	**$44,867,948**	**$211,641**
2005–06	$31,518,788	$13,410,788	$5,791,694	$8,382,627	**$59,103,897**	**$272,368**
2006–07	$28,547,598	$10,360,149	$6,499,117	$8,673,512	**$54,080,376**	**$260,002**
2007–08	$33,146,606	$13,319,325	$7,545,281	$5,969,510	**$59,980,722**	**$286,989**
2008–09	$28,873,417	$9,663,896	$5,801,749	$9,735,463	**$54,074,525**	**$258,730**
2009–10	$33,712,139	$14,040,826	$5,455,799	$9,491,026	**$62,699,790**	**$299,999**
2010–11	$41,407,826	$17,703,769	$6,003,781	$14,641,188	**$79,756,564**	**$381,610**
2011–12	$38,655,188	$7,125,567	$6,706,605	$12,570,435	**$65,057,795**	**$302,594**
2012–13	$37,021,243	$9,218,729	$6,120,015	$15,115,998	**$67,475,985**	**$309,523**
2013–14	$43,400,456	$17,508,774	$7,713,708	$12,989,382	**$81,612,320**	**$362,721**

Figure E.2 University of Toronto Institute for Aerospace Studies Research Operating Funding by Source and Average Funding per Faculty Member, 2004–2005 to 2013–2014



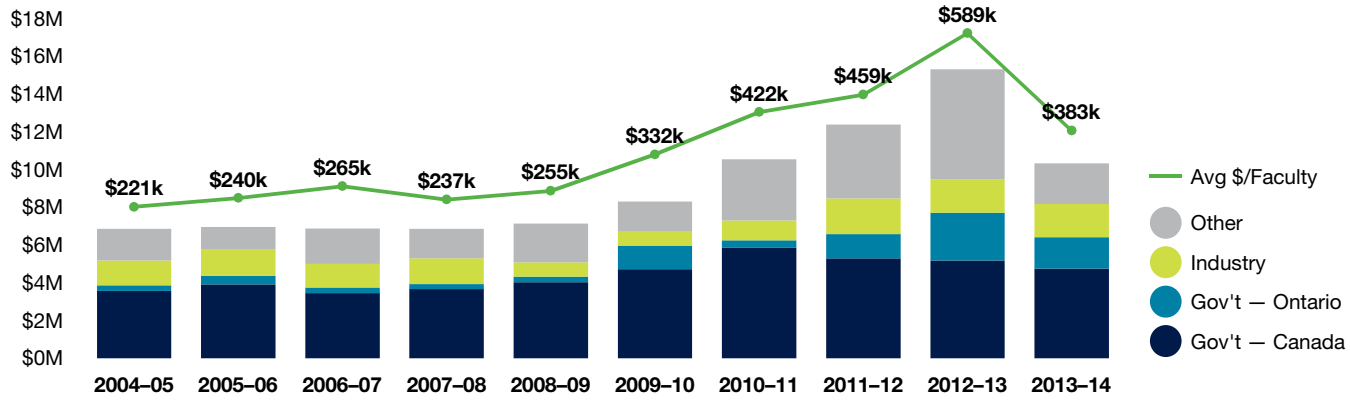
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2004–05	$1,427,214	$327,394	$498,461	$136,796	**$2,389,865**	**$132,770**
2005–06	$1,737,031	$329,500	$499,365	$210,069	**$2,775,965**	**$185,064**
2006–07	$2,365,513	$185,000	$60,000	$161,533	**$2,772,046**	**$184,803**
2007–08	$2,712,542	$175,000	$703,727	$71,667	**$3,662,936**	**$244,196**
2008–09	$2,682,272	$45,000	$172,002	$146,466	**$3,045,740**	**$190,359**
2009–10	$1,486,735	$107,333	$374,731	$233,827	**$2,202,626**	**$146,842**
2010–11	$2,261,742		$390,200	$396,936	**$3,048,878**	**$217,777**
2011–12	$4,619,917	$89,356	$420,400	$386,989	**$5,516,662**	**$394,047**
2012–13	$2,784,687	$72,605	$397,116	$337,560	**$3,591,968**	**$276,305**
2013–14	$2,302,461	$35,708	$342,400	$945,754	**$3,626,323**	**$241,755**

Figure E.3 Institute of Biomaterials & Biomedical Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2004–2005 to 2013–2014



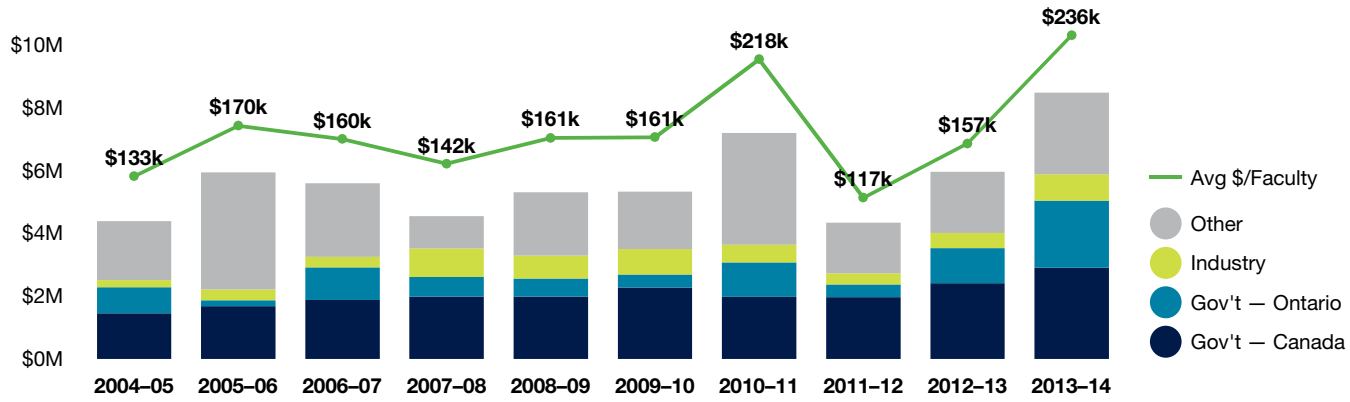
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2004–05	$1,050,550	$150,001	$275,888	$1,257,129	**$2,733,568**	**$546,714**
2005–06	$1,782,028	$48,666	$176,220	$1,857,110	**$3,864,024**	**$772,805**
2006–07	$2,243,946	$1,333	$186,904	$2,137,473	**$4,569,656**	**$761,609**
2007–08	$2,065,500	$165,515	$222,300	$1,119,211	**$3,572,526**	**$595,421**
2008–09	$1,919,671	$317,147	$117,411	$678,498	**$3,032,727**	**$433,247**
2009–10	$2,395,547	$242,228	$375,037	$1,417,800	**$4,430,612**	**$443,061**
2010–11	$2,494,234	$142,383	$160,634	$1,749,144	**$4,546,395**	**$454,640**
2011–12	$3,007,869	$13,500		$1,330,768	**$4,352,137**	**$435,214**
2012–13	$3,065,604	$908,607	$169,090	$1,088,556	**$5,231,857**	**$475,623**
2013–14	$3,626,531	$1,158,809	$4,000	$1,331,805	**$6,121,145**	**$510,095**

Figure E.4 **Department of Chemical Engineering & Applied Chemistry Research Operating Funding by Source and Average Funding per Faculty Member, 2004–2005 to 2013–2014**



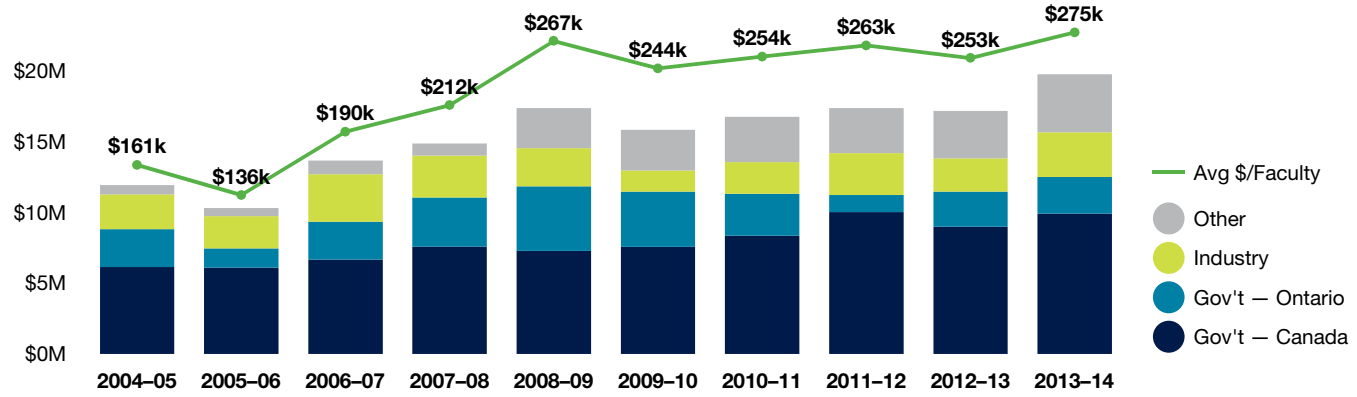
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2004–05	$3,567,347	$293,952	$1,320,139	$1,675,132	**$6,856,570**	**$221,180**
2005–06	$3,914,479	$465,999	$1,379,766	$1,195,334	**$6,955,578**	**$239,848**
2006–07	$3,460,090	$290,203	$1,261,279	$1,875,921	**$6,887,493**	**$264,904**
2007–08	$3,667,829	$261,610	$1,368,550	$1,561,293	**$6,859,282**	**$236,527**
2008–09	$4,033,714	$299,378	$757,256	$2,052,402	**$7,142,750**	**$255,098**
2009–10	$4,717,078	$1,257,813	$781,842	$1,554,321	**$8,311,054**	**$332,442**
2010–11	$5,870,910	$391,737	$1,052,026	$3,236,019	**$10,550,692**	**$422,028**
2011–12	$5,294,253	$1,283,137	$1,897,761	$3,915,646	**$12,390,797**	**$458,918**
2012–13	$5,192,831	$2,525,848	$1,783,746	$5,818,832	**$15,321,257**	**$589,279**
2013–14	$4,761,821	$1,653,303	$1,761,315	$2,152,823	**$10,329,262**	**$382,565**

Figure E.5 **Department of Civil Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2004–2005 to 2013–2014**



