UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

ANNUAL REPORT 2014

PERFORMANCE INDICATORS

Pictured on the front cover:

The **Centre for Engineering Innovation & Entrepreneurship** (CEIE) will provide a dynamic, flexible environment that fosters collaboration, encourages active learning and accelerates innovation. In addition to state-of-the-art instructional spaces, the Centre will house multidisciplinary research clusters comprised of some of the Faculty's most innovative research centres and institutes. Dedicated space for industry partners, alumni and student clubs will enable productive interaction across the entire U of T Engineering community. Located next to Convocation Hall and facing St. George Street, the CEIE is destined to become a campus landmark.

Message from the Dean

It is my privilege to present our *2014 Annual Report of Performance Indicators* and highlight programs launched in 2013-14. Through a wealth of metrics that span ten years, and benchmark comparisons with peer institutions, this report positions our progress and illustrates our remarkable achievements. We use this published data to help identify new priorities, critical to maintaining our Faculty's high standards.

At U of T Engineering, our international reputation, strategic recruitment and pioneering programs attract students of the highest calibre from across Canada and around the world. In 2014, we received more than 11,000 undergraduate applications – the highest ever recorded – meaning there was a place for only one of every ten applicants to our programs. For our incoming undergraduate class, one third comes from outside Canada and 30 per cent are women, adding diverse and global perspectives that enrich our learning environment.

We nurture the next generation of engineers to become makers and innovators. Hands-on opportunities, such as our new Multidisciplinary Capstone Projects course, spark interactions across disciplines and with industry partners. New undergraduate options, including our Biomedical Engineering minor and certificates in Engineering Leadership and Renewable Resources, allow our students to customize their degrees.

The rising interest in our graduate programs is a testament to our reputation as a global leader in engineering research, education and innovation. We have made tremendous progress towards our 2011-16 Academic Plan goal of balancing the undergraduate-to-graduate ratio. We accomplished this by keeping undergraduate enrolments on target and surpassing our goal of 2,000 graduate students two years ahead of schedule – a rise of over 50 percent in the past seven years. We enhanced our graduate programs with a certificate in Financial Engineering, a PhD collaborative program in Engineering Education, and two MEng emphases: Advanced Water Technology & Process Design and Sustainable Aviation.

U of T Engineering continues to pursue research excellence, enhance cross-disciplinary collaborations and make advances in addressing some of the world's most significant challenges. Our Faculty members are recognized leaders in their fields, whose contributions help shape our country's innovation agenda, entrepreneurism and economic prosperity. Our achievements are recognized not only in their impact to engineering and society, but also by netting the largest share of major international awards and honours; the highest number of invention disclosures and patent applications recorded at U of T; and the largest share of NSERC funding among engineering Faculties in Canada. This past year, we exceeded our NSERC funding goal three years earlier than outlined in our Academic Plan. We also launched two multidisciplinary research institutes in the key areas of advanced manufacturing and transportation.

Over the last year, alumni, students and faculty have rallied behind the forthcoming Centre for Engineering Innovation & Entrepreneurship (CEIE) – recognizing the immense opportunities the new building affords both students and researchers alike. It is invigorating to experience such a generous level of support for our campaign as, together, we take this next leap forward in driving innovation, fostering entrepreneurship and cultivating global engineering leaders.

Thank you to our vibrant engineering community for your outstanding contributions, unwavering pursuit of excellence and continued commitment to our Faculty's goals. I welcome your input on the *2014 Annual Report of Performance Indicators* and look forward to your feedback.

Cristina Amon, Dean
September 2014

Faculty Leadership, 2013–2014

Dean
Cristina Amon

Vice-Dean, Graduate Studies
Markus Bussmann

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

Vice-Dean, Undergraduate
Susan McCahan

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Bryan Karney

Chair, First Year
Micah Stickel

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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

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Mark Kortschot

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Chief Financial Officer
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Executive Director, Advancement
Gillian Sneddon

Faculty Registrar
Barbara McCann

Table of Contents

Selected Achievements Under the Academic Plan

The Faculty of Applied Science & Engineering's Academic Plan 2011-16, approved by Faculty Council in October 2011, was developed through a highly consultative planning process involving faculty and staff, students, alumni and University stakeholders. The plan provides a framework to guide us in pursuit of our goal to be a leader among the world's very best engineering schools in our discovery, creation and transfer of knowledge and technological innovation through teaching and research.

This section highlights the progress we have made in 2013-14 towards achieving our goals of the Academic Plan 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/academicplan, and our Year Two: Progress and Achievements report is available at uoftme/yeartwoprogress.

Positioning

U of T Engineering endeavours to be a leader among the world's very best engineering schools. Effectively sharing our success stories and research outcomes increases our profile. We continue to enhance our channels of communications through the use of social media and upgraded digital platforms, particularly our family of websites, to strengthen our reputation locally and internationally.

Progress Highlights

- Ranked as the top engineering school in Canada by a significant margin in all international rankings and placed 12th on the 2013 Academic Ranking of World Universities (ARWU).
- Transitioned 16 of our Faculty microsites to a mobile-friendly and accessible platform.
- Began the process of redesigning our main Faculty website with a focus on responsive design and improved navigation, content and marketing.
- Expanded social media efforts; for example, our social media promotion at convocation in June 2013 resulted in the highest use of the university-wide hashtag #UofTGrad13.
- Published our first corporate brochure as a tool to promote partnership opportunities to industry. Departmental and research-specific inserts customize the brochure to specific research and donor scenarios.
- In 2013-14, our Faculty received significant exposure from media outlets. We had 9,406 impressions with almost half from outlets outside of Canada.

Culture of Excellence

Promoting a culture of excellence is central to the vision of the Faculty of Applied Science & Engineering. Our strong international reputation continues to attract professors, researchers and students of the highest calibre. The resulting knowledge creation and transfer, research innovation and impact are reflected in the increasing recognition of our faculty, students and alumni.

Progress Highlights

- In 2013-14, garnered 21.3 per cent of all major awards received by Canadian engineering Faculties with only 5.9 per cent of overall faculty members.
- Won a remarkable number of emerging leader/early-career awards, such as the U of T McLean Award, the Natural Sciences and Engineering Research Council's Steacie Fellowship and two Engineers Canada Young Engineer Achievement Awards.

- Received dozens of major awards and fellowships from national and international professional societies, including the Ontario Professional Engineers Gold Medal and the Engineers Canada Gold Medal. Moreover, six U of T Engineering professors were honoured as Fellows of the Engineering Institute of Canada. We also won the 2014 Killam Prize in engineering.
- Published the sixth *Annual Report of Performance Indicators* used to track metrics against our Academic Plan goals.
- Made significant progress towards our goal of 25 per cent international students at both the undergraduate and graduate levels; undergraduate is currently at 23.1 per cent with a first-year class comprised of 30.4 per cent international students, while graduate international enrolment is 24.6 per cent.
- Introduced a new component to the March Break Open House event specifically targeted to the recruitment of female applicants.

Educating Future Engineers

Our highly-regarded undergraduate and graduate programs attract academically strong and culturally diverse students from across Canada and the world. We continually enhance our programs through curriculum reviews, and ensure our offerings remain innovative by integrating professional competencies into curricula and promoting hands-on, team-based, multidisciplinary learning opportunities. Our goal is to instil in our students the drive to become lifelong learners, capitalize on the entrepreneurial competencies developed, and become global engineering leaders in the fields of their choosing.

Progress Highlights

- Established a task force to review the first-year curriculum. Following broad consultation with students, faculty and staff, recommended changes to Chairs and Directors in May 2014. Implementation has begun over the course of the summer.
- Introduced four new undergraduate certificates: Mineral Resources, Nuclear Engineering, Engineering Leadership and Renewable Resources Engineering.
- Launched new Biomedical Engineering minor.
- Established more hands-on, team-based learning opportunities through capstone design courses in each program including:
  - Interdisciplinary projects through the Centre for Global Engineering (CGEN), involving students from engineering, business, public health and social sciences. In groups of four, students developed solutions for childhood malnutrition in Bangladesh while drawing on each other's specialized backgrounds.
  - Industry-sponsored Multidisciplinary Capstone Projects (MCPs) through the University of Toronto Institute for Multidisciplinary Design & Innovation (UT-IMDI). Teams include three to four students from different departments.
  - Cross-cultural capstone projects – teams consist of students from our mechanical and industrial engineering programs and from Peking University in Beijing, China.
- To meet demand for our Engineering Business minor, expanded offerings for three core courses. These classes are now offered at least six times a year; roughly one-in-three students are now enroled in a minor or certificate.
- Surpassed our goal of 2,000 graduate students by 2015, with 2,064 enrolled in fall 2013; progressing towards meeting our longer-term goal of balancing our undergraduate:graduate ratio to 60:40.
- Launched MEng in Cities Engineering & Management (MEngCEM), MEng certificate and emphases in Financial Engineering, Advanced Water Technologies & Process Design, and Sustainable Aviation.
- Developed a combined program with UTSC for a BSc in Environmental Science + MEng, added flex-time PhD options in ChemE and UTIAS, and approved a collaborative program with OISE in Engineering Education to start fall 2014.

Student Experience

The student experience extends well beyond academic learning. It includes co- and extra-curricular experiences, research, internships, international student exchanges, and summer and professional work experiences. Our Faculty continues to enhance this range of opportunities for our students, and to strengthen our teaching effectiveness, infrastructure, student information systems, communications, counselling and academic and personal support systems.

Progress Highlights

- Realized steady growth in our Professional Experience Year (PEY) program. Placed 704 students (up from 631 in 2012-13) with 60 placements abroad (up from 39 in 2012-13) accounting for 65 per cent of our third-year engineering students.
- Complemented hands-on, team-based experiences through Technology Enhanced Active Learning (TEAL) opportunities:
  - Piloted online courses for Calculus with Engineering Applications I and II (APS162 and 163). The online version of APS162 was also made available this summer (July/August) for incoming students wishing to complete one credit before starting in September 2014.
  - Created our first massive open online course (MOOC) entitled, The Energetic Earth. Over 10,000 participants enrolled in the course. Material created for the MOOC was repurposed for Terrestrial Energy Systems (CIV300).
  - Provided lecture-capture for the majority of our first-year Core 8 courses, allowing students to review lectures outside of class.
  - Piloted an inverted classroom model in Electricity and Magnetism (ECE221) and in Civil Engineering Graphics (CIV235).
  - Developed Reusable Learning Objects (RLOs) to facilitate teaching and improve the student experience through the Engineering Instructional Innovation Program (EIIP).
- Expanded Facilitated Study Groups for first-year students, from one to 17.
- Established a task force to review professional development services for undergraduate students.
- Hosted nearly 50 exchange students from countries such as Australia, China, France, India, Mexico and South Korea.
- Remained the number one choice in the world for undergraduate Science without Borders (SwB) Brazilian students with over 300 enrolled in U of T Engineering this year.
- Supported three initiatives through the second year of our Engineering Instructional Innovation Program (EIIP) to: (i) create case studies on ethics and decision making; (ii) renovate second-year ECE courses that have broad implications in future years and courses; and (iii) create new methods for professors to teach and evaluate teamwork outside of traditional approaches.

Research Foci

U of T Engineering fosters a vibrant research environment within Canada's most research-intensive university. Building on that strength, this year we established extra-departmental units (EDU:Cs) to foster cross-Faculty research in themes that align with U of T goals and contribute to local and national agendas. We also continue to enhance collaborations within our community, support undergraduate and graduate student research opportunities, build external partnerships, increase our funding base and encourage donor support to further enable research initiatives.

Progress Highlights

- During 2012-13, increased Tri-Council funding by 15 per cent to $26.3 million, surpassing our goal of $25 million per year by 2015 three years early.
- Created meaningful opportunities for faculty to learn best practices in research, build relationships with industry partners, and prepare successful proposals through panels, luncheon discussions and networking events.
- Increased support to researchers to strengthen partnerships with industry by hiring a director of foundation and corporate partnerships.
- Continued to foster multidisciplinary research by establishing two new EDU:Cs: University of Toronto Transportation Research Institute (UTTRI) and Toronto Institute of Advanced Manufacturing (TIAM), both of which align closely with areas of Faculty strength and government funding priorities.

Outreach, Collaboration & Influence

The Faculty continues to have impact far beyond the University of Toronto. Our collaborations extend from Toronto communities to peer international institutions, from Canadian high schools to industry, and from professionals to alumni and donors. These activities help us attract academically-strong students and internationally-renowned scholars. Our goals include continuously evaluating our pre-university activities, solidifying relationships with alumni and prospective donors, and further building industry partnerships.

Progress Highlights

- Cultivated relationships with alumni and potential donors in Asia, the US and South America, hosting over 60 alumni events in Hong Kong, Jakarta, San Francisco, San Jose, Seoul, Singapore, Taipei and several cities in Canada.
- Officially launched fundraising campaigns in November 2013 in Hong Kong, Indonesia, Malaysia, Singapore, South Korea and Taiwan in support of nationality-named Technology Enhanced Active Learning (TEAL) rooms in the Centre for Engineering Innovation & Entrepreneurship (CEIE). In May 2014, Dean Cristina Amon returned to Hong Kong, Singapore and Taiwan to mark the successful completion of campaigns.
- Increased undergraduate student engagement in the Graditude campaign to 32 per cent (up from 26 per cent in 2013), doubling overall financial contributions and raising awareness on how funds assist student clubs in achieving their objectives.
- Visited more than 200 GTA schools during May/June 2013 through our In-School Workshop program for students in grades three to eight.
- In summer 2013, published our first external annual report, *Where Innovation Thrives – Year in Review 2013*, to share key achievements with industry partners, alumni and potential donors.

Resource Allocation

Adequate resources are an integral part of achieving our goals under the Academic Plan. We strive to enhance and create efficiencies in academic time, physical space, budget, and administrative and technical staff. Through a variety of strategies we have been able to invest in forward-looking initiatives to advance our academic objectives.

Progress Highlights

- Maintained a strong financial position, with total revenue increasing by 7.9 per cent.
- Committed over $3 million in Dean's Strategic Funds to support multidisciplinary research and student experience initiatives; e.g., University of Toronto Transportation Research Institute (UTTRI), Institute for Sustainable Energy (ISE) and The Entrepreneurship Hatchery.
- Renovated and upgraded several facilities, including the Laser/Combustion Lab at UTIAS, BioZone Phase IV and MIE Computer Lab.
- Moved forward with plans to build the Centre for Engineering Innovation & Entrepreneurship (CEIE), which will feature an interactive auditorium, prototyping facilities, Technology Enhanced Active Learning (TEAL) classrooms, design meeting rooms, student club spaces and multidisciplinary research hubs for our recently-created centres and institutes.
- Established a new HR office dedicated to U of T Engineering and strategically aligned to the Faculty's goals to provide enhanced services.
- Realized a record-breaking fundraising year, with close to $22 million in major gifts.

Comparison of U of T Engineering with Ontario and Canada, 2013–2014

The table below compares U of T Engineering metrics against those of engineering Faculties in Ontario and Canada for 2013–14. Within Canada, we awarded 7.2 per cent of all undergraduate engineering degrees and 8 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 2013–14.

	U of T Engineering	Ontario	U of T % of Ontario	Canada	U of T % of Canada
Undergraduate					
Enrolment (FTE)	4,560	31,598	14.4%	74,126	6.2%
Degrees Awarded	960	5,927	16.2%	13,363	7.2%
% Women	21.6%	18.9%		18.3%	
Master's (MEng, MASc and MHSc)					
Enrolment (FTE)	953	5,343	17.8%	12,725	7.5%
Degrees Awarded	496	2,652	18.7%	5,496	9.0%
% Women	25.2%	21.8%		23.2%	
Doctoral (PhD)					
Enrolment (FTE)	803	3,294	24.4%	8,851	9.1%
Degrees Awarded	106	552	19.2%	1,330	8.0%
% Women	18.9%	16.3%		16.5%	
Faculty					
Tenured and Tenure-Stream	220	1,568	14.0%	3,738	5.9%
Major Awards					
Major Awards Received	13	27	48.1%	61	21.3%
Research Funding					
NSERC Funding for Engineering	$27.5M	$117.4M	23.4%	$306.0M	9.0%

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 2013 calendar year and come from Engineers Canada (www.engineerscanada.ca). Faculty data (tenured and tenure-stream) are based on November 2013 counts by Engineers Canada. Major awards and research funding statistics are based on the 2013–14 grant year (April 2013 to March 2014).

Comparison of U of T Engineering with St. George Campus and University of Toronto, 2013–2014

The following table compares U of T Engineering with the University of Toronto based on key metrics for 2013–14. 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	5,311	37,038	14.3%	61,189	8.7%
Professional Master's (MEng and MHSc)	604	6,367	9.5%	6,755	8.9%
Research Master's (MASc)	622	2,823	22.0%	2,914	21.3%
Doctoral (PhD)	838	5,769	14.5%	6,043	13.9%
All Students	7,375	51,997	14.2%	76,901	9.6%
Degrees Awarded					
Undergraduate	937	8,515	11.0%	12,468	7.5%
Professional Master's (MEng and MHSc)	321	2,838	11.3%	3,050	10.5%
Research Master's (MASc)	234	1,330	17.6%	1,369	17.1%
Doctoral (PhD)	110	820	13.4%	859	12.8%
Total Degrees	1,602	13,503	11.9%	17,746	9.0%
Faculty and Staff					
Professoriate	243			2,748	8.8%
Administrative and Technical Staff	300			6,126	4.9%
Research Funding					
Sponsored Research Funding	$67.6M			$385.1M	17.6%
Industry Research Funding	$7.0M			$18.7M	37.7%
Space					
Space (NASMs)	63,937	623,046	10.3%	797,562	8.0%
Revenue					
University-wide Costs	$56.1M			$465.6M	12.0%
Total Revenue	$183.8M			$1,602.7M	11.5%

Note: Student enrolment is shown as of November 1, 2013. Degrees awarded are based on the 2013–14 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 2012–13 grant year (April to March). Space is measured in Net Assignable Square Metres (NASMs). Revenue is based on the 2013–14 U of T fiscal year (May to April).

1 Undergraduate Studies

Our Faculty's strong programs and international reputation continue to draw the brightest students and most promising future engineers from around the globe. In 2013, we experienced yet another record year in undergraduate admissions, with over 10,000 applications. This increase of over eight per cent has enabled us to be more selective than ever in our offers of admission.