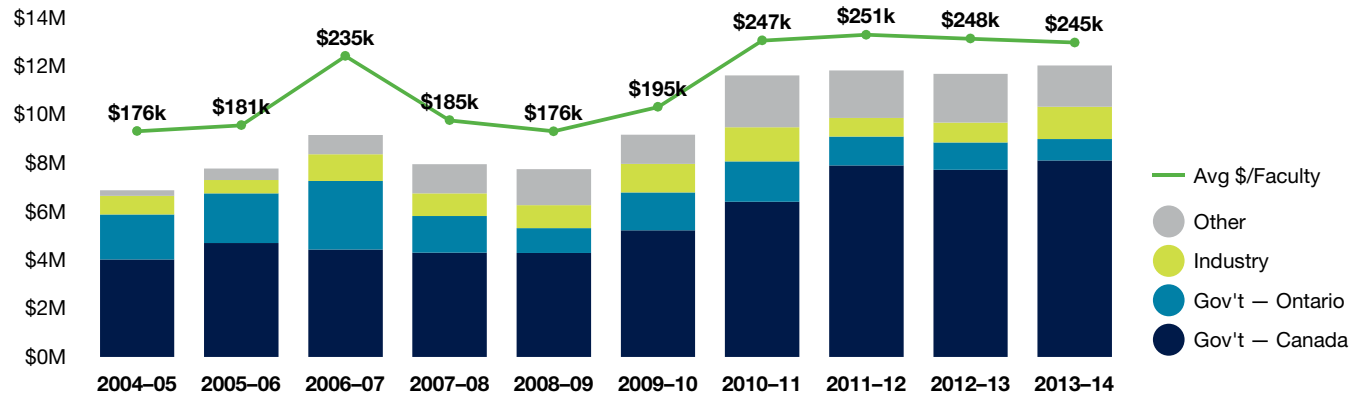
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2004–05	$1,456,773	$826,688	$225,653	$1,878,573	**$4,387,687**	**$132,960**
2005–06	$1,685,873	$182,459	$347,635	$3,725,020	**$5,940,987**	**$169,742**
2006–07	$1,879,079	$1,040,229	$337,126	$2,345,592	**$5,602,026**	**$160,058**
2007–08	$1,990,013	$622,300	$910,734	$1,023,094	**$4,546,141**	**$142,067**
2008–09	$1,990,579	$572,670	$730,076	$2,014,822	**$5,308,147**	**$160,853**
2009–10	$2,279,407	$412,542	$806,466	$1,829,277	**$5,327,692**	**$161,445**
2010–11	$1,982,184	$1,097,072	$559,231	$3,561,675	**$7,200,162**	**$218,187**
2011–12	$1,972,638	$402,645	$353,513	$1,612,893	**$4,341,689**	**$117,343**
2012–13	$2,413,881	$1,121,004	$476,088	$1,947,886	**$5,958,859**	**$156,812**
2013–14	$2,907,378	$2,136,573	$844,840	$2,595,744	**$8,484,535**	**$235,682**

Figure E.6 **The Edward S. Rogers Sr. Department of Electrical & Computer Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2004–2005 to 2013–2014**



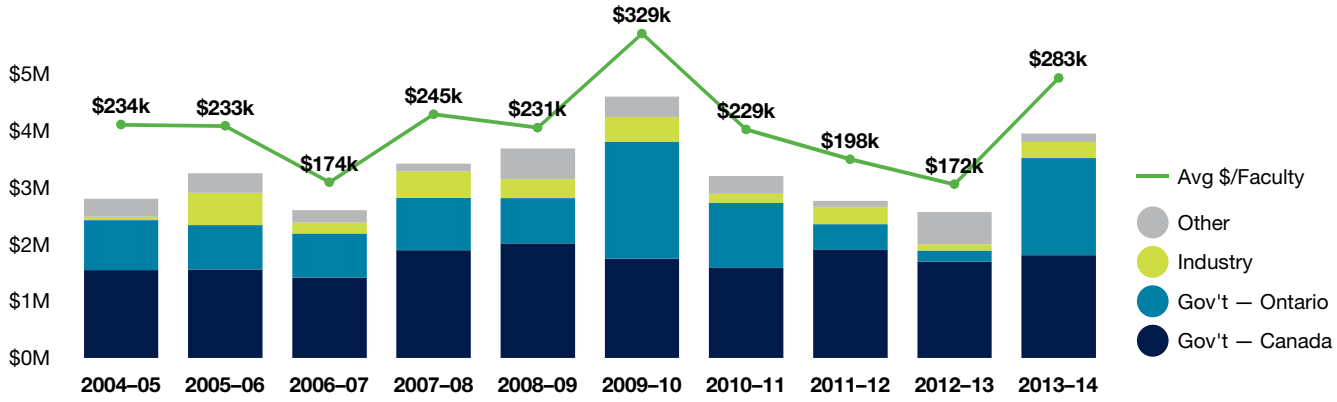
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2004–05	$6,142,164	$2,680,773	$2,455,661	$663,252	**$11,941,850**	**$161,376**
2005–06	$6,094,609	$1,378,334	$2,266,096	$575,955	**$10,314,994**	**$135,724**
2006–07	$6,679,878	$2,660,526	$3,363,559	$957,306	**$13,661,269**	**$189,740**
2007–08	$7,599,810	$3,470,568	$2,950,516	$853,281	**$14,874,175**	**$212,488**
2008–09	$7,296,269	$4,551,690	$2,709,325	$2,815,615	**$17,372,899**	**$267,275**
2009–10	$7,564,356	$3,923,866	$1,481,958	$2,878,488	**$15,848,668**	**$243,826**
2010–11	$8,355,878	$2,978,371	$2,238,062	$3,187,226	**$16,759,537**	**$253,932**
2011–12	$10,027,063	$1,205,388	$2,960,981	$3,192,836	**$17,386,268**	**$263,428**
2012–13	$8,996,927	$2,481,833	$2,355,784	$3,347,918	**$17,182,462**	**$252,683**
2013–14	$9,911,993	$2,602,801	$3,145,172	$4,110,224	**$19,770,190**	**$274,586**

Figure E.7 **Department of Mechanical & Industrial Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2004–2005 to 2013–2014**



	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2004–05	$4,024,542	$1,857,684	$766,235	$224,614	**$6,873,075**	**$176,233**
2005–06	$4,703,394	$2,042,264	$555,242	$473,811	**$7,774,711**	**$180,807**
2006–07	$4,425,552	$2,833,485	$1,095,225	$804,332	**$9,158,594**	**$234,836**
2007–08	$4,297,733	$1,519,533	$924,880	$1,200,988	**$7,943,134**	**$184,724**
2008–09	$4,289,293	$1,027,566	$946,457	$1,486,804	**$7,750,120**	**$176,139**
2009–10	$5,226,172	$1,558,727	$1,173,710	$1,211,942	**$9,170,551**	**$195,118**
2010–11	$6,406,136	$1,653,762	$1,415,128	$2,129,492	**$11,604,518**	**$246,905**
2011–12	$7,900,012	$1,188,878	$771,086	$1,956,458	**$11,816,434**	**$251,413**
2012–13	$7,723,687	$1,115,661	$827,191	$2,005,639	**$11,672,178**	**$248,344**
2013–14	$8,107,037	$879,834	$1,333,542	$1,703,357	**$12,023,770**	**$245,383**

Figure E.8 **Department of Materials Science & Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2004–2005 to 2013–2014**



	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2004–05	$1,551,531	$879,481	$63,250	$313,599	**$2,807,861**	**$233,988**
2005–06	$1,561,749	$783,577	$567,370	$345,328	**$3,258,024**	**$232,716**
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	$432,055	$364,545	**$4,611,181**	**$329,370**
2010–11	$1,588,204	$1,150,973	$158,500	$309,101	**$3,206,778**	**$229,056**
2011–12	$1,907,580	$453,820	$302,864	$104,500	**$2,768,764**	**$197,769**
2012–13	$1,698,541	$196,359	$111,000	$569,275	**$2,575,175**	**$171,678**
2013–14	$1,810,800	$1,716,977	$282,439	$149,675	**$3,959,891**	**$282,849**

Appendix F: Spinoff Companies

Est.	Company Name	Engineering Affiliation	Department
2014	Arrowonics Inc.	Hugh Liu	UTIAS
2014	Enceladeus Imaging	Steve Mann	ECE
2014	IQBiomedical	David Sinton	MIE
2014	Sonas Systems Inc.	Joyce Poon	ECE
2014	Toronto Nano Instrumentation Inc. (TNi Inc.)	Yu Sun	MIE
2013	CoursePeer	Hadi Aladdin	ECE
2013	eQOL Inc.	Binh Nguyen	ECE
2013	Kydo Engineering	John Ruggieri	ChemE
2013	Pragmatek Transport Innovations, Inc.	Baher Abdulhai	CivE
2013	QD Solar Inc.	Sjoerd Hoogland and Ted Sargent	ECE
2013	SpineSonics Medical Inc.	Richard Cobbold	IBBME
2013	XCellPure Inc.	Milica Radisic	IBBME, ChemE
2013	XTouch Inc.	Parham Aarabi	ECE
2012	MyTrak Health Systems	Sean Doherty	CivE
2012	OTI Lumionics Inc.	Zheng-Hong Lu	MSE
2012	Whirlscape Inc.	Will Walmsley	MIE
2012	XTT	Parham Aarabi	ECE
2011	Aereus Technologies Inc. (formerly Aereus Wood)	Javad Mostaghimi	MIE
2011	Filaser Inc.	Peter Herman	ECE
2011	Kinetica Dynamics Inc.	Constantin Christopoulos	CivE
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	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.	Zhenghong 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
1991	Advent Process Engineering Inc.		MSE
1991	LinShin Canada Inc.		IBBME
1991	Minnovex	Glenn Dobby	MSE
1991	Redrock Solvers Inc.	Michael Carter	MIE
1990	Fibre Metrics	Dale Hogg	UTIAS
1989	Apollo Environmental Systems Corp.	John Harbinson	ChemE
1989	Integrity Testing Laboratory Inc. (ITL)		UTIAS
1989	Translucent Technologies	Paul Milgram	MIE
1989	Xiris Automation Inc.	Cameron Serles	MIE
1988	Advanced Materials Technologies	Steven Thorpe	MSE
1988	Food BioTek Corp.	Leon Rubin	ChemE
1988	HydraTek and Associates Inc.	Bryan Karney and (since 2006) Fabian Papa	CivE
1986	EHM Rehabilitation Technologies	Pomeranz Salansky	UTIAS
1986	LACEC Energy Systems Inc.	Charles Ward	MIE
1985	El-Mar Inc.		IBBME
1985	Electrocaps Inc.	J. Smith	ChemE
1985	Katosizer Industries Ltd.	W. Snelgrove	ECE
1985	Tibur-Howden		MSE

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

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

3M Teaching Fellowship
Canada's highest teaching award in recognition of educational excellence and leadership.

Alan Blizzard Award
Recognition for exemplary collaboration in university teaching as it enhances student learning.