The rising entering average for Ontario Secondary School students speaks to the high quality of our applicants, while our additional support programs for first-year students demonstrate our commitment to ensuring their success, as evidenced by our increasing retention rate.

Enriching the diversity of our student body has a lasting effect on our undergraduates' understanding and perspective of the world around them. Through targeted recruitment activities, we have increased our female and international first-year cohorts over time to 25.4 per cent and 30.4 per cent, respectively, in fall 2013.

Initiatives such as the Girls' Leadership in Engineering Experience (GLEE) weekend, which started in 2012, serve as community-building events by connecting female applicants with women faculty, students and alumni. At the same time, active recruitment efforts in places such as Brazil, India, South Saharan Africa, Southeast Asia, Turkey and the United Arab Emirates continue to attract outstanding and diverse international students to our programs.

Our Faculty has developed strategic opportunities for undergraduate students to enhance their curricular and co-curricular experiences, and graduate with the tools and competencies to succeed in their careers. Initiatives that provide work experience – such as industry-sponsored summer research projects through the Institute for Multidisciplinary Design & Innovation (UT-IMDI), the Engineering Summer Internship Program (eSIP), and the well-established and popular Professional Experience Year (PEY) program – are instrumental to achieving this goal.

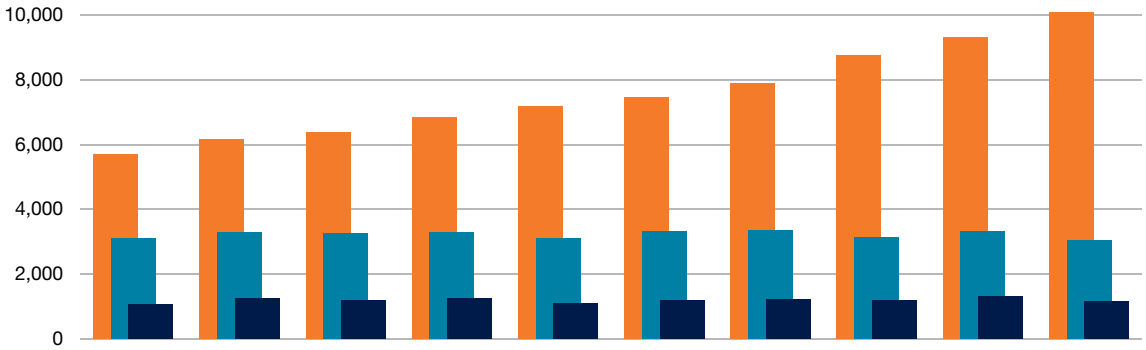
Undergraduate Admissions and First-Year Students

The number of first-year applicants in 2013 was the highest on record at 10,095, representing an eight per cent increase from 2012. This large number of applicants allowed us to be more selective with offers of admission sent to just 30 per cent of applicants. The mean entering average of Ontario Secondary School students also continues to rise steadily to a record-breaking 91.7 per cent.

Our first- to second-year retention rate rose to 94.6 per cent. This reflects the value of programs within the Faculty that support students, such as First-Year Foundations, Success 101, first-year math support and an extensive advising program that provides embedded counsellors, an international transition advisor, a learning strategist and a wellness coordinator.

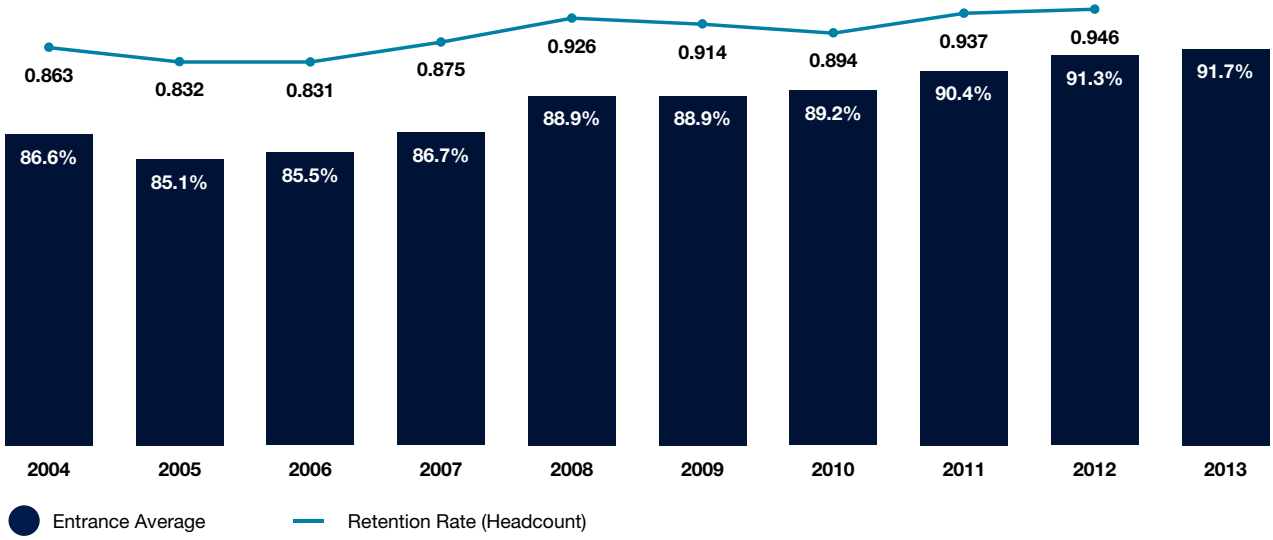
To promote success, staff in our First-Year Office reach out early in the term to students who are under-performing and encourage them to meet with academic advisors.

Figure 1.1 **Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2004 to 2013**



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Applications	5,715	6,163	6,383	6,829	7,173	7,446	7,881	8,745	9,326	10,095
Offers	3,094	3,290	3,276	3,300	3,107	3,329	3,347	3,149	3,309	3,042
Registrations	1,064	1,236	1,201	1,235	1,090	1,201	1,213	1,191	1,300	1,148
Selectivity	0.54	0.53	0.51	0.48	0.43	0.45	0.42	0.36	0.35	0.30
Yield	0.34	0.38	0.37	0.37	0.35	0.36	0.36	0.38	0.39	0.38

Figure 1.2 **Ontario Secondary School Averages of Incoming First-Year Undergraduates and Retention Rate Between First and Second Year, 2004 to 2013**



Note 1.1: Student counts are shown as of November 1. Applications and offers are for the fall admission cycle.
Selectivity = Offers ÷ Applications; the proportion of applicants who were offered admission. Yield = Registrations ÷ Offers.
Note 1.2: Entrance average is calculated based on Ontario Secondary School students. Retention Rate is based on November 1 enrolment.

A diverse student body enriches the learning experience for everyone. Our focused efforts in recruiting both female and international students have resulted in a first-year class comprised of over 25 per cent women, and over 30 per cent from outside Canada, respectively.

We held steady in female enrolment over the previous year and aim to further increase the number of talented women entering the field. Initiatives such as Girls' Leadership in Engineering Experience (GLEE) weekend, held in May 2014 for the third year, provide a unique opportunity for female applicants to spend time with and learn from women – including U of T Engineering students, professors and alumni – who share a passion for improving lives through engineering. Ninety-six female applicants attended the GLEE event with 76 accepting their admission offers.

Our ability to attract the brightest students from around the world is due in part to our excellent international reputation and targeted recruitment strategy. Recruitment efforts continue in India, Southeast Asia, Turkey and the United Arab Emirates and have started in Brazil and South Saharan Africa; interacting with applicants via video conferencing; collaborating with other Faculties at U of T to expand outreach worldwide; and strengthening relationships with educators in international schools.

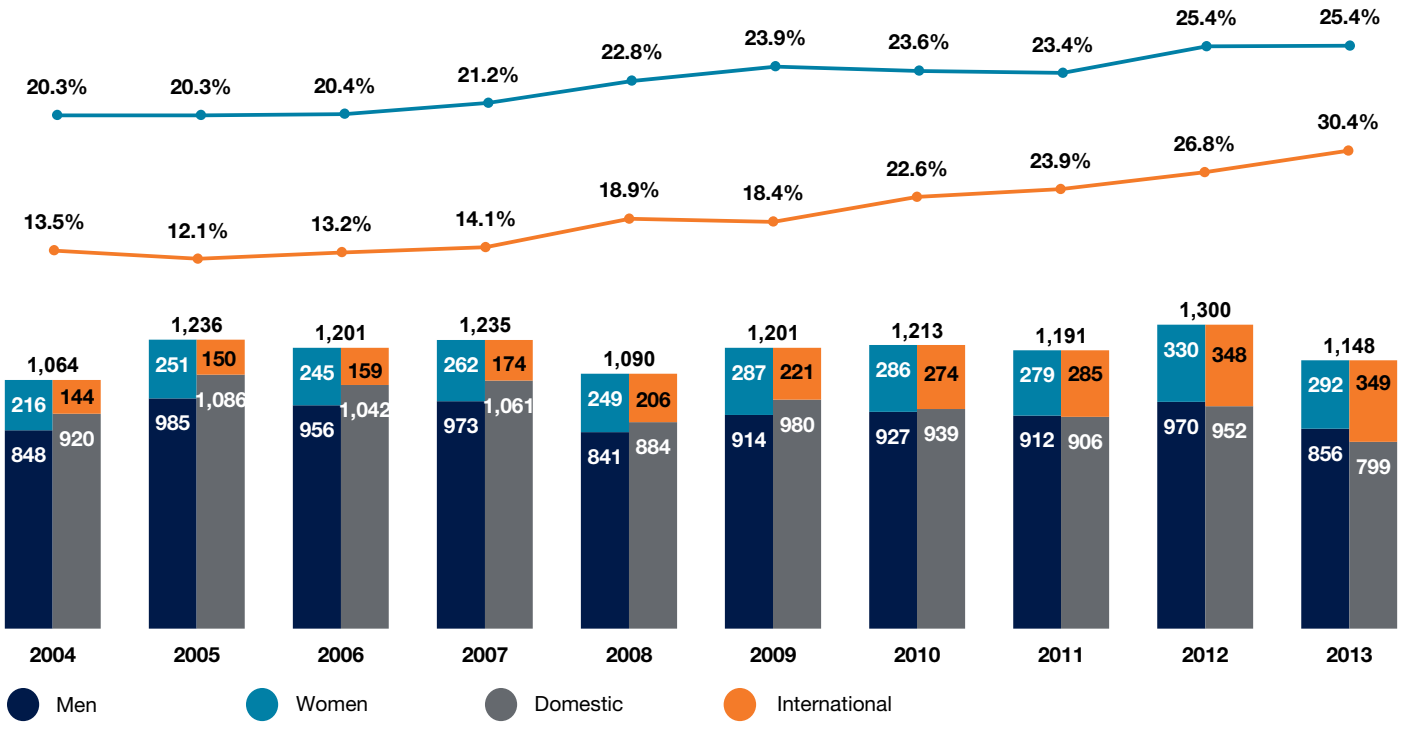
We also continue to draw highly-qualified international students through our International Foundation Program (IFP), now in its fourth year. Thirty-three students were admitted through IFP in 2013, up from 20 in 2010. This program allows students who are academically strong but have lower English fluency scores to be conditionally admitted to Engineering as non-degree students. Students in this program must complete an intensive eight-month English language program as well as the Engineering Strategies & Practice course series in order to continue in a program of study in our Faculty.

As we grow our international student ranks, we have increased our efforts to support their transition. Our International Student Ambassador Program, for example, connects new international students with upper-year engineering students to ease them into their new learning and cultural environment.

We also attract high-achieving local students to U of T Engineering through ongoing recruitment events on campus, at local high schools, Fall Campus Day, our March Break Applicant Event and the annual Welcome to Engineering event.

Together, these initiatives position U of T Engineering as the first choice institution for some of the most talented and promising students from across the country and around the world.

Figure 1.3 **Incoming First-Year Undergraduates with Percentage of Women and International Students, 2004 to 2013**



Note 1.3: Student counts are shown as of November 1.

Undergraduate Enrolment

International student enrolment has grown throughout our undergraduate program, while domestic numbers have remained relatively constant. This year, international students account for over 23 per cent of our total undergraduate population. This brings us closer to our Academic Plan goal of 25 per cent by 2015.

Our consistent placement as the top engineering school in the country and among the best in the world is a significant draw for the brightest students, regardless of geography. Our international student population has grown significantly over the past five years. Total undergraduate enrolment increased by one per cent in 2013, and we are on target to start decreasing our total undergraduate enrolment, as well as continue decreasing the ratio of undergraduate students to faculty members.

We are progressing towards our long-term goal of balancing our undergraduate:graduate ratio to 60:40. Through improved selectivity, we were significantly closer to our target of 1,130 first-year students.

Figure 1.4 Incoming First-Year Domestic and International Undergraduates, 2005 to 2013

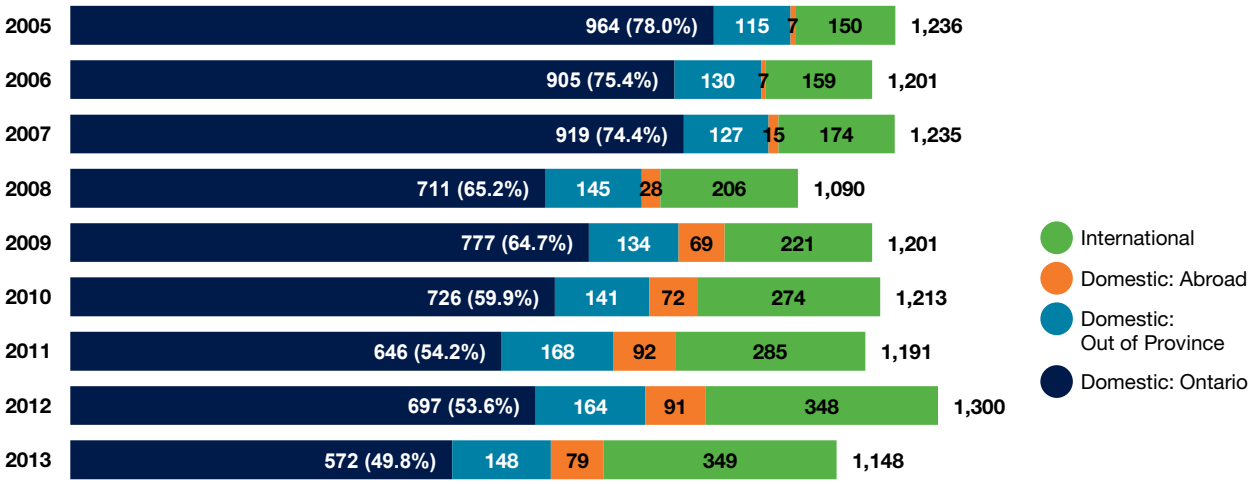
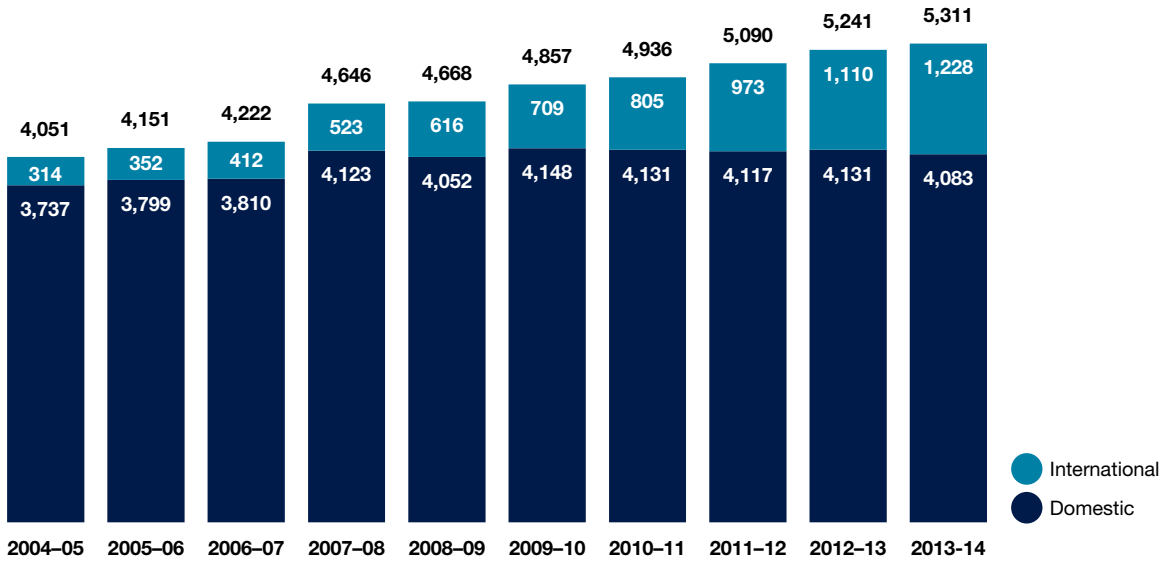
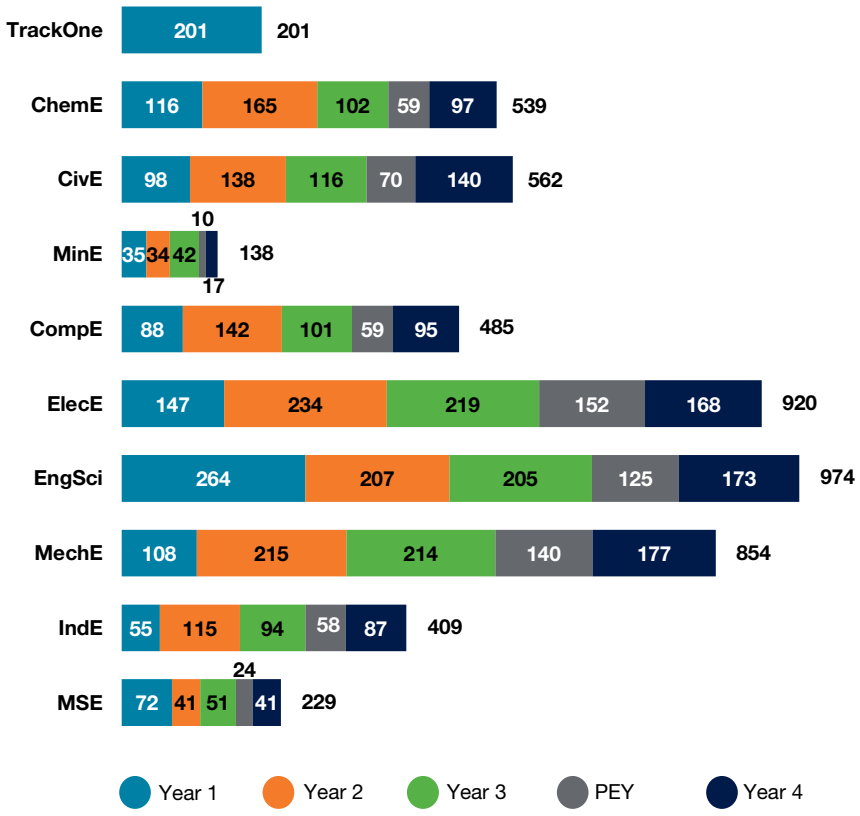