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 achievements 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.

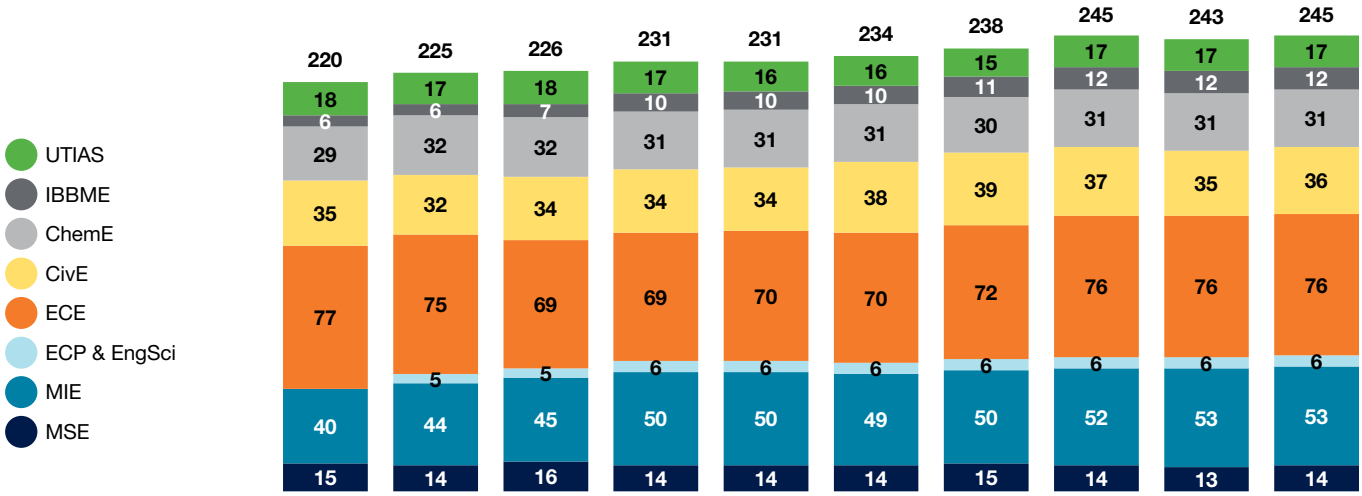
Provincial

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.

Appendix H: Academic Staff by Academic Area

The figures in Appendix H show the composition of our academic staff from 2005–2006 to 2014–2015. Figures H.1a and H.1b provide a Faculty overview and H.2 to H.8 present a detailed analysis by academic area.

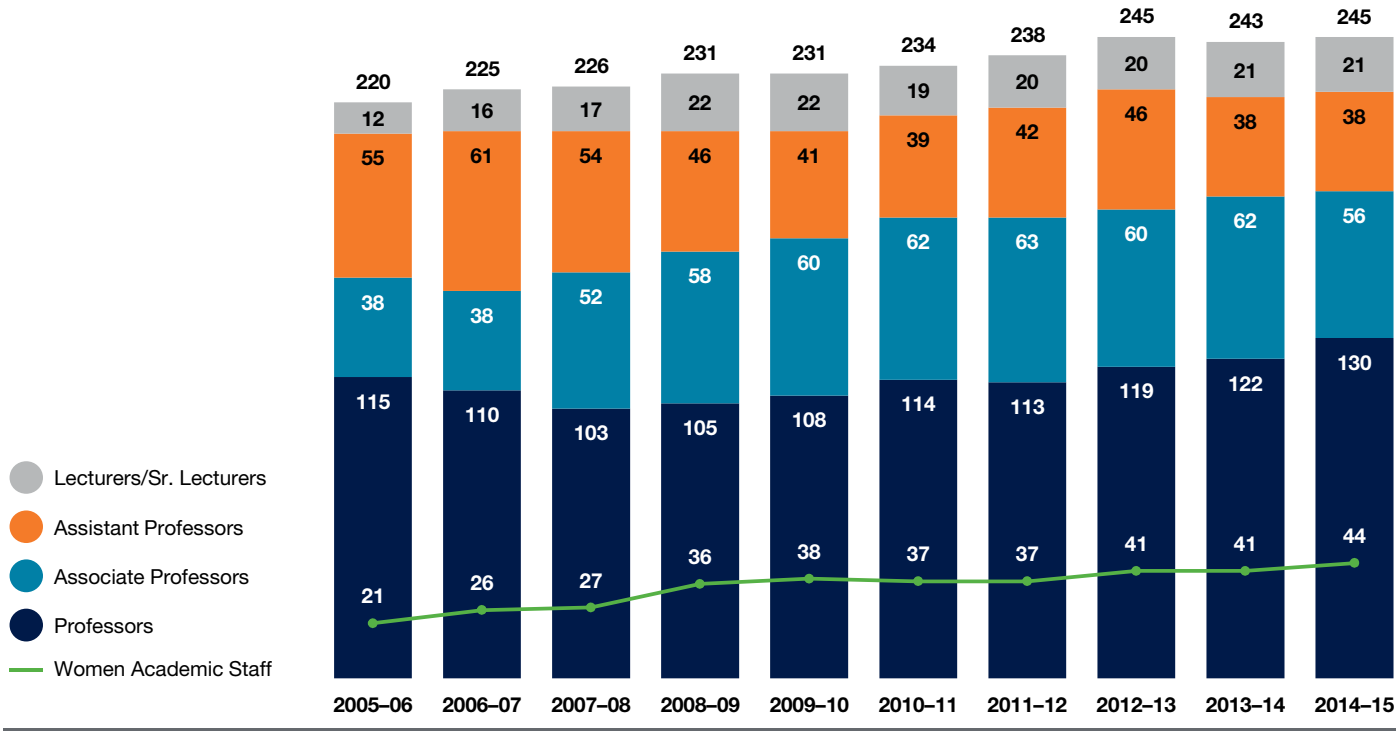
Figure H.1a **Total Academic Staff by Academic Area, 2005–2006 to 2014–2015**



		2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
UTIAS	Assistant Profs	4	4	4	4	4	4	5	6	5	5
	Associate Profs	1	1	3	5	4	3	3	4	4	4
	Professors	10	10	9	6	6	7	5	5	6	6
	Lecturers	3	2	2	2	2	2	2	2	2	2
IBBME	Assistant Profs	3	3	3	6	5	3	5	6	5	4
	Associate Profs	3	3	3	3	1	3	3	2	2	3
	Professors	0	0	1	1	4	4	3	4	4	4
	Lecturers	0	0	0	0	0	0	0	0	1	1
ChemE	Assistant Profs	2	4	5	5	6	7	5	6	4	5
	Associate Profs	2	3	3	3	2	2	3	3	5	5
	Professors	22	22	20	17	17	18	18	18	18	17
	Lecturers	3	3	4	6	6	4	4	4	4	4
CivE	Assistant Profs	7	11	8	6	6	9	9	8	7	8
	Associate Profs	9	6	10	12	12	11	10	11	11	9
	Professors	19	15	15	15	15	17	19	17	16	18
	Lecturers	0	0	1	1	1	1	1	1	1	1
ECE	Assistant Profs	28	25	18	9	8	7	9	11	9	7
	Associate Profs	14	15	22	26	26	25	25	22	20	16
	Professors	30	30	25	30	32	34	34	39	43	49
	Lecturers	5	5	4	4	4	4	4	4	4	4
ECP & EngSci	Lecturers		5	5	6	6	6	6	6	6	6
MIE	Assistant Profs	10	13	14	13	11	8	7	7	6	6
	Associate Profs	5	6	7	8	12	15	16	14	16	15
	Professors	24	24	23	26	24	24	24	28	28	29
	Lecturers	1	1	1	3	3	2	3	3	3	3
MSE	Assistant Profs	1	1	2	2	1	1	2	2	2	3
	Associate Profs	4	4	4	2	3	3	3	4	4	4
	Professors	10	9	10	10	10	10	10	8	7	7
	Lecturers	0	0	0	0	0	0	0	0	0	0
Total		**220**	**225**	**226**	**231**	**231**	**234**	**238**	**245**	**243**	**245**

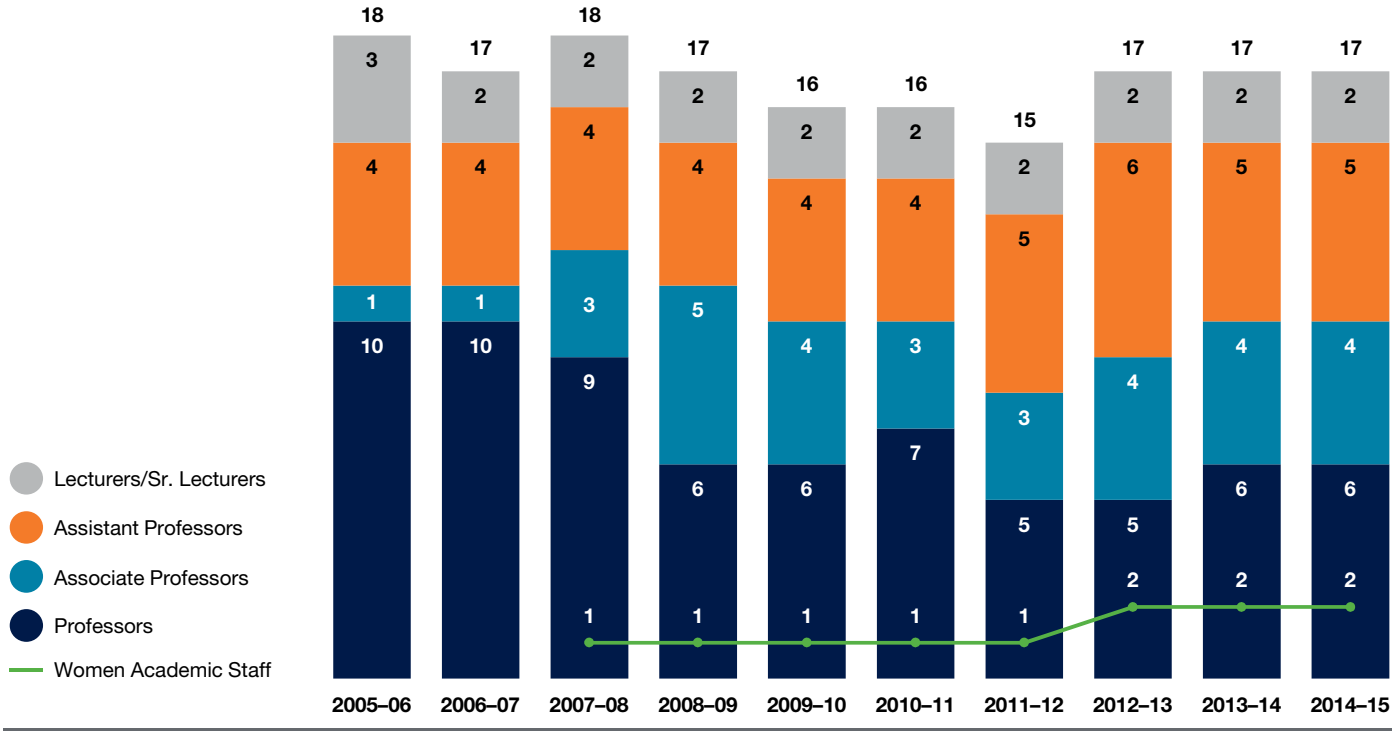
Note: Number of lecturers from Engineering Communications Program (ECP) and EngSci is unavailable prior to 2006–07.