Figure 1.5 International and Domestic Undergraduate Enrolment, 2004–2005 to 2013–2014



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

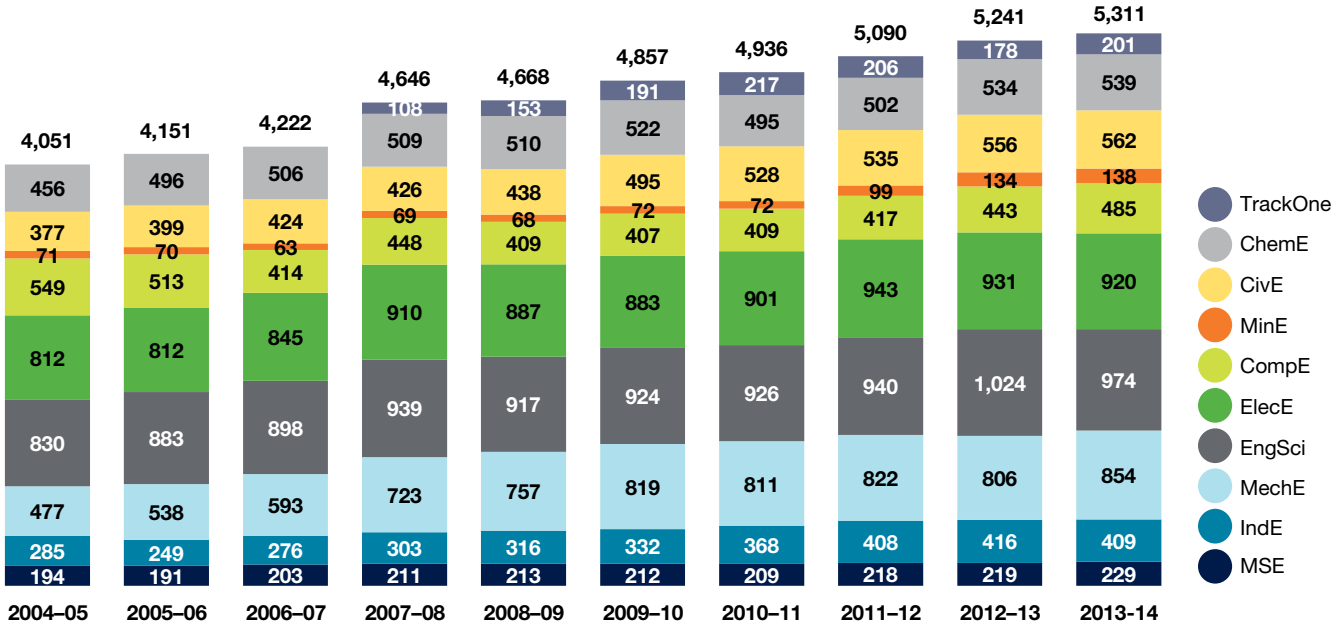
Figure 1.6 Undergraduates by Program, Year of Study and Professional Experience Year (PEY), 2013–2014



Engineering Science Majors	Enrolment
Aerospace Engineering	43
Biomedical Engineering	16
Biomedical Systems Engineering	41
Electrical and Computer Engineering	103
Energy Systems	55
Infrastructure Engineering	33
Mathematics, Statistics and Finance	58
Nanoengineering	11
Physics	18
Total	**378**

Enrolment in MechE (Figure 1.7) increased from 806 students to 854 this year. Due to the strength of the software industry and the rise of mobile devices and apps, interest in CompE has also continued to grow, with enrolment rising from 443 to 485. Most other programs stayed relatively constant, maintaining healthy enrolments.

Figure 1.7 Undergraduates by Program, 2004–2005 to 2013–2014



Note 1.6: The Biomedical Engineering major is being phased out in favour of Biomedical Systems Engineering.
Note 1.7: Student counts are shown as of November 1.

Undergraduate Need-Based Funding

The University of Toronto is committed to ensuring that our students are able to enter or complete their degrees regardless of financial means. We grant students funding from a variety of sources, including individual donors and the University-wide UTAPS (University of Toronto Advanced Planning for Students) program. In 2013-14, 1,630 students received financial awards, representing a decrease from 1,655 in 2012-13. However, the total value increased from $7.6 million to $9.1 million. The amounts shown in this chapter do not include merit-based awards, or funding from provincial assistance programs such as the Ontario Student Assistance Program.

Undergraduate need-based funding is distributed across years to support undergraduates as they progress through their studies.

Figure 1.8a **Number of Awards Received by Cohort with Total Number of Undergraduate Need-based Award Recipients, 2004–2005 to 2013–2014**

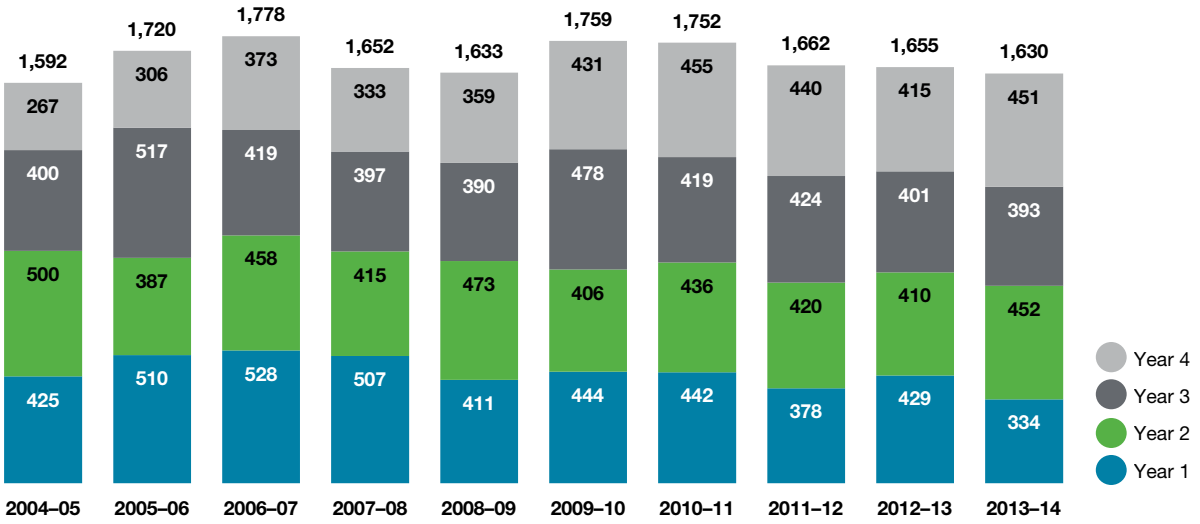
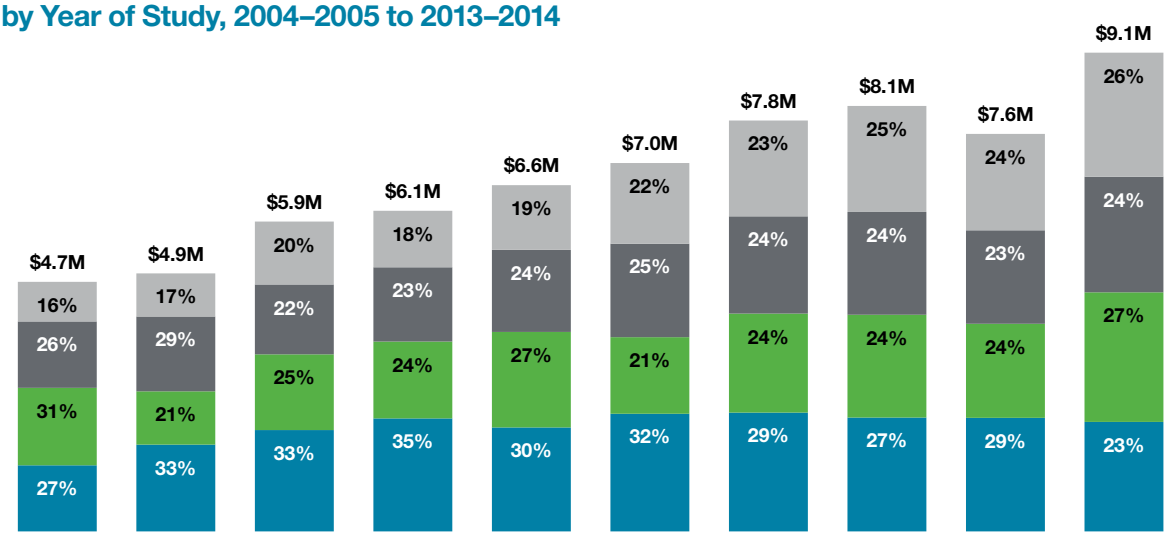


Figure 1.8b **Total Value of Undergraduate Financial Assistance and Percentage Distributed by Year of Study, 2004–2005 to 2013–2014**



	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
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	$2,360,576
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	$2,197,725
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	$2,461,455
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	$2,085,353
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	$9,105,109

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

Degrees Awarded

U of T grants two types of engineering undergraduate degrees: Bachelor of Applied Science (BASc) and Bachelor of Applied Science in Engineering Science (BASc EngSci). While an undergraduate degree typically takes four years, many students who participate in our Professional Experience Year (PEY) complete their studies in five years.

In 2012, nearly eight out of every 100 Canadian engineering graduates were from U of T. The ratios in EngSci and MSE are unusually high because comparable programs are offered at fewer institutions across Canada and North America (Figure 1.9b).

Figure 1.9a **Undergraduate Degrees Awarded by Program, 2004–2005 to 2013–2014**

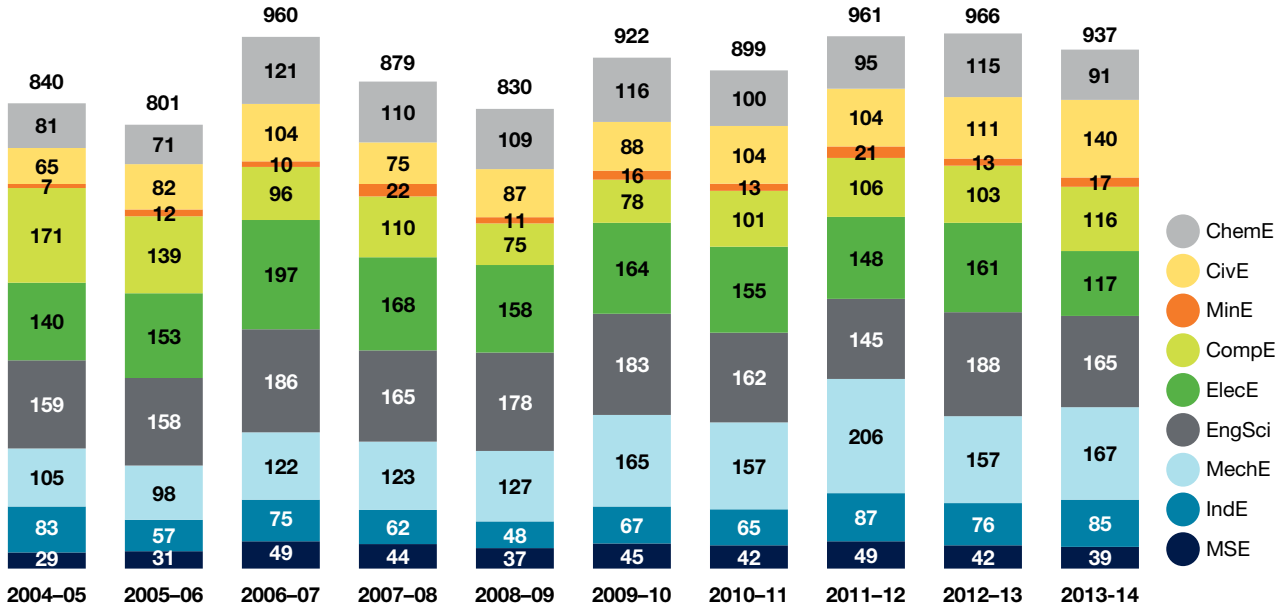
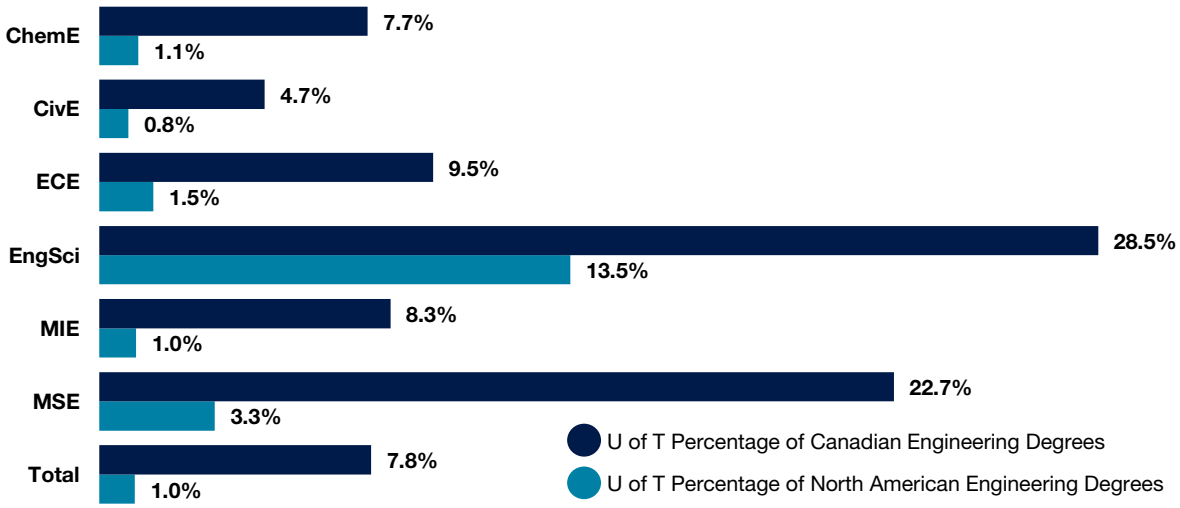


Figure 1.9b **U of T Engineering Degrees Awarded by Academic Area Compared with Canadian and North American Degree Totals, 2012**



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-Faculty Ratios

Figure 1.10 shows the number of undergraduates in each department relative to the number of teaching faculty in that department. Our EngSci and TrackOne programs use 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 rather than a particular department.

Figure 1.10 **Undergraduate Student-Faculty Ratios by Academic Area, 2013–2014**

Improving the Undergraduate Experience

The Faculty actively seeks student feedback through a variety of mechanisms, including town halls and course evaluations. As anticipated in previous Annual Reports, in the fall of 2013 the Faculty moved to a new professionally validated evaluation system, designed to give both summative and formative feedback on teaching. It informs our leadership about how well instructors are meeting the perceived teaching needs of our students and provides input on ways to improve.

The core questions for the evaluation system are deployed across the University, allowing for broad comparisons and sharing of best practices. The new system enables students to respond on their mobile devices for increased convenience. One immediate outcome has been a marked increase in the amount of qualitative feedback students have provided.

Because this is the first year of the new evaluation system it is not possible to provide comparative analysis and identify trends, so no numerical data from the evaluations is included in this Annual Report. Trends will emerge as we accumulate additional years of data. It was notable, even on the first round of evaluations, that scores were especially high overall on the question that asked how well instructors related course concepts to practical applications and/or current research.

The implementation of the Co-Curricular Record (CCR) will also be beneficial for our students. This is an official U of T document that recognizes students' co-curricular involvement as a significant part of their university experience. It became available on an opt-in basis beginning in September 2013. Among its features is a search tool that allows students to seek activities based on the skills they would like to gain, time commitment and interest. For more information, please visit ccr.utoronto.ca.

Note 1.10: Student enrolment (headcounts) is based on November 1 data. Students with special status and those on Professional Experience Year (PEY) are not included in ratio calculations. No adjustment has been made for departmental contributions to shared first-year curriculum, Engineering Science or cross-Faculty minors. Faculty counts are based on data from the 2013–14 academic year, and include tenured or tenure-stream faculty and lecturers or teaching-stream faculty.

In addition to responding to our students' feedback and the CCR, we have established a number of initiatives aimed at enhancing the undergraduate experience. Some of these begin before our students join us. Incoming students, for example, can begin preparing for first year in advance through programs like First-Year Foundations, a summer series of free and paid programming and short videos based on our Success 101 material. We have also expanded the Facilitated Study Groups pilot project from one course to 17 first-year courses.

We continue to enrich the learning environment through Technology Enhanced Active Learning (TEAL) approaches, which have enormous potential to change the way that we interact with students in the classroom. Two key examples are:

- Inverted classroom: For the second year in ECE221 – a required second-year core course for the electrical engineering and computer engineering programs that focuses on electric and magnetic fields – students watch lectures online prior to class and spend in-class time working on problem set questions, and conceptual elements with faculty and peer support.
- Online courses: This past year we piloted two online calculus courses – Calculus with Engineering Applications I and II (APS162 and 163). We received funding for these two courses and a mechanics course from the Ontario Ministry of Training, Colleges & Universities to further develop them, and be shared with students from other universities in the province.

The Faculty also creates innovative learning opportunities in our range of multidisciplinary courses, where students collaborate to transform their ideas and classroom knowledge into designs that tackle challenges proposed by industry or other real-world clients. By enabling the next generation of makers through cross-disciplinary programs including minors and certificates (see chapter 4), we continue engineering's legacy of driving economic development, spurring innovation and offering solutions to some of the world's greatest challenges. Examples of opportunities offered this year include:

- Multidisciplinary Capstone Projects (MCPs) course in partnership with industry: This year, U of T Engineering launched our first Multidisciplinary Capstone Projects in collaboration with industry partners such as Bombardier, Defence Research and Development Canada, Magna International and others. Teams of students – each from a different department – worked together on new solutions, such as software that helps pilots manage jetlag or new caterpillar tracks for an amphibious vehicle.
- MIE cross-cultural capstone design projects: Select undergraduates in our mechanical and industrial engineering programs collaborated with students at Peking University in Beijing, China, for their capstone course. This involved teams of students from both countries working on client-based projects that brought together different global perspectives to create solutions to practical problems. There were two in-person meetings, in China and in Toronto, and the remaining interactions were virtual. Projects were sponsored by industries that have operations both in Canada and China, such as Siemens, Bombardier International and Litens Automotive.

Professional Development Support

Creating opportunities for students to build on their competencies outside of the classroom environment through professional development experiences, both locally and internationally, is one way that we develop our global engineers.

Over 2,000 students attended the 2014 You're Next Career Fair organized by the You're Next Career Network, a student led organization. The fair focuses on science and engineering careers, with many companies actively recruiting students for summer employment, internships and new graduate opportunities. This year a larger number of industries were represented and 50 per cent of employers participated for the first time. A second event hosted through the You're Next Career Network, the annual Start-up Career Exposition, was the largest Canadian start-up event with 85 start-ups from across North America attending.

The Engineering Career Centre's two primary programs, the Professional Experience Year (PEY) and the Engineering Summer Internship Program (eSIP), have evolved throughout the years to meet the growing need for professional development opportunities for our undergraduate students.

PEY is one of the most recognized undergraduate paid internship programs in Canada. Second- and third-year students can participate in 12- to 16-month internships to apply the knowledge they've gained in the classroom to a professional environment. The PEY program adds tremendous value to students: they complete their internships with additional competencies, industry connections and often job offers.

PEY placements abroad have grown considerably this year. Compared to 2012-13, the number of students accepting offers outside Canada has increased by 56 per cent, while international student participation in PEY has increased by 55 per cent.

The number of PEY employers has also increased, bringing diverse placement opportunities to our students. Apple, for example, recently joined the program. There has also been a notable hiring increase in several industries, including energy and oil, construction and finance.

Figure 1.11a **PEY Internship Placements for Engineering Undergraduates with Percentage Participation from Previous Third-Year Class, 2004–2005 to 2013–2014**

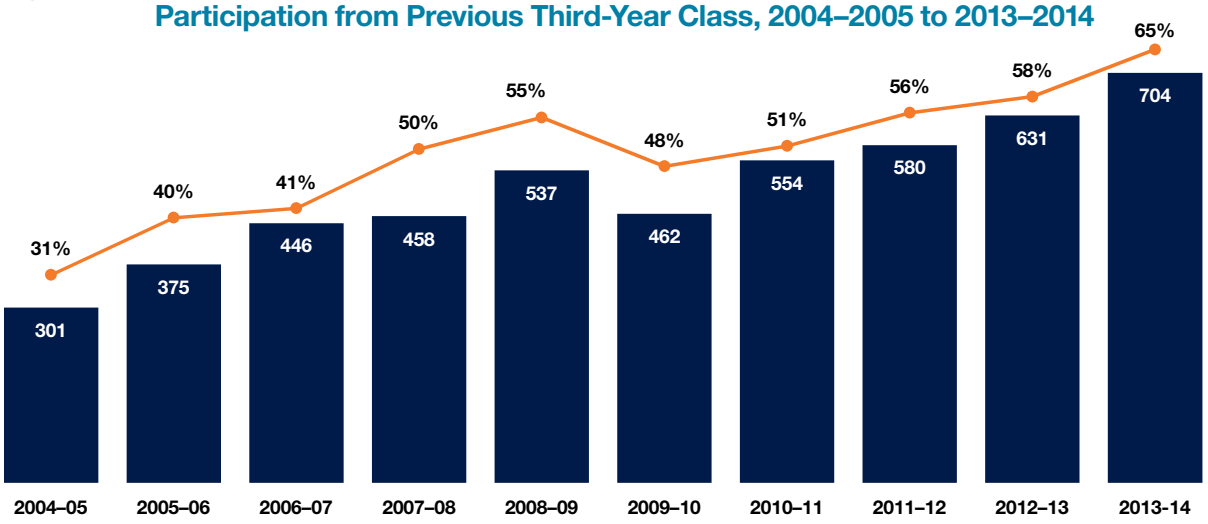


Figure 1.11b **PEY Internship Placements, 2008–2009 to 2013–2014**

	Canadian Placements	International Placements
2008–09	490	47
2009–10	426	36
2010–11	530	24
2011–12	547	33
2012–13	592	39
2013–14	644	60

Figure 1.11c **PEY Employers, 2008–2009 to 2013–2014**

	PEY Employers who Hired Engineering Students
2008–09	193
2009–10	158
2010–11	185
2011–12	221
2012–13	241
2013–14	304

Summer Research Opportunities

Many of our departments provide summer employment to undergraduate students. The Engineering Summer Internship Program (eSIP), for example, allows students to work in the lab alongside professors, conducting research that will equip them with experience that they can carry forward into future courses or careers.

Undergraduate participation in abroad summer research opportunities continues to increase. In 2013-14, 43 students went abroad – the highest number and percentage over the last five years.

The University of Toronto Institute for Multidisciplinary Design & Innovation (UT-IMDI) offers industry-based summer projects and has grown from eight students in 2012 to 25 in 2013. Students work as interns for four months on real world projects. Companies that have participated in recent years include Bombardier Aerospace, Pratt & Whitney Canada, Magna Advanced Technologies, and Holt Renfrew/ The Poirier Group.

Figure 1.12a **Undergraduate Participation in Summer Research Opportunities, 2009-2010 to 2013-2014**

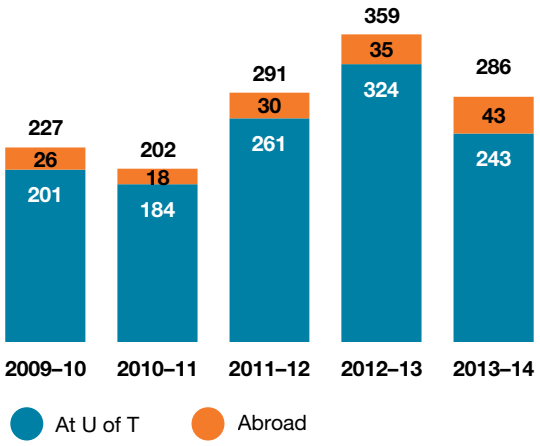


Figure 1.12b **Undergraduate Participation in Summer Research Opportunities, 2014**

Research Participation	U of T	Abroad	Total
ChemE	17	10	27
CivE & MinE	24	2	26
ECE	45	2	47
EngSci	75	26	101
MIE	34	2	36
MSE	20	1	21
TrackOne	4	0	4
Other (Non-Degree)	24	0	24
Total	**243**	**43**	**286**

Pre-University Engineering Outreach

The Engineering Student Outreach Office designs and delivers pre-university programs that engage youth in science, technology, engineering and math (STEM). Taught by our undergraduate and graduate students, the programs often represent the first connection youth make to U of T Engineering. The outreach team works closely with student organizations, faculty members and academic areas to spark an interest in STEM among pre-university students, especially those from underrepresented communities. New initiatives this year included:

- DEEP (Da Vinci Engineering Enrichment Program) Saturday Workshops, which allow participants to explore cutting-edge industries, such as sustainable energy, biomedical engineering and robotics. For a full list of program offerings, visit http://uoft.me/DEEP.
- Hosting the inaugural FIRST LEGO League (FLL) International Open in June 2014. The competition exposed students aged nine to 14 to real-world engineering challenges by building LEGO-based robots to complete tasks on a thematic playing surface.
- The Big Ideas event, run by the Faculty in partnership with U of T's Rotman School of Management. Funded by FedDev Ontario, the event gave youth exposure to innovation and understanding of the business of science and engineering. Participants identified a need, generated ideas to meet that need and then created prototypes.

Student Clubs and Teams

Student life at U of T Engineering is as dynamic and diverse as our students. Our undergraduates participate in organizations related to the arts, athletics, community, culture, design, special interests and professional development. A full list of categorized clubs can be found in Appendix B. In addition to the associations listed in Appendix B, there are over 400 clubs at U of T that our students have access to.

Note 1.12a and 1.12b: All international research opportunities for U of T students going abroad were coordinated by the Centre for International Exchange. In Figure 1.12b, students are shown by their home department for opportunities at U of T and abroad.

2 Graduate Studies

The exceptional quality of our research and strong international reputation continue to attract graduate students of the highest calibre. The Faculty has focused over the last few years on both growing and enhancing our graduate programs as we work towards our long-term Academic Plan goal of balancing the graduate:undergraduate ratio to 40:60. We have made tremendous progress by keeping undergraduate enrolments on target and surpassing our goal of 2,000 graduate students by 2015 – an increase of nearly 40 per cent over the past five years.

We offer outstanding opportunities to conduct research with some of the brightest minds in their fields and have created options to attract talented engineers currently working in industry. One such option is the flex-time PhD, already in place in Mechanical & Industrial Engineering and available to students in Chemical Engineering & Applied Chemistry and the University of Toronto Institute for Aerospace Studies in the fall.

We have also partnered with the Ontario Institute for Studies in Education (OISE) to introduce the country's first collaborative program in Engineering Education at both the master and PhD levels.

Our MEng applications and enrolments are at an all-time high. Most notably, international MEng enrolment has increased from 18 to 114 over the past five years. To ensure that we continue to strengthen our links to engineering professionals, we have further enhanced our MEng programs with the introduction of new certificates and emphases in Financial Engineering, Advanced Water Technologies & Process Design, and Sustainable Aviation.

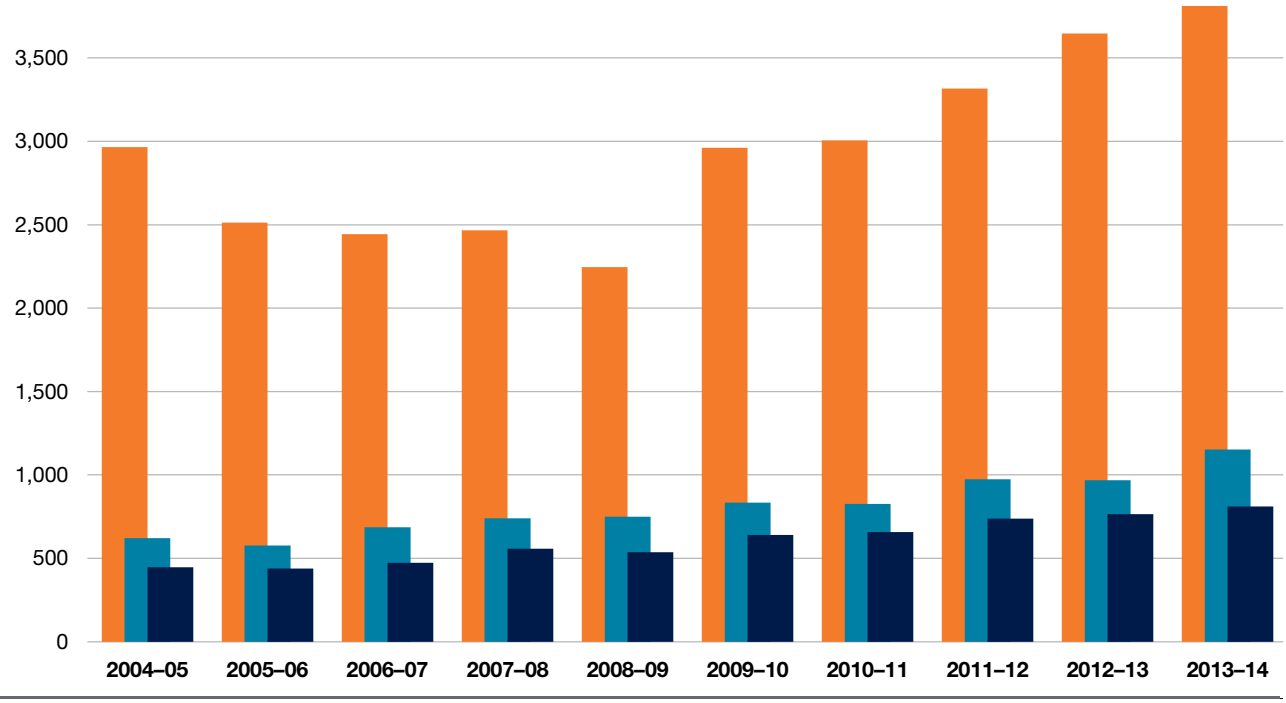
Graduate Student Admissions

Applications to our graduate programs rose by 4.5 per cent compared to 2012-13, marking a five-year upward trend. Selectivity to our research stream programs continues to indicate strong demand, as we made offers to only 21 per cent of PhD applicants and 21 per cent of MASc students.

The popularity of our professional MEng programs is predominantly responsible for the rise in applications, with an increase of 34 per cent over the previous year and more than 100 percent over five years ago. This is a testament to the innovative MEng programs we have introduced.

Recruitment initiatives and our global reputation for quality programs and innovative research influence applications to our graduate programs. Recruitment activities, such as department research showcases, attract top-level applicants who learn more about our programs and meet with professors. One such example is Chemical Engineering & Applied Chemistry's Graduate Research Weekend, which coincided this year with its first Industry Day. Prospective graduate students were given the opportunity to interact with industry partners in addition to professors and current graduate students.

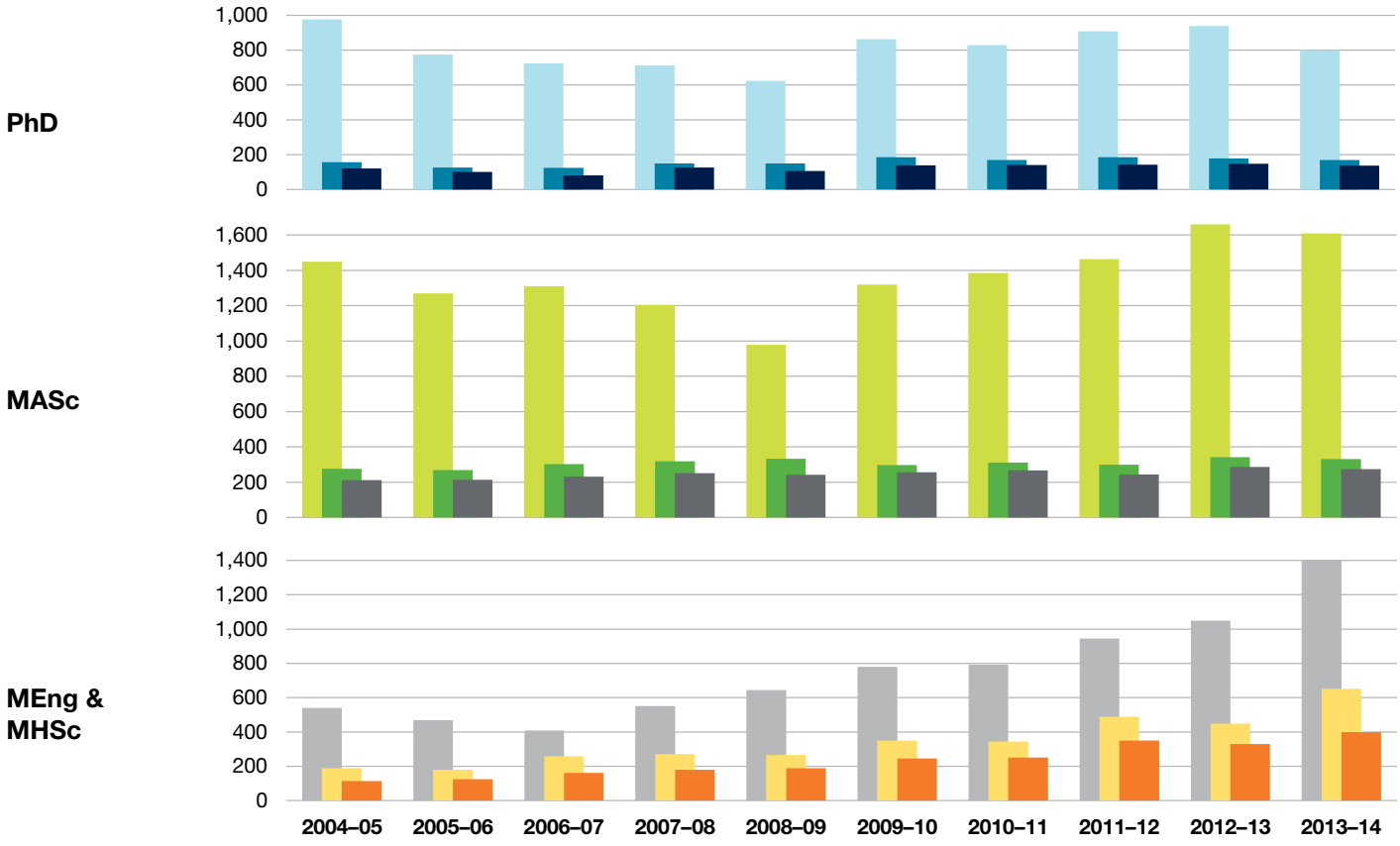
Figure 2.1a **Applications, Offers, Registrations, Selectivity and Yield of Graduate Students, 2004–2005 to 2013–2014**



	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Applications	2,966	2,512	2,443	2,467	2,246	2,962	3,006	3,317	3,646	3,812
Offers	621	576	686	740	749	834	827	974	969	1,153
Registrations	447	439	474	558	537	641	658	738	764	810
Selectivity	0.21	0.23	0.28	0.30	0.33	0.28	0.28	0.29	0.27	0.30
Yield	0.72	0.76	0.69	0.75	0.72	0.77	0.80	0.76	0.79	0.70

Note 2.1a: Graduate student counts are shown as of November 1. Applications and offers represent a full-year admission cycle. Selectivity = Offers ÷ Applications; the proportion of applicants who were offered admission. Yield = Registrations ÷ Offers; the proportion of students who accept our offers.