Figure H.1b **University of Toronto Faculty of Applied Science & Engineering Total Academic Staff by Position with Percentage of Women, 2005–2006 to 2014–2015**



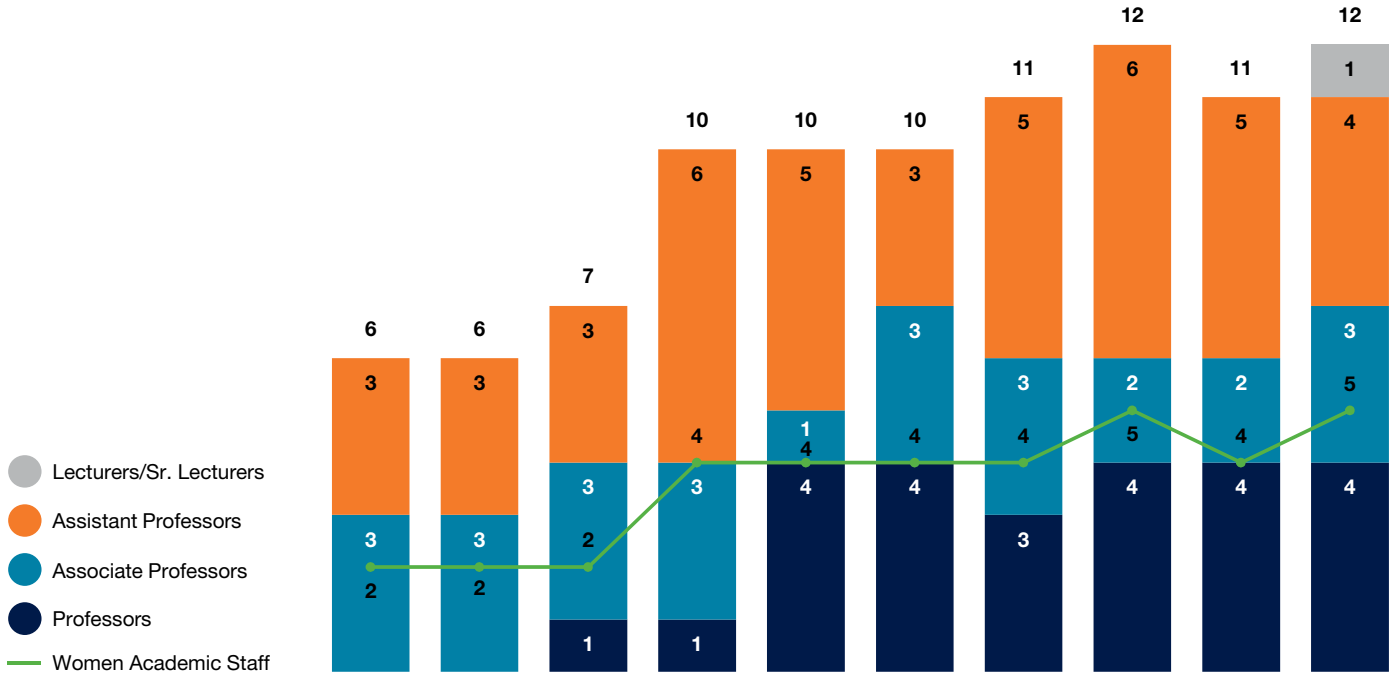
	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Assistant Professors	55	61	54	46	41	39	42	46	38	38
Women Assistant Professors	9	13	12	17	17	15	14	16	10	12
% Women Assistant Professors	**16.4%**	**21.3%**	**22.2%**	**37.0%**	**41.5%**	**38.5%**	**33.3%**	**34.8%**	**26.3%**	**31.6%**
Associate Professors	38	38	52	58	60	62	63	60	62	56
Women Associate Professors	6	5	6	8	10	13	13	13	17	14
% Women Associate Professors	**15.8%**	**13.2%**	**11.5%**	**13.8%**	**16.7%**	**21.0%**	**20.6%**	**21.7%**	**27.4%**	**25.0%**
Professors	115	110	103	105	108	114	113	119	122	130
Women Professors	4	5	6	5	5	5	6	8	9	13
% Women Professors	**3.5%**	**4.5%**	**5.8%**	**4.8%**	**4.6%**	**4.4%**	**5.3%**	**6.7%**	**7.4%**	**10.0%**
Lecturers/ Sr. Lecturers	12	16	17	22	22	19	20	20	21	21
Women Lecturers/ Sr. Lecturers	2	3	3	6	6	4	4	4	5	5
% Women Lecturers/ Sr. Lecturers	**16.7%**	**18.8%**	**17.6%**	**27.3%**	**27.3%**	**21.1%**	**20.0%**	**20.0%**	**23.8%**	**23.8%**
Total Tenured and Tenure Stream	208	209	209	209	209	215	218	225	222	224
Women Tenured and Tenure Stream	19	23	24	30	32	33	33	37	36	39
% Women Tenured and Tenure Stream	**9.1%**	**11.0%**	**11.5%**	**14.4%**	**15.3%**	**15.3%**	**15.1%**	**16.4%**	**16.2%**	**17.4%**
Total Academic Staff	220	225	226	231	231	234	238	245	243	245
Women Academic Staff	21	26	27	36	38	37	37	41	41	44
% Women Academic Staff	**9.5%**	**11.6%**	**11.9%**	**15.6%**	**16.5%**	**15.8%**	**15.5%**	**16.7%**	**16.9%**	**18.0%**

Figure H.2 **University of Toronto Institute for Aerospace Studies: Academic Staff by Position with Percentage of Women, 2005–2006 to 2014–2015**



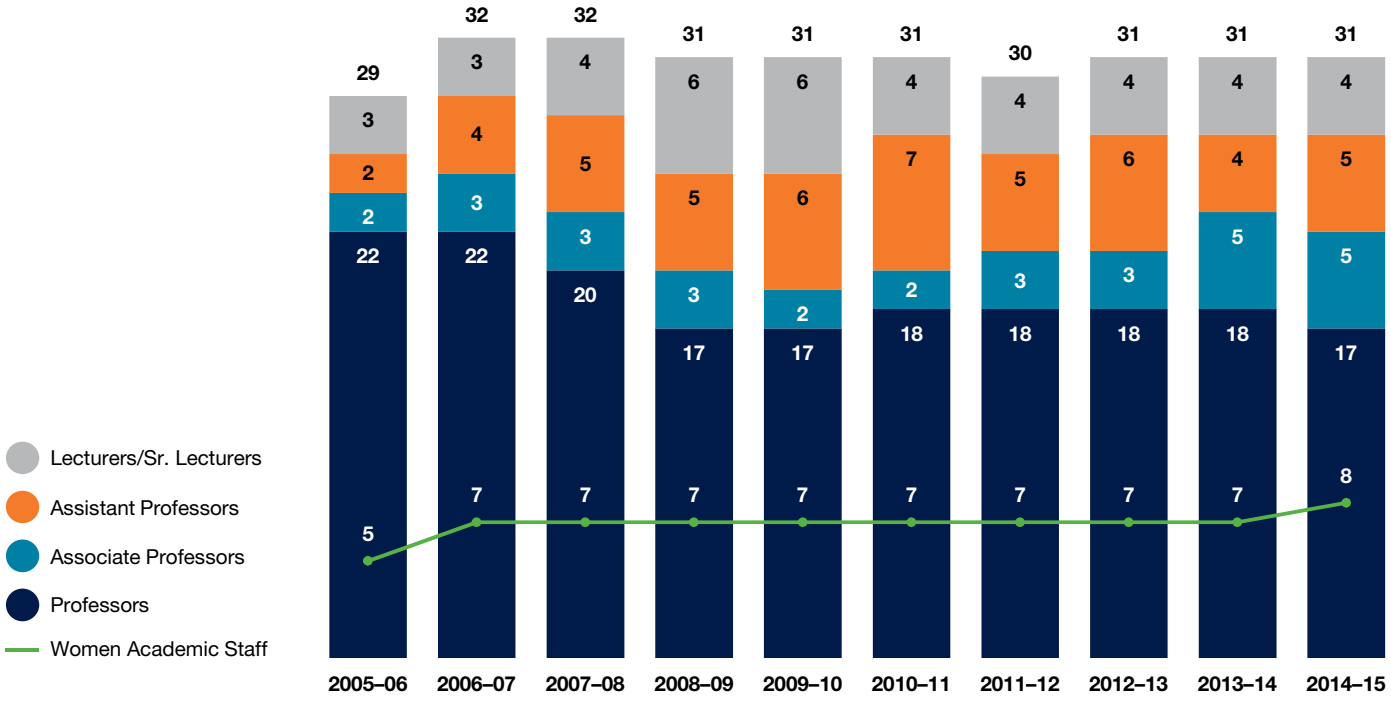
	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Assistant Professors	4	4	4	4	4	4	5	6	5	5
Women Assistant Professors	0	0	1	1	1	1	1	2	2	2
% Women Assistant Professors	**0.0%**	**0.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**20.0%**	**33.3%**	**40.0%**	**40.0%**
Associate Professors	1	1	3	5	4	3	3	4	4	4
Women Associate Professors	0	0	0	0	0	0	0	0	0	0
% Women Associate Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Professors	10	10	9	6	6	7	5	5	6	6
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	3	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	15	15	16	15	14	14	13	15	15	15
Women Tenured and Tenure Stream	0	0	1	1	1	1	1	2	2	2
% Women Tenured and Tenure Stream	**0.0%**	**0.0%**	**6.3%**	**6.7%**	**7.1%**	**7.1%**	**7.7%**	**13.3%**	**13.3%**	**13.3%**
Total Academic Staff	18	17	18	17	16	16	15	17	17	17
Women Academic Staff	0	0	1	1	1	1	1	2	2	2
% Women Academic Staff	**0.0%**	**0.0%**	**5.6%**	**5.9%**	**6.3%**	**6.3%**	**6.7%**	**11.8%**	**11.8%**	**11.8%**