Figure 2.1b **Applications, Offers, Registrations, Selectivity and Yield of Graduate Students by Degree Type, 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
Applications	PhD	976	774	724	712	623	863	828	908	938	800
	MASc	1,450	1,270	1,310	1,204	979	1,319	1,385	1,464	1,660	1,609
	MEng & MHSc	540	468	409	551	644	780	793	945	1,048	1,403
Offers	PhD	156	127	124	150	150	186	170	186	179	170
	MASc	277	270	303	319	333	298	312	299	342	332
	MEng & MHSc	188	179	259	271	266	350	345	489	448	651
Registrations	PhD	121	101	82	127	106	139	140	143	147	137
	MASc	213	214	231	251	243	256	267	245	287	274
	MEng & MHSc	113	124	161	180	188	246	251	350	330	399
Selectivity	PhD	0.16	0.16	0.17	0.21	0.24	0.22	0.21	0.20	0.19	0.21
	MASc	0.19	0.21	0.23	0.26	0.34	0.23	0.23	0.20	0.21	0.21
	MEng & MHSc	0.35	0.38	0.63	0.49	0.41	0.45	0.44	0.52	0.43	0.46
Yield	PhD	0.78	0.80	0.66	0.85	0.71	0.75	0.82	0.77	0.82	0.81
	MASc	0.77	0.79	0.76	0.79	0.73	0.86	0.86	0.82	0.84	0.83
	MEng & MHSc	0.60	0.69	0.62	0.66	0.71	0.70	0.73	0.72	0.74	0.61

Note 2.1b: Student counts are shown as of November 1. Applications and offers represent a full-year admission cycle. Selectivity = Offers ÷ Applications; Yield = Registrations ÷ Offers

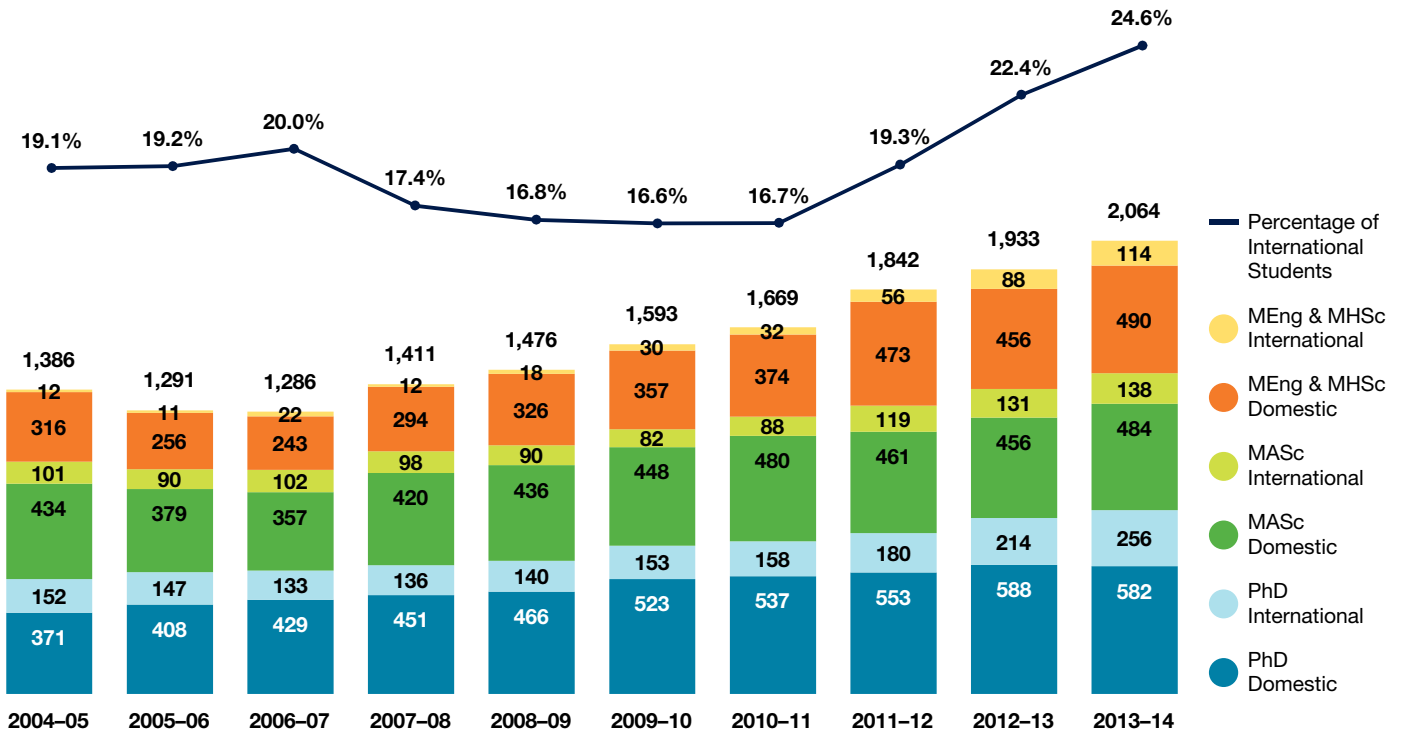
Graduate Student Enrolment

This past year was a significant one for graduate enrolment. We reached an all-time high of 2,064 graduate students – surpassing our Academic Plan goal of 2,000 graduate students by 2015. This record demand for our graduate programs reflects our international reputation as Canada's top-ranked school for engineering research, teaching and innovation.

More than 24 per cent of graduate students – the highest to date – came to U of T Engineering from outside Canada. This includes international MEng students: enrolment has increased to 114 compared to 18 five years ago. This increase signals that students from around the world are increasingly coming to U of T Engineering not only for our outstanding research reputation, but also for our professional programs.

We continue to slowly move closer to our long-term goal of 40 per cent graduate students and 60 per cent undergraduate students. Currently, the ratio sits at 28 per cent graduate students to 72 per cent undergraduates. Five years ago the ratio was 24 per cent graduate students to 76 per cent undergraduates.

Figure 2.2a **International and Domestic Graduate Students by Degree Type, with Percentage of International Students, 2004–2005 to 2013–2014**



Note 2.2a: Student counts are shown as of November 1.

Figure 2.2b **Graduate Students by Degree Type and Gender, with Percentage of Women, 2004–2005 to 2013–2014**

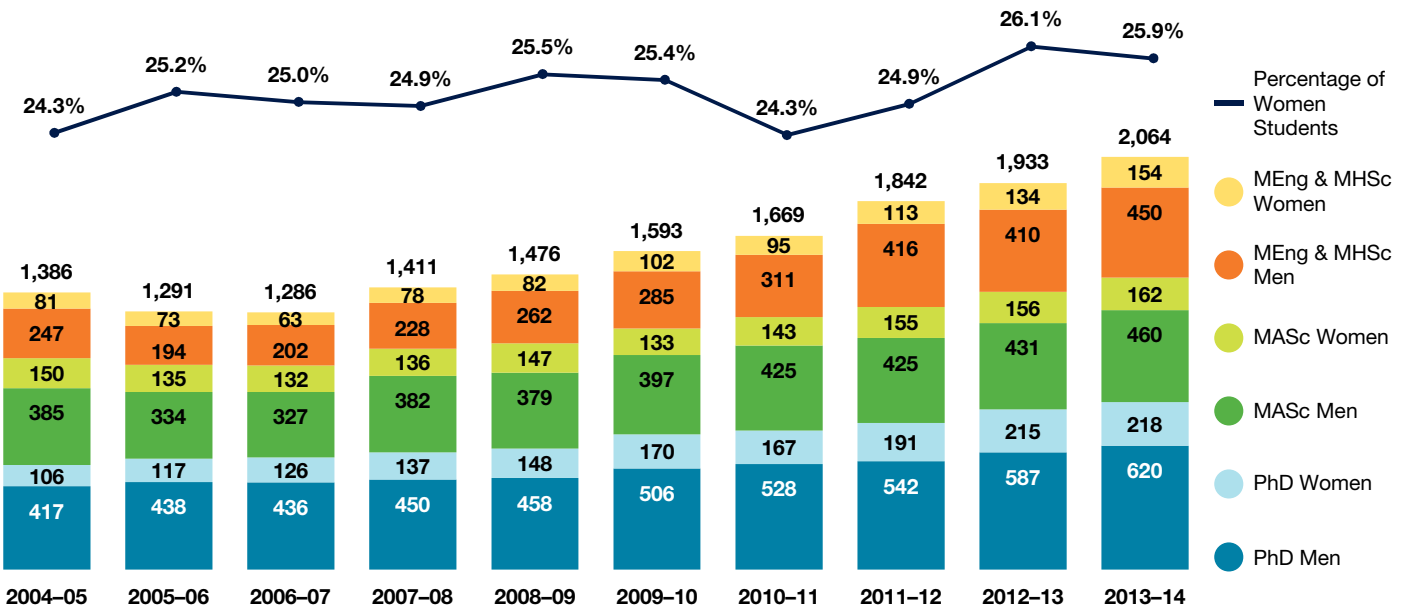


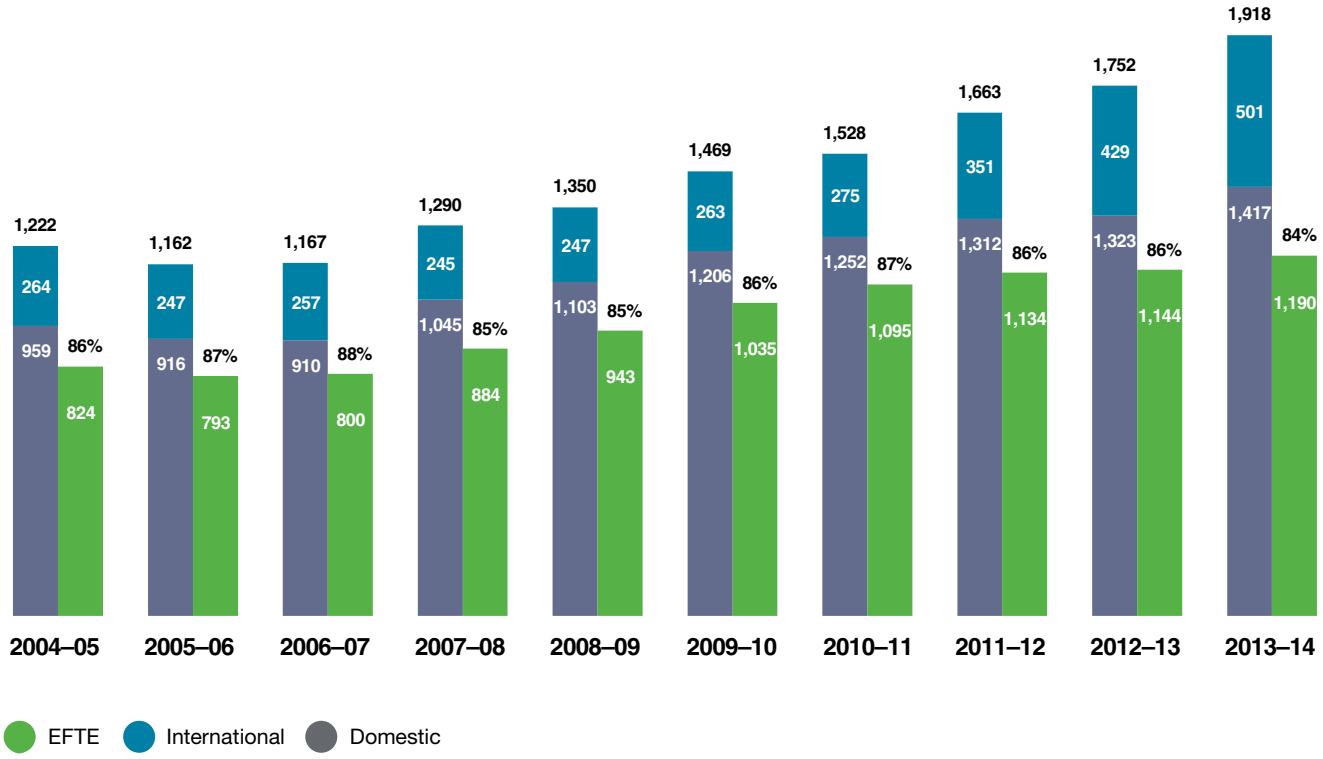
Figure 2.2c **Graduate Student Enrolment by Full-Time Equivalent (FTE) and Headcount (HC) by Academic Area, 2004–2005 to 2013–2014**

		UTIAS	IBBME	ChemE	CivE	ECE	MIE	MSE	Total
2004–2005	FTE	97.0	57.0	164.7	157.5	381.7	287.3	77.0	**1,222.2**
	HC	97	57	171	189	430	358	84	**1,386**
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**

Note 2.2b: Student counts are shown as of November 1. EFTE is calculated on a 12-month basis (i.e., May to April).
Note 2.2c: For figure 2.2c, a difference between FTE and HC only exists when discussing part-time students. At U of T Engineering, MEng candidates are the only grad students who can pursue their studies on a part-time basis.

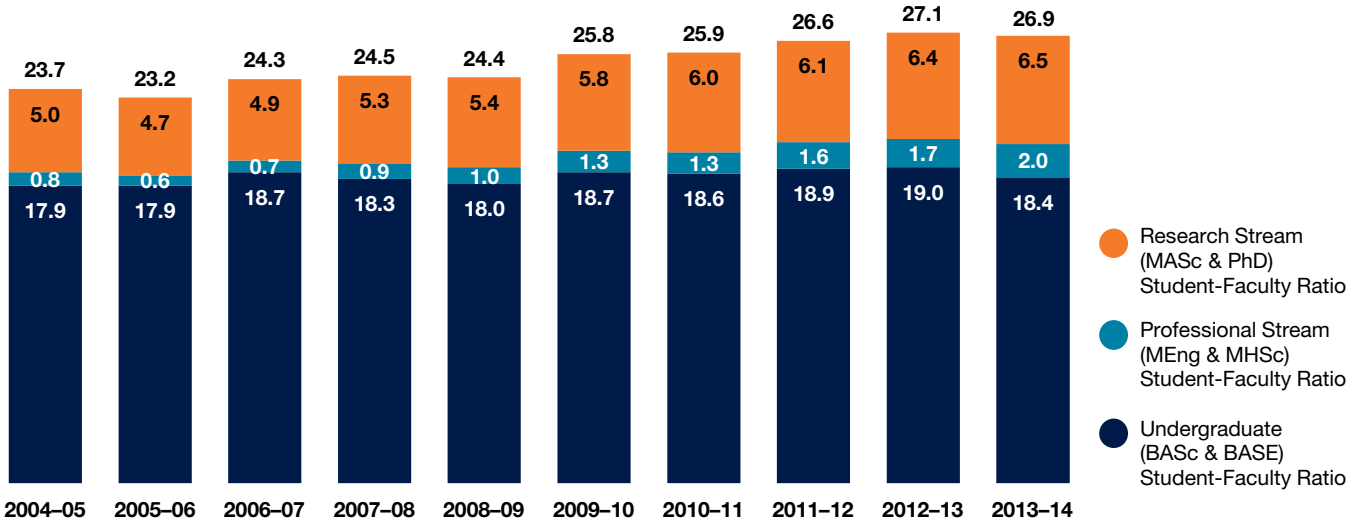
Government of Ontario funding guidelines define the number of years for which domestic students in each degree stream are grant-eligible. The percentage of enrolled domestic students who are eligible has stayed relatively constant. EFTE represents the number of FTE students who are eligible for government funding. Almost all domestic master's students are eligible. PhD students may start to become ineligible after a number of years in the program. We continue to encourage students to fast-track into doctoral programs and complete their degrees in a timely fashion.

Figure 2.2d **Graduate Students: International and Domestic Full-Time Equivalent (FTE) and Domestic Eligible Full-Time Equivalent (EFTE), 2004–2005 to 2013–2014**



Note 2.2d: Figure 2.2d illustrates enrolment on a FTE basis (where full-time graduate students count as 1.0, and part-time MEng students count as 0.3).

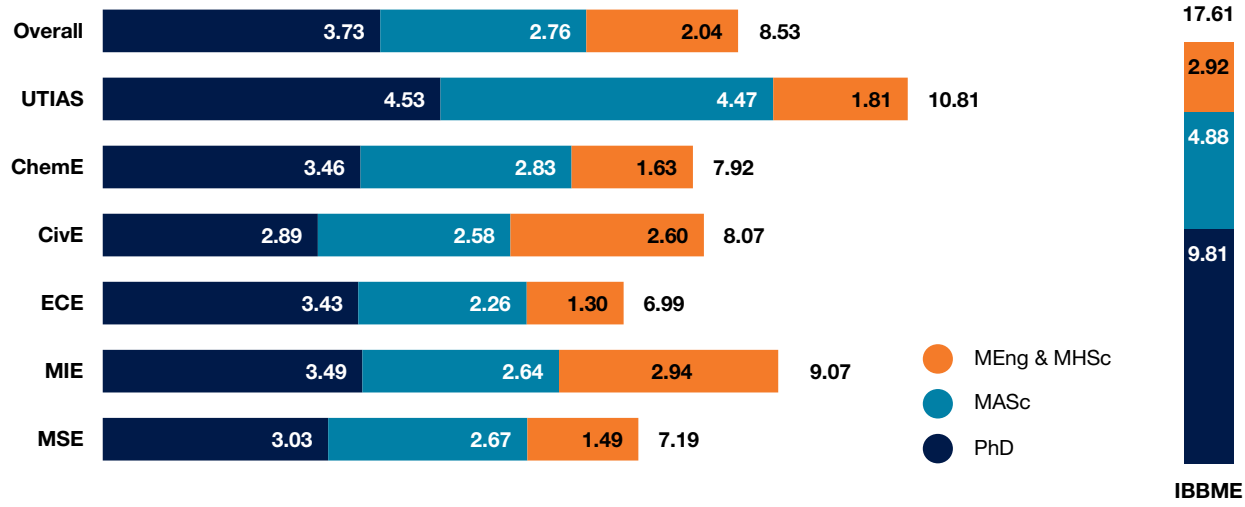
Figure 2.3a **Graduate and Undergraduate Full-Time Equivalent Student-Faculty Ratios, 2004–2005 to 2013–2014**



The Faculty's ratio of students to faculty members has increased to 6.5 for research stream (MASc and PhD) students and 2.0 for MEng students, while it has decreased to 18.4 for undergraduate students.

The number of graduate students per faculty member is calculated by dividing the number of full-time equivalent (FTE) students in each academic unit by the number of tenure-stream professors in that academic area. Figure 2.3b does not include professors from outside U of T Engineering who contribute to and strengthen our graduate programs.

Figure 2.3b **Full-Time Equivalent (FTE) Graduate Student-Faculty Ratios by Academic Area and Degree Type, 2013–2014**



Note 2.3a: To allow more accurate comparisons, undergraduate FTEs are determined by counting each part-time student as 0.3 FTE. Previous annual reports used the total undergraduate headcount. The revised methodology matches the way graduate student FTEs are calculated, and more accurately reflects actual undergraduate teaching.
Note 2.3b: 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 only includes faculty with a budgetary appointment in IBBME, comparisons with other Engineering departments are not possible. For that reason 2.3b shows IBBME in a visually distinct way. Within the Faculty, in cases of inter-departmental supervision of PhDs and MAScs, the students are assigned 100 per cent to their supervisors' department.

Graduate Student Funding

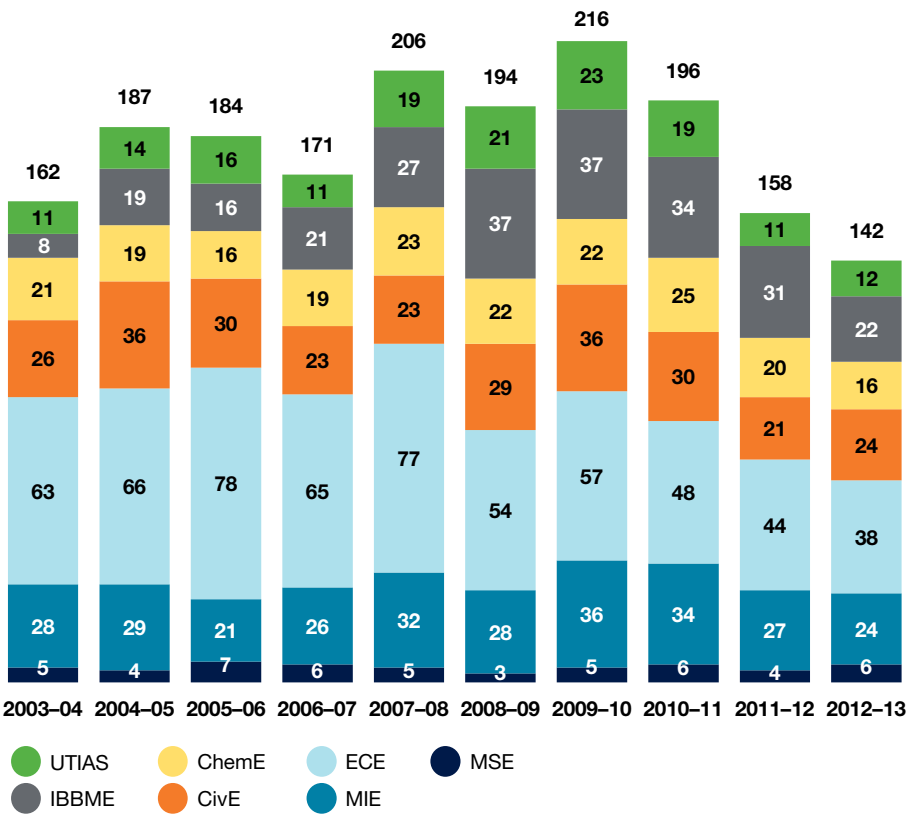
Total graduate student funding grew by 9.1 per cent (Figure 2.5a), due to increases in research, Faculty and departmental funding, as well as scholarship funding for graduate students. A minimum stipend of $15,000 plus tuition and fees is available to U of T Engineering graduate students enrolled in our research stream programs. Research funds continue to be the greatest source of graduate student funding.

While graduate student scholarships have increased by 10 per cent (Figure 2.5a), funding from government scholarships decreased by five per cent this year, compared to 2011-12 (Figure 2.4a). With a decrease in Natural Sciences and Engineering Research Council (NSERC) funding, more students are taking up Ontario Graduate Scholarships (OGS).

Figure 2.4a **External Graduate Student Scholarships by Source, 2003–2004 to 2012–2013**

	NSERC	OGS	External-Other	Total
2003 / 2004	$2,764,450	$1,479,994	$56,240	$4,300,685
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

Figure 2.4b **Number of NSERC Graduate Student Award Recipients by Academic Area, 2003–2004 to 2012–2013**



Note 2.4a: 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 2.4b: Data reported by academic year (September to August).

The scholarship total in Figure 2.5a includes the NSERC, OGS and external scholarships shown in Figure 2.4a, plus a variety of other U of T scholarships. Graduate students received nearly $1 million more in total scholarships this past year, from $9.3 million in 2011-12 to $10.2 million in 2012-13, continuing our upward trend.

Figure 2.5a **Graduate Student Funding by Category, 2003–2004 to 2012–2013**

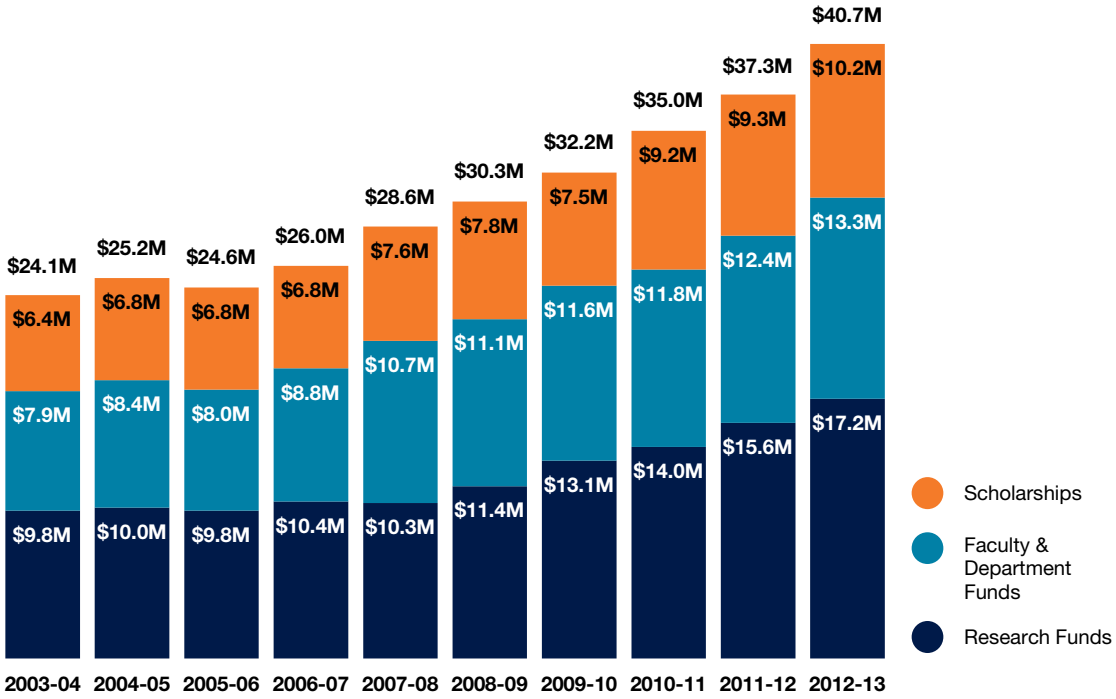
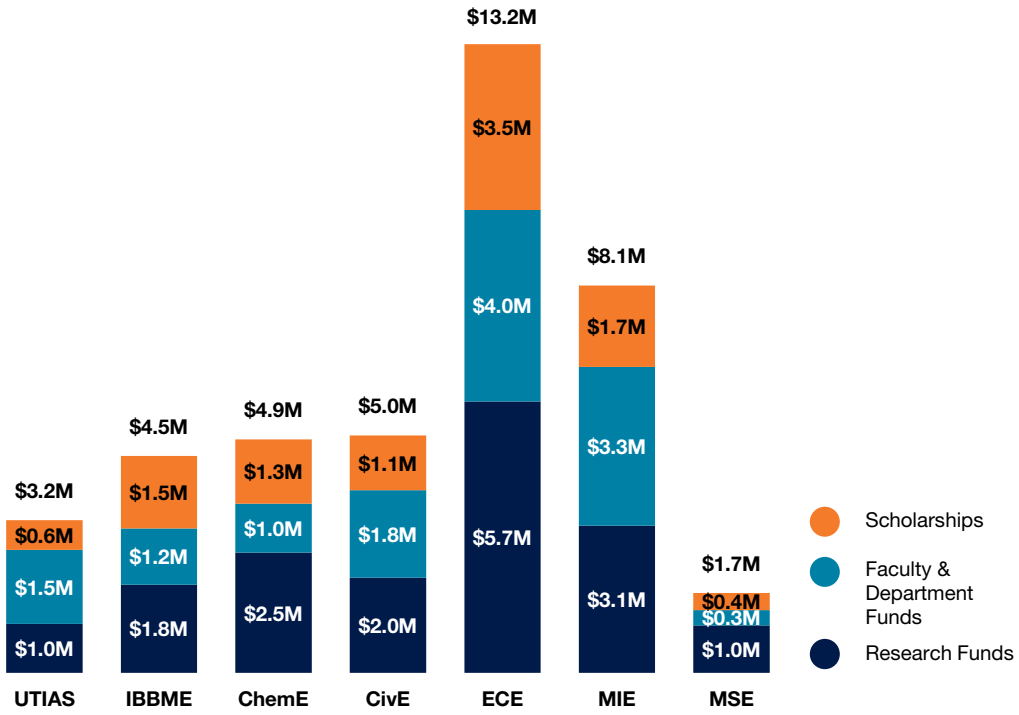


Figure 2.5b **Graduate Student Funding by Category and Academic Area, 2012–2013**



Graduate Studies Completion

Qualified MASc students near the end of their first year have the option to fast-track to a PhD, with the possibility of completing their doctoral degree in a shorter amount of time. In 2012-13, 27 students fast-tracked (shown in Figure 2.6), the lowest number in the past six years. To increase this number, we are encouraging MASc graduate supervisors to promote the advantages of fast-tracking, including the opportunity to complete a PhD in less time and further develop their research ideas.

Figure 2.7 presents the average length of time between a student's enrolment in a graduate program and fulfilling all requirements for graduation. Typically, MASc students take two years to graduate, while full-time MEng students take one year. Our PhD students take on average 5.2 years to complete their studies, which is a shorter time period than most others at U of T (the average over the past four years is 5.7 years).

Figure 2.6 Number of Students Fast-Tracked from MASc to PhD by Academic Area, 2006–2007 to 2012–2013

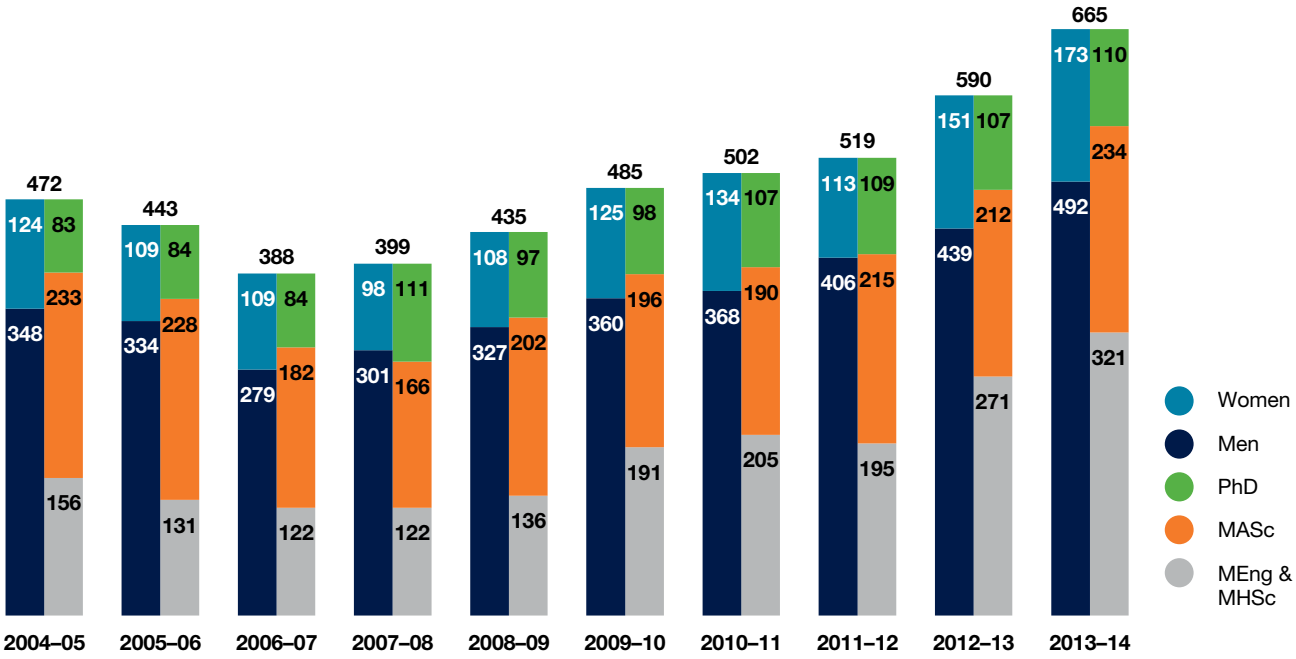
Fast-tracked during	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13
Most began PhD in	**Fall 2007**	**Fall 2008**	**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**
UTIAS	1	2	8	6	5	3	4
IBBME	2	8	9	8	7	5	8
ChemE	7	4	9	8	5	8	8
CivE	5	4	4	3	4	5	0
ECE	2	2	1	1	6	3	2
MIE	3	8	9	4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

Figure 2.7 Time to Graduation for PhD, MASc, MEng and MHSc Students, 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
PhD	5.0	4.3	5.0	4.7	4.7	4.7	5.3	5.0	5.3	5.2
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng & MHSc (FT)	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.0
MEng & MHSc (PT)	2.0	2.3	2.0	2.0	2.3	2.3	2.3	2.0	2.0	2.0

Note 2.7: Data reported by academic year (September to August).

Figure 2.8 **Graduate Degrees Awarded by Degree Type and Gender, 2004–2005 to 2013–2014**



Graduate Studies Initiatives

Recruitment

In 2013, we created a consortium of five top Canadian engineering schools (McGill University, University of Alberta, University of British Columbia, University of Toronto and University of Waterloo) to better target those interested in engineering graduate studies in Canada and we will be building on this new initiative in 2014. In addition, we held a U of T Engineering MEng info session targeting third- and fourth-year students in February 2014. The session introduced our senior undergraduate students to our MEng programs and outlined the advantages of continuing their studies for another year to pursue one of them.

Collaborative Program in Engineering Education

The Faculty has partnered with the Ontario Institute for Studies in Education (OISE) to develop and launch Canada's first collaborative program in Engineering Education at both the master and PhD levels in September 2014. The program brings together graduate students from disciplines in engineering and education with shared interests in the research and learning that is at the nexus of engineering and education practice. It will support students pursuing engineering education research from a number of perspectives, including the knowledge base, learning processes in engineering programs, the surrounding socio-cultural context and the outcomes that result. The program will yield research findings that will benefit science, technology, engineering and math (STEM) learning in K-12, university-level engineering instruction and continued professional training after post-secondary education.

Note 2.8: Data reported by academic year (September to August).

Graduate Enterprise Internship Program

The University of Toronto Graduate Enterprise Internship (GEI) program launched in February 2012 and concluded in March 2014. It was a six-month paid internship program for those with graduate degrees who obtained their education within the past five years, as well as for currently-enrolled graduate students in the fields of science, technology, engineering and mathematics (STEM). The program was funded by FedDev Ontario and provided salary subsidies for southern Ontario start-ups and small- to medium-sized businesses. It was extremely successful in giving STEM graduates a head start in their careers. A total of 86 U of T Engineering graduates (31 graduate students and 55 recent graduates) secured internships with companies in the STEM sector. At the end of the U of T GEI program, more than 40 per cent of graduates reported that they were employed full-time, with a vast majority continuing employment with their GEI employer. The program also injected in excess of $7 million in salaries into southern Ontario's economy.

Figure 2.9 ELITE Certificates Awarded, 2008–2009 to 2013–2014

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

Enrolment in our Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE) certificate courses continue to grow, rising from 986 in 2012-13 to 1,163 this year. Over the past two years, the number of students who completed the ELITE certificate has nearly doubled (see Figure 2.9). For the full list of ELITE courses, visit uoft.me/ELITE.

Figure 2.10 MEng, SCFI Program Enrolment, Fall 2008 to Winter 2014

	Enrolment
Fall 2008	9
Fall 2009	8
Winter 2010	12
Fall 2010	30
Winter 2011	33
Fall 2011	28
Winter 2012	30
Fall 2012	21
Winter 2013	23
Fall 2013	25
Winter 2014	26

The MEng program for the Stronach Centre for Innovation (MEng, SCFI) is a joint initiative with Magna International to provide employees with the opportunity to pursue a specialized MEng through a major technical project and coursework. Illustrated in Figure 2.10, enrolment has almost tripled since the program launched in 2008.

Flex-time PhDs

Mechanical & Industrial Engineering introduced the Faculty's first flex-time PhD option in 2012 and now has six students enrolled. Chemical Engineering & Applied Chemistry and the University of Toronto Institute for Aerospace Studies will launch flex-time PhD options in September 2014. Select applicants already working in research and development positions are able to pursue a doctoral degree by conducting research in the field and applying that knowledge to their organization.

New Graduate Courses

During 2013-14, the Faculty introduced 15 new courses, including a number of APS courses that are offered to graduate students Faculty-wide. The Institute for Leadership Education in Engineering (ILead) offered a new graduate course – APS1026H Positive Psychology for Engineers – during the winter term. Close to 60 students took the course and gave it very positive evaluations. In September 2014, ILead will offer APS1027H Engineering Presentations for the first time. The course will teach students to capture the essence of complex subjects and express it through key words, data and images.