Figure H.3 **Institute of Biomaterials & Biomedical Engineering: Academic Staff by Position with Percentage of Women, 2005–2006 to 2014–2015**



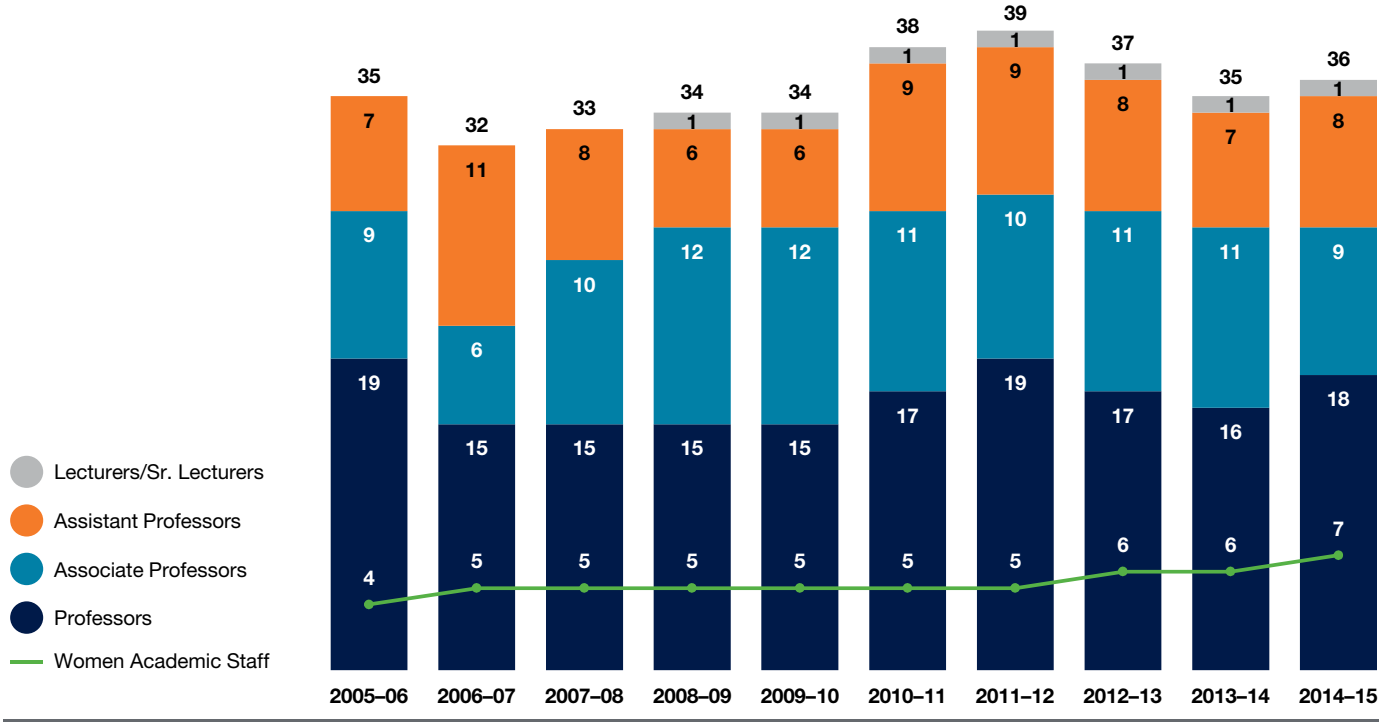
	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Assistant Professors	3	3	3	6	5	3	5	6	5	4
Women Assistant Professors	2	2	2	4	4	2	2	3	1	2
% Women Assistant Professors	**66.7%**	**66.7%**	**66.7%**	**66.7%**	**80.0%**	**66.7%**	**40.0%**	**50.0%**	**20.0%**	**50.0%**
Associate Professors	3	3	3	3	1	3	3	2	2	3
Women Associate Professors	0	0	0	0	0	2	2	2	2	1
% Women Associate Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**66.7%**	**66.7%**	**100.0%**	**100.0%**	**33.3%**
Professors	0	0	1	1	4	4	3	4	4	4
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%**	**25.0%**
Lecturers/ Sr. Lecturers	0	0	0	0	0	0	0	0	1	1
Women Lecturers/ Sr. Lecturers	0	0	0	0	0	0	0	0	1	1
% Women Lecturers/ Sr. Lecturers	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	**100.0%**
Total Tenured and Tenure Stream	6	6	7	10	10	10	11	12	11	11
Women Tenured and Tenure Stream	2	2	2	4	4	4	4	5	3	4
% Women Tenured and Tenure Stream	**33.3%**	**33.3%**	**28.6%**	**40.0%**	**40.0%**	**40.0%**	**36.4%**	**41.7%**	**27.3%**	**36.4%**
Total Academic Staff	6	6	7	10	10	10	11	12	12	12
Women Academic Staff	2	2	2	4	4	4	4	5	4	5
% Women Academic Staff	**33.3%**	**33.3%**	**28.6%**	**40.0%**	**40.0%**	**40.0%**	**36.4%**	**41.7%**	**33.3%**	**41.7%**

Figure H.4 **Department of Chemical Engineering & Applied Chemistry: Academic Staff by Position with Percentage of Women, 2005–2006 to 2014–2015**



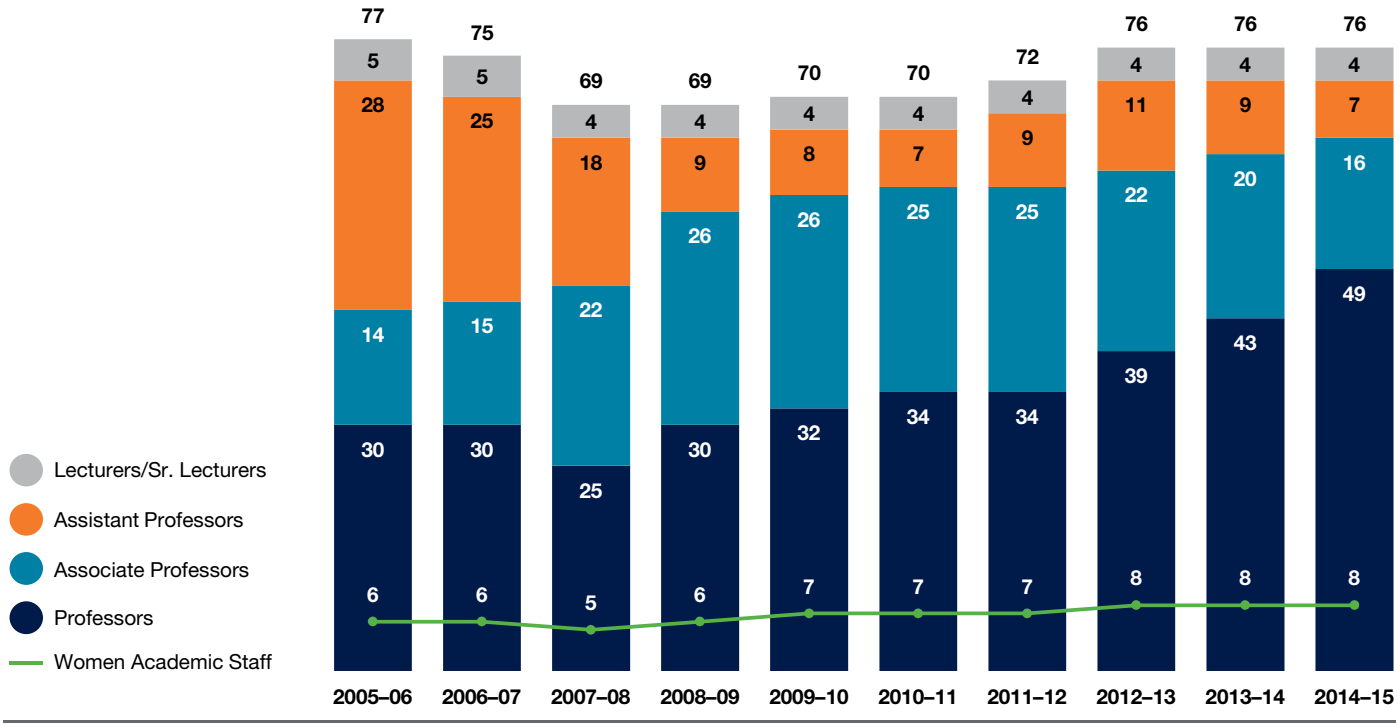
	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Assistant Professors	2	4	5	5	6	7	5	6	4	5
Women Assistant Professors	0	2	2	2	2	3	2	2	2	3
% Women Assistant Professors	**0.0%**	**50.0%**	**40.0%**	**40.0%**	**33.3%**	**42.9%**	**40.0%**	**33.3%**	**50.0%**	**60.0%**
Associate Professors	2	3	3	3	2	2	3	3	5	5
Women Associate Professors	1	1	0	0	0	0	1	1	1	1
% Women Associate Professors	**50.0%**	**33.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**33.3%**	**33.3%**	**20.0%**	**20.0%**
Professors	22	22	20	17	17	18	18	18	18	17
Women Professors	3	3	4	3	3	3	3	3	3	3
% Women Professors	**13.6%**	**13.6%**	**20.0%**	**17.6%**	**17.6%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**	**17.6%**
Lecturers/ Sr. Lecturers	3	3	4	6	6	4	4	4	4	4
Women Lecturers/ Sr. Lecturers	1	1	1	2	2	1	1	1	1	1
% Women Lecturers/ Sr. Lecturers	**33.3%**	**33.3%**	**25.0%**	**33.3%**	**33.3%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**
Total Tenured and Tenure Stream	26	29	28	25	25	27	26	27	27	27
Women Tenured and Tenure Stream	4	6	6	5	5	6	6	6	6	7
% Women Tenured and Tenure Stream	**15.4%**	**20.7%**	**21.4%**	**20.0%**	**20.0%**	**22.2%**	**23.1%**	**22.2%**	**22.2%**	**25.9%**
Total Academic Staff	29	32	32	31	31	31	30	31	31	31
Women Academic Staff	5	7	7	7	7	7	7	7	7	8
% Women Academic Staff	**17.2%**	**21.9%**	**21.9%**	**22.6%**	**22.6%**	**22.6%**	**23.3%**	**22.6%**	**22.6%**	**25.8%**

Figure H.5 **Department of Civil Engineering: Academic Staff by Position with Percentage of Women, 2005–2006 to 2014–2015**