Other new courses available to MEng students this academic cycle include: APS1022 Financial Engineering II, APS1023 New Product Innovation, and two courses offered by Civil Engineering (APS1024 Infrastructure Resilience Planning and APS1025 Infrastructure Protection).

New Certificates and Emphases

The Faculty introduced several new offerings this year, allowing graduate students to further tailor their educational and research experiences. They include:

- Certificate in Financial Engineering (MIE)
- Emphasis in Advanced Water Technologies & Process Design (ChemE and CivE)
- Emphasis in Sustainable Aviation (UTIAS)

3 Research

U of T Engineering researchers continue to make tremendous advances in addressing some of the world's most significant challenges. Our groundbreaking research ranges from combating disease and treating contaminated water to solving urban transportation problems and creating more efficient manufacturing systems.

The Faculty remains committed to developing and fostering a thriving multidisciplinary and collaborative research environment. This year we launched two extra-departmental research units (EDU:Cs), the Toronto Institute of Advanced Manufacturing (TIAM) and the University of Toronto Transportation Research Institute (UTTRI). These new cross-disciplinary institutes will further enhance the profile of U of T Engineering in key research areas central to our economic growth.

Research funding received by U of T Engineering continues to grow at a steady pace. We secured $26.3 million in Tri-Council funding in 2012-13, surpassing three years ahead of schedule our Academic Plan goal of $25 million per year by 2015. The Faculty has also experienced strong growth in annual research operating funding over the past five years, with an average rise of six per cent per year.

Many advances in research result from partnerships with industry, non-profit organizations and government. To strengthen engagement with industry and federal and provincial sources, we created a second corporate partnership position that adds the development of support from foundations to our portfolio. We continue to foster collaborations by creating opportunities for our researchers to develop partnerships with industry. Our departmental open houses, company-specific research days and our second Faculty-wide reception for industry partners are some of the ways we facilitate this strategic interaction.

Selected Research Highlights for 2013–2014

Professor Wins Killam Prize for New Laser Applications

Mechanical & Industrial Engineering Professor Andreas Mandelis's pioneering laser research garnered a 2014 Killam Prize, one of Canada's most prestigious scholarly awards. The Killam Prize recognizes outstanding career achievement by scholars actively engaged in research. Administered by the Canada Council for the Arts, only one Killam Prize in engineering is awarded annually. Professor Mandelis's research sits at the intersection between engineering and applied physics. His investigations using lasers advance the diagnosis of diseases such as breast cancer, manage diabetes and spot flaws in the manufacture of electronic and other goods.

Canada Foundation for Innovation Awards 17 Grants to Engineering

The Canada Foundation for Innovation (CFI) awarded more than $1.7 million to U of T Engineering for infrastructure that will advance research in a wide range of areas, from testing drinking water to investigating how airborne microscopic particles threaten human health. The funding comes from CFI's John R. Evans Leaders Fund, a program designed to help universities attract and retain the very best researchers. Forty-four projects across U of T received a total of $12.1 million; 17 of those projects are from our Faculty. For a complete list, visit http://www.research.utoronto.ca/cfi2014.

U of T Engineering Launches Advanced Manufacturing Institute

Canada's manufacturing sector is vital for economic growth and innovation – it was responsible for $280 billion in exports and 30 per cent of business tax revenues in 2012. Leveraging the strength of our research and partnerships in this area, the Faculty conferred EDU:C status to the Toronto Institute of Advanced Manufacturing (TIAM) in 2014. The institute – in collaboration with its partners and using advances in nanotechnology, biotechnology, energy and sustainability – will create and scale up advanced manufacturing technologies and develop innovative practices for the 21st century. TIAM is a multidisciplinary partnership, one that includes the departments of Chemical Engineering & Applied Chemistry, Electrical & Computer Engineering, Materials Science & Engineering, and Mechanical & Industrial Engineering (lead department), as well as the University of Toronto Institute for Aerospace Studies and the Institute of Biomaterials & Biomedical Engineering.

Solution-Oriented Transportation Effort

An efficient, cost-effective, equitable, sustainable and resilient transportation system is essential to productivity and quality of life in urban regions. The University of Toronto Transportation Research Institute (UTTRI) is a solution-oriented transportation think tank that received EDU:C status in 2014 to address these points. The institute is a cross-disciplinary effort involving the Faculty of Applied Science & Engineering, the Faculty of Arts & Science, the Martin Prosperity Institute, the Munk Centre of Global Affairs and the School of Public Policy and Governance. UTTRI leverages the University's internationally-recognized critical mass of researchers with extensive experience in the analysis, planning and design of urban transportation systems. The institute seeks solutions to pressing problems such as: cost-effective suburban transit systems; road pricing systems that optimize network performance and meet the public's needs; dynamic real-time control of road and transit systems to maximize capacity; improved urban logistics systems for goods movements; and improved urban and street design for walking and cycling.

Creating Greener, Lighter Cars

A U of T research team led by Professor Mohini Sain – dean of the Faculty of Forestry and cross-appointed to Chemical Engineering & Applied Chemistry – attracted $2.5 million from Automotive Partnership Canada through its lead agency, the Natural Sciences and Engineering Research Council of Canada (NSERC). The team, which also includes ChemE Professor Ramin Farnood, MSE Professor Chandra Veer Singh and Forestry Professor Ning Yan (cross appointed to Chemical Engineering & Applied Chemistry), will work with Ford Motor Company to develop a novel material for car parts using renewable resources extracted from wood pulp. Professor Sain is also director of the Centre for Biocomposites and Biomaterials Processing. When taken together with financial and in-kind contributions from Ford and U of T, the project's total value is close to $5 million.

Recent Grad Honoured for Research on Smart Traffic Lights

Samah El-Tantawy's (CivE PhD 1T2) award-winning dissertation uses game theory and artificial intelligence to teach traffic lights how to adjust to traffic patterns in real time. Tests of El-Tantawy's system on 60 downtown Toronto intersections at rush hour showed a reduction in delays of about 40 per cent and a cut in travel times of roughly 26 per cent. Unlike existing systems, hers processes data on site and in real time, avoiding transmission delays. While current systems monitor traffic patterns along a single road either east/west or north/south, El-Tantawy's system uses data from all directions. She won first place in the best PhD dissertation competition from the Institute of Electrical and Electronics Engineers' Intelligent Transportation Systems Society. El-Tantawy also came in second in The Institute of Operations Research and Management Sciences (INFORMS) George B. Dantzig Dissertation Award.

Invisibility Cloak Demonstrated for the First Time

ECE Professor George Eleftheriades and PhD candidate Michael Selvanayagam made international news when they demonstrated an invisibility cloak that can make objects of different types and sizes undetectable to radar. The pair discovered how to circumvent radars by surrounding a metal cylinder with small antennae that collectively radiate an electromagnetic field, cancelling out waves as they scatter off the cylinder. The technology holds possibilities that go beyond obvious applications such as hiding military vehicles or conducting surveillance. For example, structures that interrupt signals from cellular base stations could be cloaked to allow signals to pass by freely. The system can also alter the signature of a cloaked object, making it appear bigger, smaller, or even shifting it in space.

SAVI Demonstrates New Testbed at 2nd Annual General Meeting

Smart Applications on Virtual Infrastructure (SAVI) is a national network pioneering an infrastructure for connecting innovations and services that have not yet been invented. This includes everything from smart grids for more efficient power distribution and consumption, to e-health information and telecommunications applications. Led by Professor Alberto Leon-Garcia (ECE), SAVI includes nine universities, more than 20 industry partners, research and education networks, and high-performance computing centres. It is currently deploying the first phase of its testbed network and teaching partners how to use it. At the network's July 2013 annual general meeting at U of T, researchers and students from 10 universities across Canada presented more than 45 posters and demonstrations on SAVI's key themes: smart applications, extended cloud computing, integrated wireless/optical access and smart edges.

Pilotless Planes May Hold Key to Spotting Forest Fires

Every year Ontario experiences more than 700 forest fires, affecting more than 120,000 hectares of woodland. Finding those fires and alerting fire rangers is a daunting task. But UTIAS Professor Hugh Liu has developed a solution: pilotless airplanes armed with thermal cameras. Professor Liu is testing his new concepts with the help of Ontario's Ministry of Natural Resources (MNR) and Brican Flight Systems of Brampton. Recently, his research team tested their system – a Brican-built plane equipped with a thermal camera – at MNR's Burwash Training Centre. It was a tremendous success, with nine out of 10 fires detected.

Predicting the Fate of Stem Cells

IBBME Professor Peter Zandstra and PhD candidate Emanuel Nazareth are able to rapidly screen human stem cells and better control what they will turn into. Their method gives important insight into how to efficiently turn stem cells into clinically-useful cell types, and could potentially be used in regenerative medicine and drug development. Published in the journal *Nature Methods* in October 2013, the research also provides a platform to study differences across cell lines to forecast genetic information, such as abnormal chromosomes. These predictions can be made in a fraction of the time of existing techniques and at a substantially lower cost.

New State-of-the-Art Materials Engineering Lab

The Walter Curlook Materials Characterization & Processing Laboratory opened in September 2013. It houses the latest in research equipment for investigating the properties and behaviour of engineering materials down to their atomic structure and chemical composition. This type of analysis lets materials engineers gather critical information to develop new materials processing technologies, design advanced materials and determine end-of-life options such as recycling, reuse or environmentally-safe disposal.

Two New NSERC CREATE Grants

Two U of T Engineering research projects will each receive $1.65 million over six years through the NSERC CREATE (Collaborative Research and Training Experience) program. *Manufacturing, Materials and Mimetics*, directed by ChemE and IBBME Professor Molly Shoichet, is based on the idea that the next generation of cellular therapeutics will depend on engineering and manufacturing cell-based products, and that the global market for regenerative medicine is large and growing. The project will provide students with the breadth and depth they will need for success in industry through experience in product development, intellectual property and regulatory affairs.

The Program in Clean Combustion Engines, directed by MIE Professor Murray Thomson, will train students to become part of the new wave of combustion experts. Fuel combustion provides over 91 per cent of the world's energy, but is also the principal contributor to global warming and air pollution. The program will establish a new multi-university network, which will include a combustion summer school and internships.

Emerging Expertise in Remediating Contaminated Sites

Canada's reported liability for contaminated sites has skyrocketed to $4.9 billion. Ongoing research in Civil Engineering and in Chemical Engineering & Applied Chemistry is focused on finding cost-effective ways to remediate such sites. CivE Professor Brent Sleep leads the Innovative Technologies for Groundwater Remediation (INTEGRATE) initiative, while ChemE Professor Elizabeth Edwards heads up the bioremediation thrust of this project and ChemE Professor Edgar Acosta brings expertise in surface chemistry to the team. This multi-university, five-year venture, which started in October 2011, involves partnerships with chemical companies and leading environmental consulting firms. Professors Sleep, Edwards and Acosta, along with a network of colleagues, are also championing international collaborations involving exchanges of expertise, personnel and joint classes to raise awareness and build expertise in rapidly-expanding economies such as China and Brazil.

Research Funding and Partnerships

Figure 3.1a **Overall Research Funding Breakdown: Research Infrastructure and Research Operating Funding, 2003–2004 to 2012–2013**

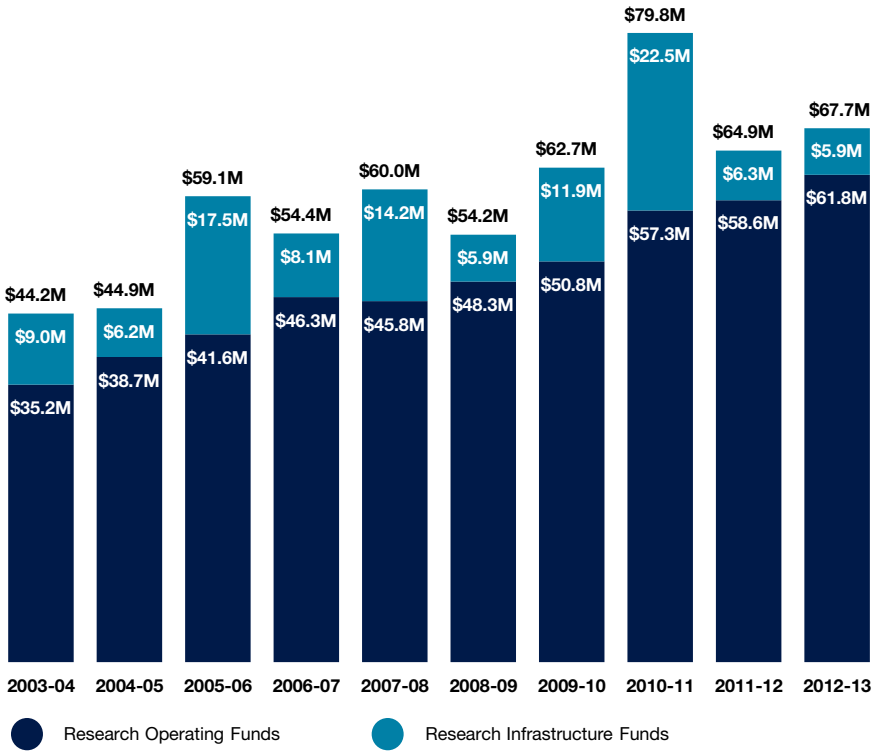
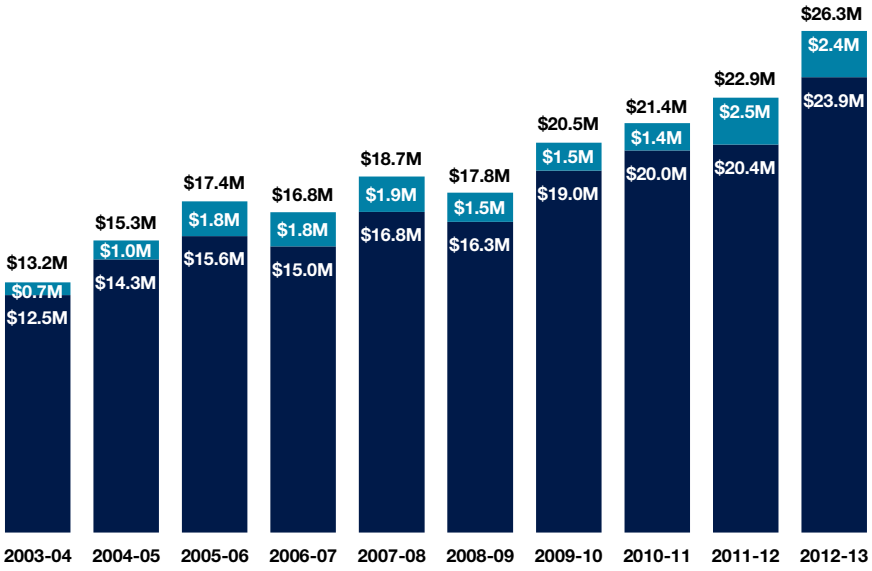


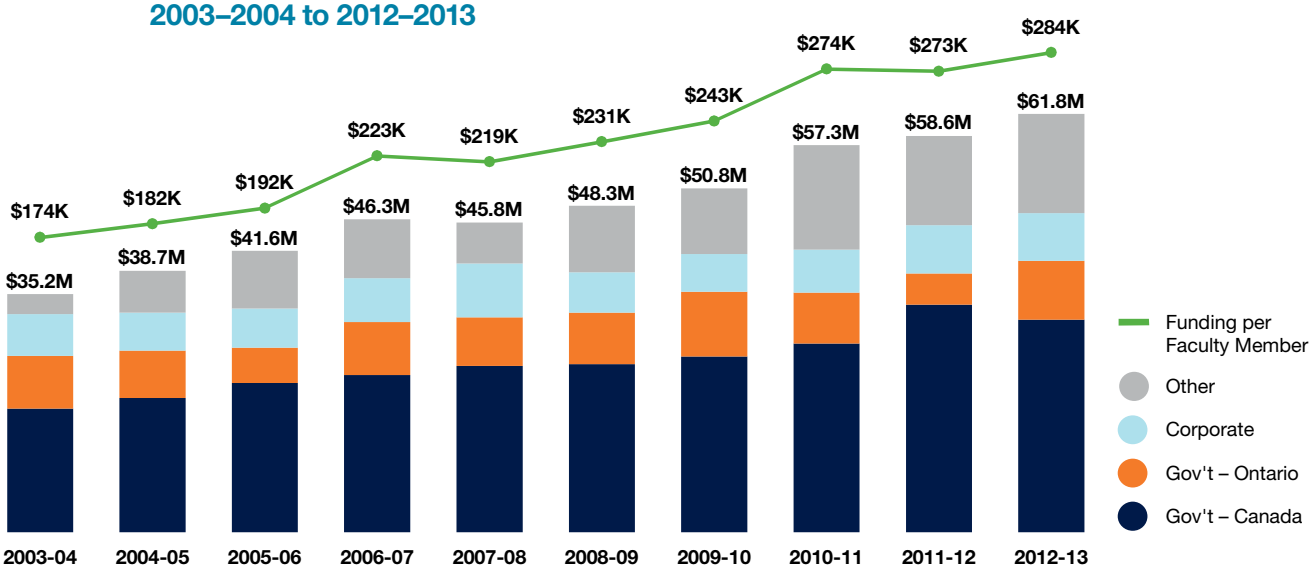
Figure 3.1a shows the breakdown of research infrastructure funding versus research operating funding over a 10-year period. The Faculty's annual research operating funding has grown steadily over the past five years, with an average of six per cent growth annually.

Figure 3.1b **Canadian Institutes of Health Research (CIHR) and Natural Sciences and Engineering Research Council (NSERC) Funding, 2003–2004 to 2012–2013**



In 2012-13 we surpassed, three years ahead of schedule and by more than $1 million, our goal of securing $25 million in Tri-Council Funding by 2015: we reached $26.3 million in 2012-13.