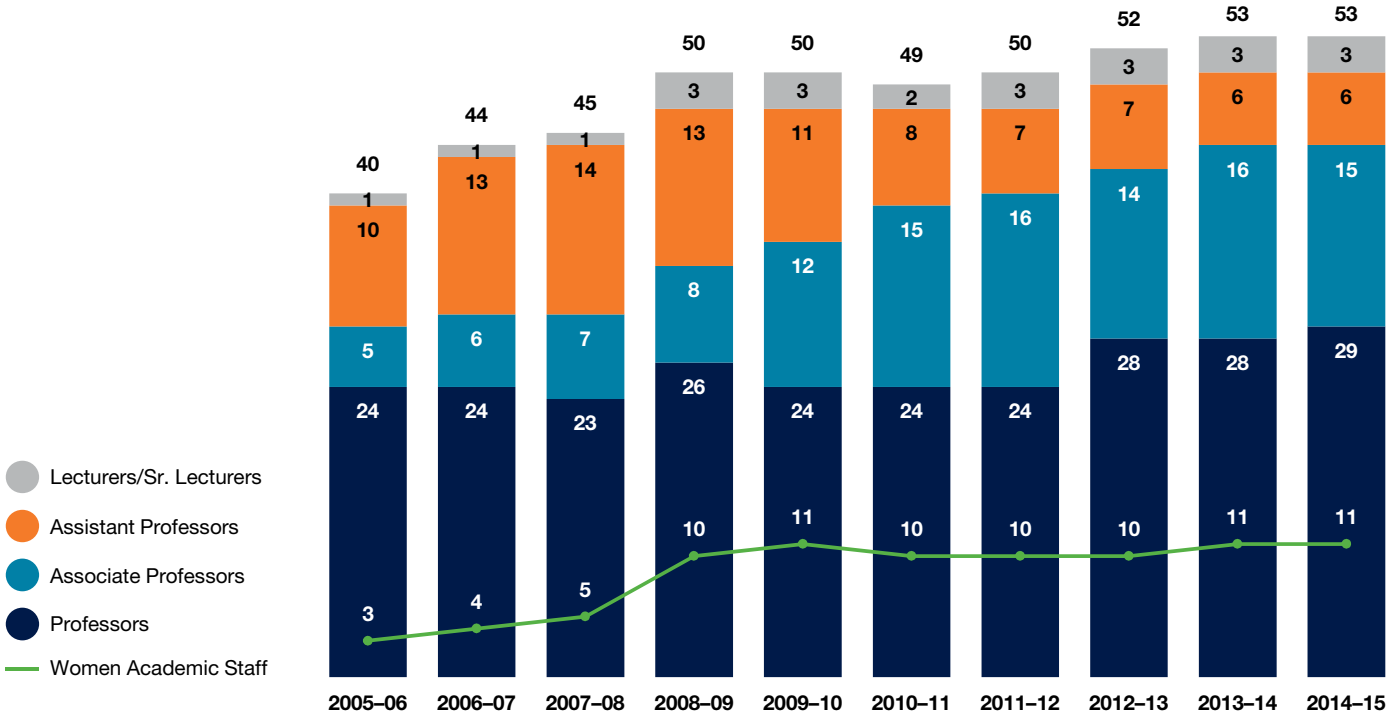
	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Assistant Professors	7	11	8	6	6	9	9	8	7	8
Women Assistant Professors	3	4	3	2	2	2	2	3	2	3
% Women Assistant Professors	**42.9%**	**36.4%**	**37.5%**	**33.3%**	**33.3%**	**22.2%**	**22.2%**	**37.5%**	**28.6%**	**37.5%**
Associate Professors	9	6	10	12	12	11	10	11	11	9
Women Associate Professors	1	1	2	3	3	3	2	2	3	2
% Women Associate Professors	**11.1%**	**16.7%**	**20.0%**	**25.0%**	**25.0%**	**27.3%**	**20.0%**	**18.2%**	**27.3%**	**22.2%**
Professors	19	15	15	15	15	17	19	17	16	18
Women Professors	0	0	0	0	0	0	1	1	1	2
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**5.3%**	**5.9%**	**6.3%**	**11.1%**
Lecturers/ Sr. Lecturers	0	0	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	35	32	33	33	33	37	38	36	34	35
Women Tenured and Tenure Stream	4	5	5	5	5	5	5	6	6	7
% Women Tenured and Tenure Stream	**11.4%**	**15.6%**	**15.2%**	**15.2%**	**15.2%**	**13.5%**	**13.2%**	**16.7%**	**17.6%**	**20.0%**
Total Academic Staff	35	32	34	34	34	38	39	37	35	36
Women Academic Staff	4	5	5	5	5	5	5	6	6	7
% Women Academic Staff	**11.4%**	**15.6%**	**14.7%**	**14.7%**	**14.7%**	**13.2%**	**12.8%**	**16.2%**	**17.1%**	**19.4%**

Figure H.6 **The Edward S. Rogers Sr. Department of Electrical & Computer Engineering: Academic Staff by Position with Percentage of Women, 2005–2006 to 2014–2015**



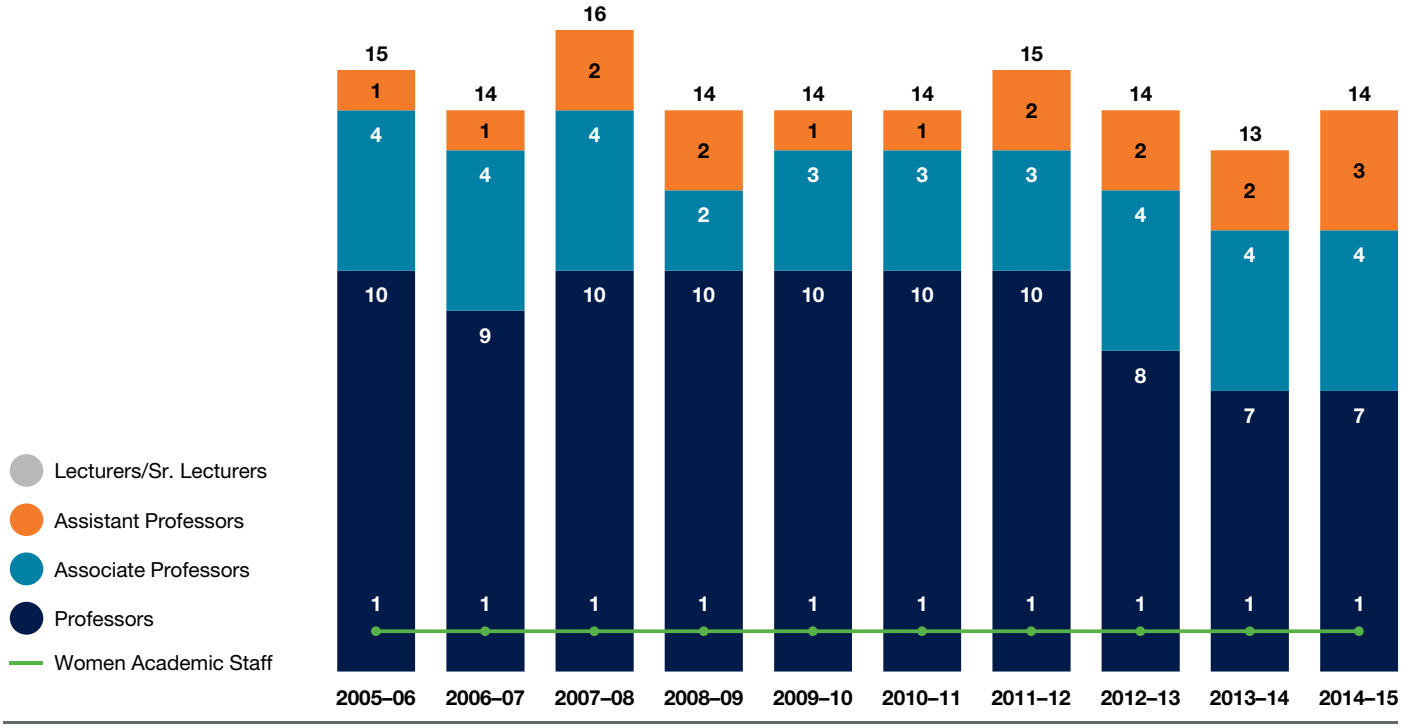
	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Assistant Professors	28	25	18	9	8	7	9	11	9	7
Women Assistant Professors	4	5	3	2	2	2	2	2	1	0
% Women Assistant Professors	**14.3%**	**20.0%**	**16.7%**	**22.2%**	**25.0%**	**28.6%**	**22.2%**	**18.2%**	**11.1%**	**0.0%**
Associate Professors	14	15	22	26	26	25	25	22	20	16
Women Associate Professors	1	0	1	3	4	4	4	4	4	4
% Women Associate Professors	**7.1%**	**0.0%**	**4.5%**	**11.5%**	**15.4%**	**16.0%**	**16.0%**	**18.2%**	**20.0%**	**25.0%**
Professors	30	30	25	30	32	34	34	39	43	49
Women Professors	0	0	0	0	0	0	0	1	2	3
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.6%**	**4.7%**	**6.1%**
Lecturers/ Sr. Lecturers	5	5	4	4	4	4	4	4	4	4
Women Lecturers/ Sr. Lecturers	1	1	1	1	1	1	1	1	1	1
% Women Lecturers/ Sr. Lecturers	**20.0%**	**20.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**
Total Tenured and Tenure Stream	72	70	65	65	66	66	68	72	72	72
Women Tenured and Tenure Stream	5	5	4	5	6	6	6	7	7	7
% Women Tenured and Tenure Stream	**6.9%**	**7.1%**	**6.2%**	**7.7%**	**9.1%**	**9.1%**	**8.8%**	**9.7%**	**9.7%**	**9.7%**
Total Academic Staff	77	75	69	69	70	70	72	76	76	76
Women Academic Staff	6	6	5	6	7	7	7	8	8	8
% Women Academic Staff	**7.8%**	**8.0%**	**7.2%**	**8.7%**	**10.0%**	**10.0%**	**9.7%**	**10.5%**	**10.5%**	**10.5%**

Figure H.7 **Department of Mechanical & Industrial Engineering: Academic Staff by Position with Percentage of Women, 2005–2006 to 2014–2015**



	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Assistant Professors	10	13	14	13	11	8	7	7	6	6
Women Assistant Professors	0	0	1	5	6	5	5	4	2	2
% Women Assistant Professors	**0.0%**	**0.0%**	**7.1%**	**38.5%**	**54.5%**	**62.5%**	**71.4%**	**57.1%**	**33.3%**	**33.3%**
Associate Professors	5	6	7	8	12	15	16	14	16	15
Women Associate Professors	2	2	2	2	2	3	3	3	6	5
% Women Associate Professors	**40.0%**	**33.3%**	**28.6%**	**25.0%**	**16.7%**	**20.0%**	**18.8%**	**21.4%**	**37.5%**	**33.3%**
Professors	24	24	23	26	24	24	24	28	28	29
Women Professors	1	2	2	2	2	2	2	3	3	4
% Women Professors	**4.2%**	**8.3%**	**8.7%**	**7.7%**	**8.3%**	**8.3%**	**8.3%**	**10.7%**	**10.7%**	**13.8%**
Lecturers/ Sr. Lecturers	1	1	1	3	3	2	3	3	3	3
Women Lecturers/ Sr. Lecturers	0	0	0	1	1	0	0	0	0	0
% Women Lecturers/ Sr. Lecturers	**0.0%**	**0.0%**	**0.0%**	**33.3%**	**33.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Total Tenured and Tenure Stream	39	43	44	47	47	47	47	49	50	50
Women Tenured and Tenure Stream	3	4	5	9	10	10	10	10	11	11
% Women Tenured and Tenure Stream	**7.7%**	**9.3%**	**11.4%**	**19.1%**	**21.3%**	**21.3%**	**21.3%**	**20.4%**	**22.0%**	**22.0%**
Total Academic Staff	40	44	45	50	50	49	50	52	53	53
Women Academic Staff	3	4	5	10	11	10	10	10	11	11
% Women Academic Staff	**7.5%**	**9.1%**	**11.1%**	**20.0%**	**22.0%**	**20.4%**	**20.0%**	**19.2%**	**20.8%**	**20.8%**

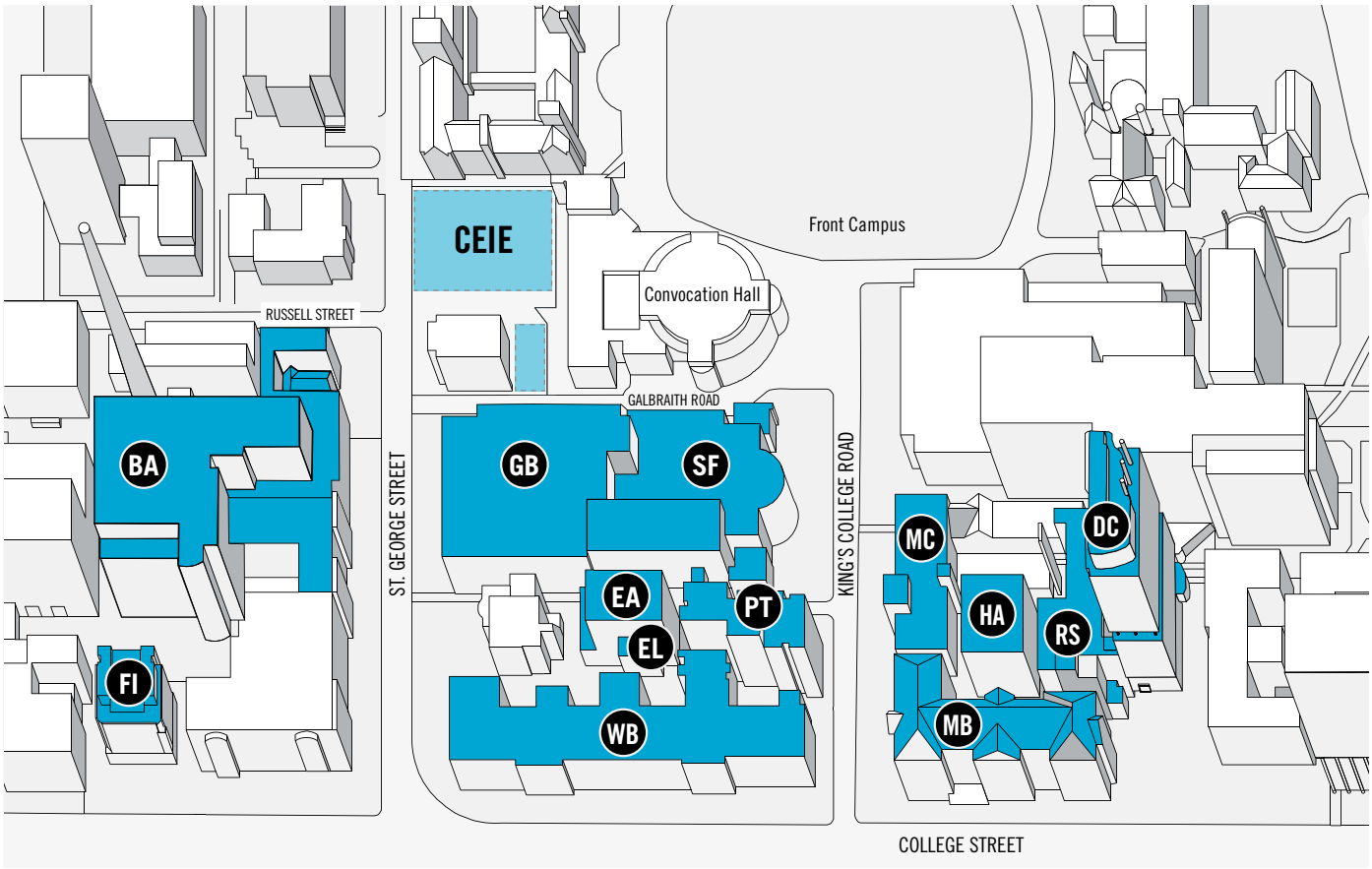
Figure H.8 **Department of Materials Science & Engineering: Academic Staff by Position with Percentage of Women, 2005–2006 to 2014–2015**



	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
Assistant Professors	1	1	2	2	1	1	2	2	2	3
Women Assistant Professors	0	0	0	0	0	0	0	0	0	0
% Women Assistant Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Associate Professors	4	4	4	2	3	3	3	4	4	4
Women Associate Professors	1	1	1	1	1	1	1	1	1	1
% Women Associate Professors	**25.0%**	**25.0%**	**25.0%**	**50.0%**	**33.3%**	**33.3%**	**33.3%**	**25.0%**	**25.0%**	**25.0%**
Professors	10	9	10	10	10	10	10	8	7	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	0	0	0	0	0	0	0	0	0	0
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	15	14	16	14	14	14	15	14	13	14
Women Tenured and Tenure Stream	1	1	1	1	1	1	1	1	1	1
% Women Tenured and Tenure Stream	**6.7%**	**7.1%**	**6.3%**	**7.1%**	**7.1%**	**7.1%**	**6.7%**	**7.1%**	**7.7%**	**7.1%**
Total Academic Staff	15	14	16	14	14	14	15	14	13	14
Women Academic Staff	1	1	1	1	1	1	1	1	1	1
% Women Academic Staff	**6.7%**	**7.1%**	**6.3%**	**7.1%**	**7.1%**	**7.1%**	**6.7%**	**7.1%**	**7.7%**	**7.1%**

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 and 704 Spadina Avenue, and the site of the forthcoming CEIE, these 17 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]
–	UTIAS (Downsview) [not pictured]
CEIE	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, 2014–2015 Information provided by Assistant Dean, Administration, Faculty of Applied Science & Engineering. uoft.me/facultyleadership
	Comparison of U of T Engineering with Ontario and Canada, 2014–2015 Enrolment, degrees granted and faculty data are based on the 2014 calendar year and come from the National Council of Deans of Engineering and Applied Science (NCDEAS) 2014 Resources Report, prepared by Engineers Canada and circulated to Canadian engineering deans in July 2015. 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 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 = 2014–2015 (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 2014 calendar year (April to March).
	Comparison of U of T Engineering with St. George Campus and University of Toronto, 2014–2015 All student enrolment statistics are based on headcount for Fall 2014 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 2014 to June 2015 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 2013–2014 grant year and exclude partner hospitals; includes all program types; data current as of May 2015. 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 2014 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 2014. 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 2015. U of T and St. George space statistics from U of T Facts and Figures 2014, which is available online at: www.utoronto.ca/about-uoft/measuring-our-performance/facts-figures-2014.
	Chapter 1: Undergraduate Studies
1.1a	**Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2005 to 2014** 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 2005–2014, Degree Type = Undergraduate; Stage of Study (SESLEV) = Year 1, New Intake (NEWINTK) = Yes, Measure = Headcount.
1.1b	**Domestic Students: Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2005 to 2014** 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 2005–2014, Degree Type = Undergraduate, Stage of Study (SESLEV) = Year 1, New Intake (NEWINTK) = Yes, Domestic / International (DOM_INTL) = Domestic; Measure = Headcount.

1.1c International Students: Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2005 to 2014

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 2005–2014, 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, 2005 to 2014

Averages of incoming students from Admissions Committee Report to Faculty Council (November). Retention rates based on Undergraduate Enrolment Projections documents, published by the U of T Planning and Budget Office, Oct. 2014 and Jan. 2015.

1.3 Incoming First-Year Undergraduates with Percentage of Women and International Students, 2005 to 2014

Headcount from U of T Undergraduate Enrolment Cube. Excludes students with special status. Cube Parameters: All Fall Terms for 2005–2014; 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, 2005 to 2014

Headcount from U of T 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 2005–2014; Stage of Study (SESLEV) = Year 1; Degree Type = Undergraduate.

1.5a Undergraduate Enrolment with Proportion of Women and International Students, 2005–2006 to 2014–2015

Headcount from U of T Undergraduate Enrolment Cube. Excludes students with special status. Cube Parameters: All Fall Terms for 2005–2014; 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, 2005–2006 to 2014–2015

Headcount from U of T Undergraduate Enrolment Reporting Cube. Excludes students with special status. Cube Parameters: Fall Terms for 2005–2014; Degree Type = Undergraduate; Gender = Female; Departments based on [Programs] field.

1.6 Undergraduates by Program, Year of Study and Professional Experience Year (PEY), 2014–2015

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: Years 1–4; Fall 2014; Departments based on [Programs] field; Degree Type = Undergraduate.

1.7 Undergraduates by Program, 2005–2006 to 2014–2015

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 2005–2014; Years 1–4 (SESLEV); 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, 2005–2006 to 2014–2015

Data provided by the Assistant Registrar, Scholarships & Financial Aid, Faculty of Applied Science & Engineering.

1.8b Total Value of Undergraduate Financial Assistance and Percentage Distributed by Year of Study, 2005–2006 to 2014–2015

Data provided by the Assistant Registrar, Scholarships & Financial Aid, Faculty of Applied Science & Engineering.

1.9a Undergraduate Degrees Awarded by Program, 2005–2006 to 2014–2015

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

1.9b **U of T Engineering Degrees Awarded by Academic Area Compared with Canadian and North American Degree Totals, 2013**
U of T and Canadian statistics are based on the 2013 calendar year and come from Engineers Canada Report of Enrolment & Degrees Granted (Canadian Engineers for Tomorrow, 2009–2013), revised December 2014, and available online at: www.engineerscanada.ca/sites/default/files/enrolmentreport2013-en-3.pdf. American statistics used to calculate North American percentages are based on the 2013–2014 academic year and come from the 2014 American Society of Engineering Educators (ASEE) Report, available online at: www.asee.org/papers-and-publications/publications/college-profiles.

1.10 **Undergraduate Student-to-Faculty Ratios by Academic Area, 2014–2015**
Number of undergraduates from U of T Undergraduate Enrolment Reporting Cube. Excludes students on PEY internship and students with special status. Cube Parameters: Fall 2014, 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, EngSci 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 2014 are used to compare with 2014–2015 student counts. Calculation includes tenured/tenure-stream and lecturers/teaching stream faculty.

1.11a **Number of Students and Percentage of Class Graduating with Honours, 2006 to 2015**
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, 2010–2011 to 2014–2015**
Statistics provided by Assistant Director, Engineering Career Centre, Faculty of Applied Science & Engineering.

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, 2005–2006 to 2014–2015**
Enrolment counts are from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: All Fall Terms for 2005–2014, 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, 2005–2006 to 2014–2015**
Enrolment counts are from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: All Fall Terms for 2005–2014; 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, 2005–2006 to 2014–2015**
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 for 2005–2014. FTEs are counted by academic year as reported in the cube (May to April).

2.1d **MEng and MHSc FTE Students as a Proportion of Total Master's FTE Students, 2005–2006 to 2014–2015**
Enrolment counts are from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: All Fall Terms for 2005–2014; Measure = Total FTE (UAR).

2.2a **Student-to-Faculty Ratios for FTE Undergraduate and Graduate Students, 2005–2006 to 2014–2015**
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 2005–2014; 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 2005–2014; 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. Graduate ratios include only tenured and tenure-stream faculty; Undergraduate ratios also include lecturers / teaching stream faculty.

2.2b Ratio of Undergraduate to Graduate FTE Students, 2005–2006 to 2014–2015
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 2005–2014; 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 2005–2014; Measure = Total FTE (UAR); Includes all degree types but excludes students with special status.

2.2c FTE Graduate Student-to-Faculty Ratios by Academic Area and Degree Type, 2014–2015
Number of FTE graduate students from U of T Graduate Enrolment Reporting Cube. Cube Parameters: Fall 2014; 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 include tenured and tenure-stream faculty only.

2.3 Domestic and International PhD Students: Applications, Offers, Registrations, Selectivity and Yield, 2005–2006 to 2014–2015
All data from ROSI download: 4BEG (Admissions Statistics).

2.4 Domestic and International MASc Students: Applications, Offers, Registrations, Selectivity and Yield, 2005–2006 to 2014–2015
All data from ROSI download: 4BEG (Admissions Statistics).

2.5 Domestic and International MEng and MHSc Students: Applications, Offers, Registrations, Selectivity and Yield, 2005–2006 to 2014–2015
All data from ROSI download: 4BEG (Admissions Statistics).

2.6a MEng and MHSc Students: International and Domestic Full-Time Equivalent (FTE) and Domestic Eligible Full-Time Equivalent (EFTE), 2005–2006 to 2014–2015
EFTE and headcount for fall terms from U of T Graduate Enrolment Reporting Cube. Cube Parameters: All Fall terms for 2005–2014, Measure = Headcount or Eligible FTE.

2.6b MASc Students: International and Domestic Full-Time Equivalent (FTE) and Domestic Eligible Full-Time Equivalent (EFTE), 2005–2006 to 2014–2015
EFTE and headcount for fall terms from U of T Graduate Enrolment Reporting Cube. Cube Parameters: All Fall terms for 2005–2014, Measure = Headcount or Eligible FTE.

2.6c PhD Students: International and Domestic Full-Time Equivalent (FTE) and Domestic Eligible Full-Time Equivalent (EFTE), 2005–2006 to 2014–2015
EFTE and headcount for fall terms from U of T Graduate Enrolment Reporting Cube. Cube Parameters: All Fall terms for 2005–2014, Measure = Headcount or Eligible FTE.

2.7a Total External Graduate Student Scholarships by Source, 2004–2005 to 2013–2014
All data from U of T Graduate Student Income Reporting Cube, current as of May 2015 (includes complete 2013–2014 academic year). Faculty = Faculty of Applied Science & Engineering. Award Income only.

2.7b Number of NSERC Graduate Student Award Recipients by Academic Area, 2004–2005 to 2013–2014
All data from U of T Graduate Student Income Reporting Cube, current as of May 2015 (includes complete 2013–2014 academic year). Faculty = Faculty of Applied Science & Engineering. Award Income only. Source = Federal — Natural Sciences and Engineering Research Council. Measure = Student Count.

2.8a Graduate Student Funding by Category, 2004–2005 to 2013–2014
All data from U of T Graduate Student Income Reporting Cube, current as of May 2015. Reported by academic year (September to August). Faculty = Faculty of Applied Science & Engineering. Includes funding from all sources except work-study employment income.

2.8b Graduate Student Funding by Category and Academic Area, 2013–2014
All data from U of T Graduate Student Income Reporting Cube, current as of May 2015. Reported by academic year (September to August). Faculty = Faculty of Applied Science & Engineering. Includes funding from all sources except work-study employment income.

2.9 Number of Students Fast-Tracked from MASc to PhD by Academic Area, 2006–2007 to 2013–2014
All data from ROSI download: 4FF (Student Registrations). Fast-tracked students are identified by POSt codes that end in 'PHD U.'

2.10 Time to Graduation for PhD, MASc, MEng and MHSc Students, 2005–2006 to 2014–2015
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 and part-time MEng students are distinguished for greater clarity and accuracy.

2.11 Graduate Degrees Awarded by Degree Type and Gender, 2005–2006 to 2014–2015
All data from ROSI download: 5EA (Graduated Students); Faculty = Faculty of Applied Science & Engineering.

Text Graduate Studies Initiatives
Information provided by the Vice-Dean Graduate Studies, Faculty of Applied Science & Engineering.

2.12 ELITE Certificates Awarded, 2008–2009 to 2014–2015
Information provided by the Faculty Graduate Coordinator, Faculty of Applied Science & Engineering.

2.13 MEng, SCFI Program Enrolment, Fall 2008 to Winter 2015
Information provided by the Graduate Program Administrator, Department of Mechanical & Industrial 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, 2004–2005 to 2013–2014
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year. Faculty = Applied Science & Engineering. 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 Tri-Council and NCE Support: CIHR, NSERC and NCE Funding, 2004–2005 to 2013–2014
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year (e.g., 2013–2014 = April 2013 to March 2014 = Grant Year 2014). Faculty = Faculty of Applied Science & Engineering.

3.1c Research Operating Funding by Year, Source and Funding per Faculty Member, 2004–2005 to 2013–2014
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year (e.g., 2013–2014 = April 2013 to March 2014 = Grant Year 2014). Faculty = Applied Science & Engineering. Categories as defined in footnote to Figure 3.1a. Number of faculty included in the calculation provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering (based on HRIS and published lists of faculty). Includes tenured and tenure-stream faculty only.

3.2a NSERC Funding, 2013–2014
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year (e.g., 2013–2014 = April 2013 to March 2014 = Grant Year 2014). Faculty = Faculty of Applied Science & Engineering.

3.2b NSERC Industrial Partnership Funding by Program, 2004–2005 to 2013–2014
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year (e.g., 2013–2014 = April 2013 to March 2014 = Grant Year 2014). Faculty = Faculty of Applied Science & Engineering.

3.2c Industrial Partnerships as a Proportion of Total NSERC Funding, 2004–2005 to 2013–2014
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year (e.g., 2013–2014 = April 2013 to March 2014 = Grant Year 2014). Faculty = Faculty of Applied Science & Engineering.

3.2d **Industrial Partnerships, 2014–2015**
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year (e.g., 2013–2014 = April 2013 to March 2014 = Grant Year 2014). Faculty = Faculty of Applied Science & Engineering. 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, 2004–2005 to 2013–2014**
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year (e.g., 2013–2014 = April 2013 to March 2014 = Grant Year 2014). Faculty = Faculty of Applied Science & Engineering.

3.3a **Canadian Peer Universities vs. University of Toronto Share of NSERC Funding for Engineering, Cumulative Five-Year Share, 2009–2010 to 2013–2014**
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.

3.3b **U of T Annual Share of NSERC Funding in Engineering, 2004–2005 to 2013–2014**
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.

3.4a **Engineering Invention Disclosures by Academic Area, 2010–2011 to 2014–2015**
Report of U of T Commercialization Indicators, Annual Supplement for FY2015, provided by the Office of the Vice-President, Research. Data current as of May 1, 2015.

3.4b **U of T Invention Disclosures by Faculty, 2014–2015**
Report of U of T Commercialization Indicators, Annual Supplement for FY2015, provided by the Office of the Vice-President, Research. Data current as of May 1, 2015.

3.4c **U of T Patent Applications by Faculty, 2014–2015**
Report of U of T Commercialization Indicators, Annual Supplement for FY2015, provided by the Office of the Vice-President, Research. Data current as of May 1, 2015.

3.5 **Distribution of Research Operating Funding by Academic Area, 2004–2005 to 2013–2014**
Data from the U of T Research Reporting Cube. Current as of May 2015. Organized by grant year. Faculty = Faculty of Applied Science & Engineering.

Chapter 4: **Cross-Faculty Education and Experiential Learning**

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10.2 **Total Number of Faculty with Percentage of Women, 2005–2006 or 2014–2015**
Information provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering.

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Information provided by the Assistant Dean, Administration, Faculty of Applied Science & Engineering.

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Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

11.3 **Budget Data, 2006–2007 to 2014–2015**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

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11.7 **Summary of Buildings Occupied by Engineering, 2014–2015**
Data 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.

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A Outreach Programs

Information provided by Engineering Student Outreach Office, Faculty of Applied Science & Engineering.

B Engineering Student Clubs and Teams

Information from the Engineering Society: www.skule.ca.

C Time to Completion for Graduate Students

All data from ROSI 4BEA downloads, originally created for Ontario Council of Graduate Studies (OCGS) reporting purposes. The data reflect 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 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, 2015, 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 2015, and is organized by grant year. Faculty = Faculty of Applied Science & Engineering. Faculty data is provided by the Assistant Dean, Administration, 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 2013 (for Academic Year 2012–2013) are linked to Grant Year 2014 (April 2013 to March 2014).

F Spinoff Companies

Report of U of T Commercialization Indicators, Annual Supplement for FY2015, provided by the Office of the Vice-President, Research. Data current as of May 1, 2015.

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.

UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Office of the Dean
Faculty of Applied Science & Engineering
University of Toronto
416-978-3131
dean.engineering@ecf.utoronto.ca
www.engineering.utoronto.ca