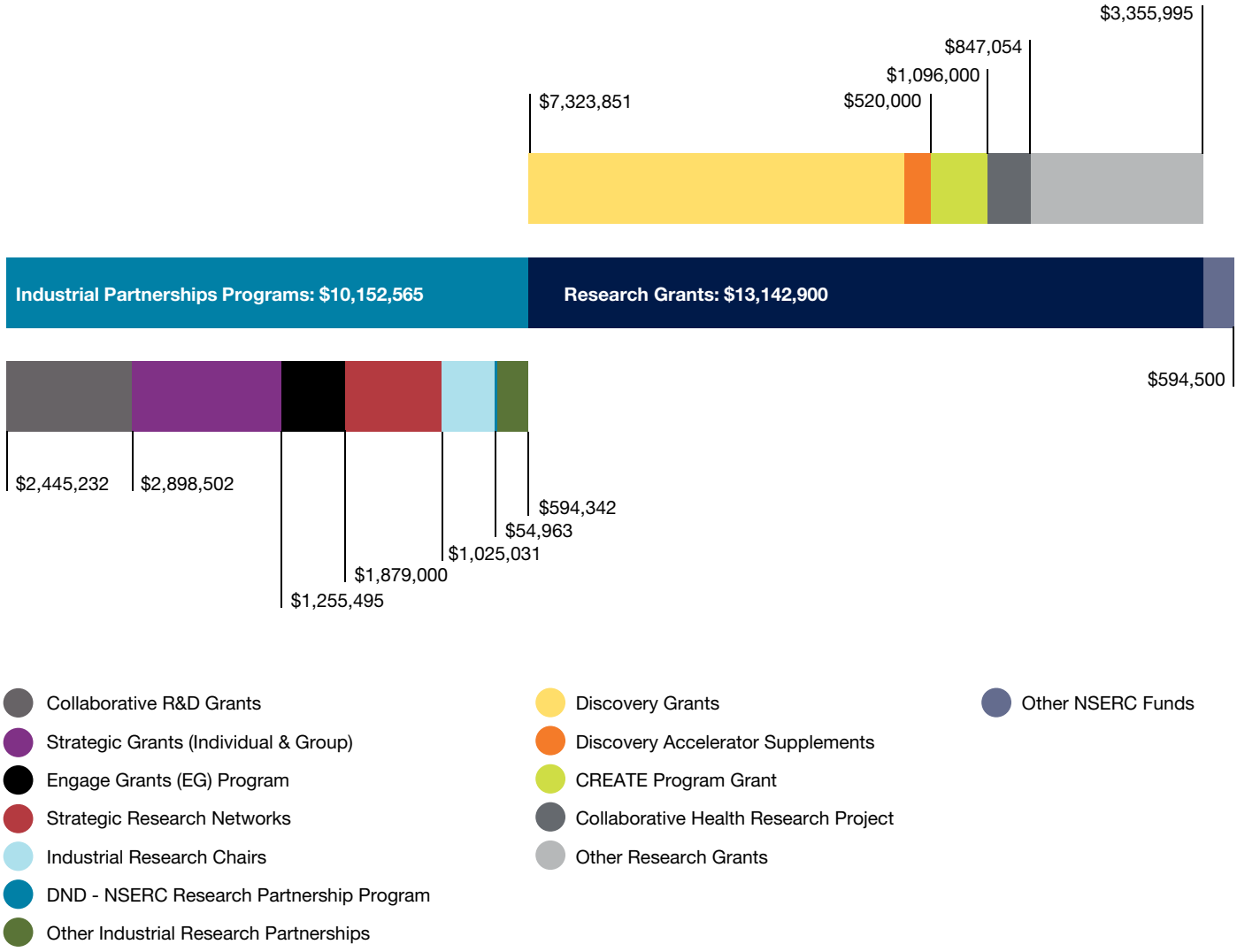
Figure 3.1c **Research Operating Funding by Year, Source and Funding per Faculty Member, 2003–2004 to 2012–2013**



	Funding per Faculty Member	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total
2003-04	$174,330	$18,265,288	$7,800,731	$6,202,324	$2,946,339	**$35,214,682**
2004-05	$182,434	$19,853,164	$7,015,973	$5,605,287	$6,201,491	**$38,675,915**
2005-06	$191,703	$22,061,746	$5,241,595	$5,791,694	$8,504,513	**$41,599,548**
2006-07	$222,562	$23,249,886	$7,817,967	$6,499,117	$8,726,012	**$46,292,982**
2007-08	$219,104	$24,618,220	$7,168,950	$7,945,281	$6,060,260	**$45,792,711**
2008-09	$230,995	$24,879,695	$7,618,346	$5,951,749	$9,828,127	**$48,277,917**
2009-10	$243,279	$25,992,224	$9,558,802	$5,605,799	$9,688,396	**$50,845,221**
2010-11	$273,956	$27,890,910	$7,539,929	$6,356,194	$15,469,759	**$57,256,792**
2011-12	$272,642	$33,644,846	$4,636,724	$7,137,670	$13,198,779	**$58,618,019**
2012-13	$283,708	$31,419,069	$8,718,783	$7,040,754	$14,669,800	**$61,848,406**

Note 3.1c: 'Gov't – Canada' represents funding from the Tri-Council (CIHR, NSERC, SSHRC), Canada Foundation for Innovation, Canada Research Chairs and National Centres of Excellence. 'Gov't – Ontario' denotes funds from the Ministry of Research and Innovation, Ontario Research Fund and Ontario Centres of Excellence. Industry partners are listed later in this chapter.

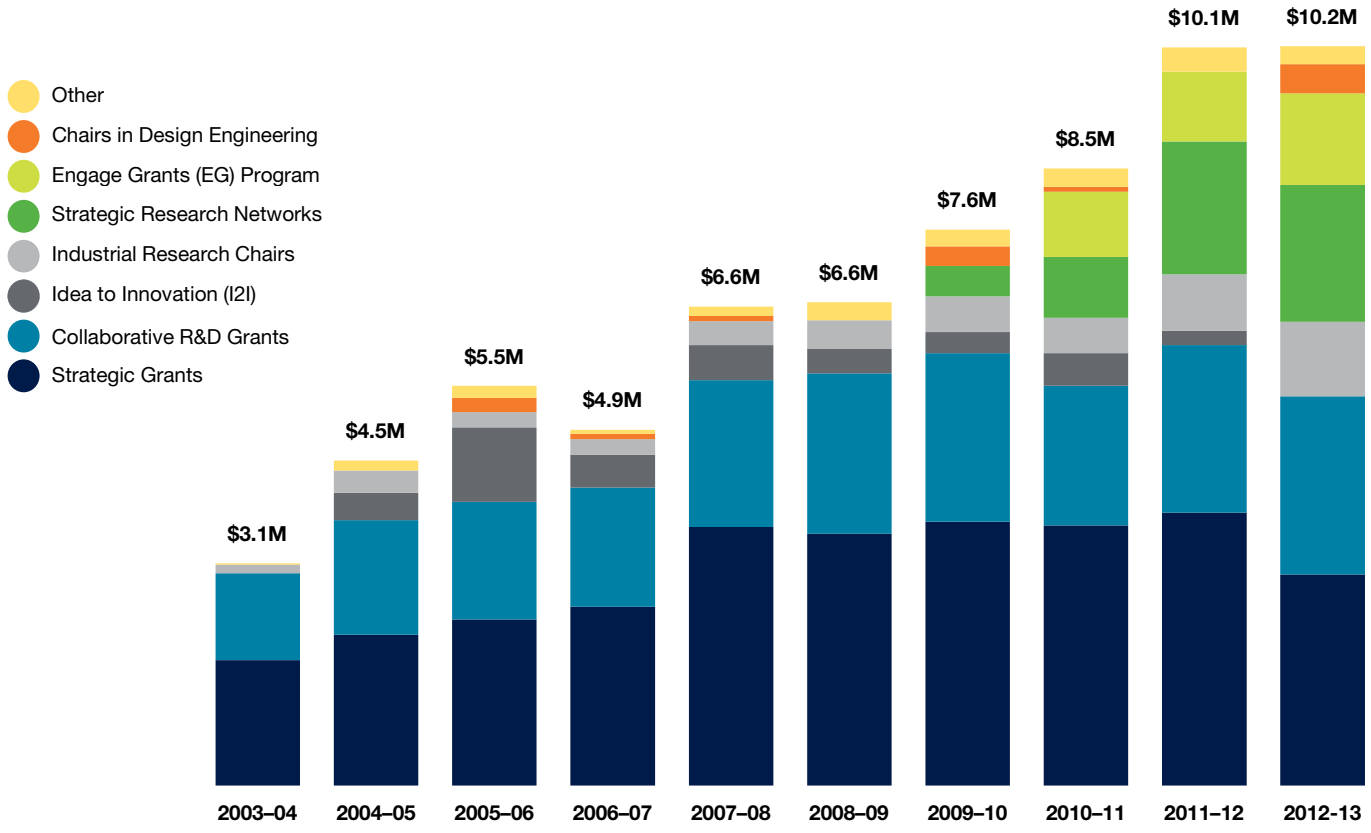
Figure 3.2a **Natural Sciences and Engineering Research Council (NSERC) Funding, 2012–2013**



Note 3.2a: Data current as of May 2013 and based on grant year (April to March).

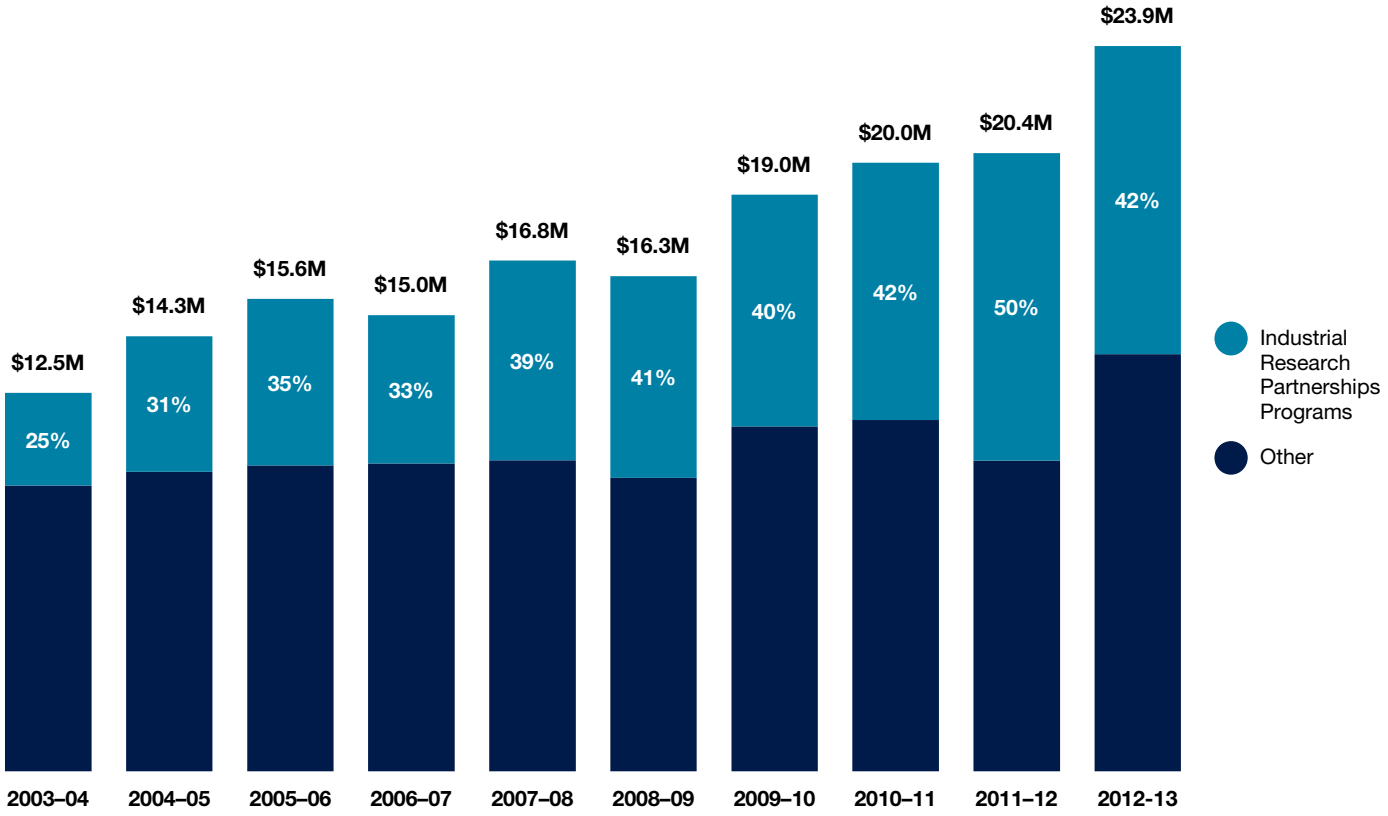
Figure 3.2b shows a substantial growth in Industrial Research Chair funding this year, rising to $1.025 million from its highest historical value of $773,964 in 2011-12.

Figure 3.2b **NSERC Industrial Partnership Funding by Program, 2003–2004 to 2012–2013**



	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012-13
Other	$17,400	$136,233	$163,537	$55,267	$130,000	$247,392	$230,000	$251,770	$328,780	$249,305
Chairs in Design Engineering			$195,437	$69,076	$69,076		$267,173	$69,076		$400,000
Engage Grants (EG) Program								$897,114	$960,531	$1,255,495
Strategic Research Networks							$417,293	$832,697	$1,826,000	$1,879,000
Industrial Research Chairs	$118,500	$309,500	$211,000	$216,000	$329,834	$390,667	$493,197	$485,711	$773,964	$1,025,031
Idea to Innovation (I2I)		$375,000	$1,023,640	$449,032	$483,200	$339,200	$287,417	$448,612	$195,000	
Collaborative R&D Grants	$1,196,225	$1,571,393	$1,612,412	$1,637,132	$2,015,904	$2,203,103	$2,313,127	$1,917,049	$2,301,643	$2,445,232
Strategic Grants	$1,722,087	$2,072,793	$2,282,310	$2,457,079	$3,549,374	$3,457,330	$3,625,317	$3,572,592	$3,747,567	$2,898,502
Total	**$3,054,212**	**$4,464,919**	**$5,488,336**	**$4,883,586**	**$6,577,388**	**$6,637,692**	**$7,633,524**	**$8,474,621**	**$10,133,485**	**$10,152,565**

Figure 3.2c **Industrial Partnerships as a Proportion of Total NSERC Funding, 2003–2004 to 2012–2013**



The following list identifies those organizations that funded Faculty research in the 2013–14 fiscal year through individual sponsored research agreements, or as part of consortia. The list reflects sponsored research agreements recorded in U of T's Research Information System, and is supplemented by research collaborators that participate in funded research through the Pulp & Paper Centre, Centre for Industrial Application of Microcellular Plastics, Toronto Nanofabrication Centre and the Centre for Advanced Coating Technologies. Not reflected in this list are the many partners who provide philanthropic support, in-kind support, sponsorship of events, and student employment and development opportunities through initiatives such as Professional Experience Year (PEY) program and capstone design projects.

Figure 3.2d **Industrial Partnerships, 2013–2014**

- 5D Composite
- ABB Group
- Advanced Micro Devices Inc.
- AEG Power Solutions Inc.
- Agnico-Eagle Mines Ltd.
- Airbus S.A.S
- AISC
- Alcatel-Lucent Canada Inc.
- Allanson International Inc.
- Altera Corp.
- American Institute of Steel Construction
- Americas Styrenics LLC
- Andec Manufacturing Ltd.
- Andritz Group
- Anglo Operations Ltd.
- Armacell
- Atomic Energy of Canada Ltd.
- Automotive Fuel Cell Cooperation
- AV Nackawic Group
- Axcelon Biopolymers Corp.
- Babcock & Wilcox Ltd.
- Barrick Gold Corp.
- BASF
- Bell Canada
- BLiNQ Inc.
- BMW
- Boise Cascade
- Bombardier Inc.
- Borealis Infrastructure Management Inc.
- Brammo, Inc.
- Braskem
- Brican Flight Systems Inc.
- Broadcom Corp.
- Calgon Carbon Corp.
- Canadian Renewable Fuels Assoc.
- Canadian Solar Inc.
- Canadian Transportation Research Forum
- Canadian Urban Institute
- Carter Holt Harvey Ltd.
- Cascades
- Cedap
- Celulose Nipo-Brasileira
- Centre for Excellence in Mining
- Ciena Canada Inc.
- Clyde-Bergemann, Inc.
- COM DEV International Ltd.
- Corix Water Systems Inc.
- Cytodiagnostics
- Daishowa-Marubeni International Ltd. - Peace River Pulp Division
- Dana Canada Corp.
- Digital Predictive Systems Inc.
- Dow Chemical Company
- E. I. du Pont Canada Company
- eCamion Inc.
- Eco-Tec Inc.
- Eldorado Brasil
- Elementa Group Inc.

- Enbridge Gas Distribution Inc.
- Energent Inc.
- Engineering Services Inc.
- ERCO Worldwide
- Ericsson Canada Inc.
- Exar Corp.
- Facca Inc.
- Fibria Celulose
- Finisar Corporation
- Ford Motor Company
- FP Innovations
- Fuji Electric Co. Ltd.
- Fuji Electric Holdings Co. Ltd.
- Fujitsu Laboratories Ltd.
- GE Global Research
- Gedex Inc.
- Gefinex
- General Motors of Canada Ltd.
- Genia Photonics Inc.
- Gennum Corp.
- Global Emissions Systems Inc.
- GO Lighting Technologies Inc.
- Google Inc.
- Gracious Living Innovations Inc.
- Greencore Composites
- Groupe Mequaltech Inc.
- Hanwha Solar Canada
- Hatch Ltd.
- Hewlett-Packard Company
- Hitachi High-Technologies
- Holcim Inc.
- Horizon Plastics
- Huawei Technologies Co. Ltd.
- Hydro One Networks
- Hydro Quebec
- Hyundai Motor Company
- IBM Canada Ltd.
- Industrial Thermo Polymers Ltd.
- Ingenia Polymers Corp.
- Insight Nanofluidics Inc.
- Intel Corp.
- International Paper Company
- Inteva Products Canada Ulc
- Intlvac Canada
- Ionics Mass Spectrometry Group Inc.
- IPPLEX Holdings Corp.
- Irving Pulp & Paper Ltd.
- ITS Electronics Inc.
- Johnson & Johnson Inc.
- Jyco Sealing Technologies
- Kapik Integration
- Kiln Flame Systems Ltd.
- Kimberly-Clark Corp.
- Kinectrics
- Klabin
- Krauss Maffei Corp.
- Kumho Petrochemical R & D Center
- Lattice Semiconductor Ltd.
- Lockheed Martin Canada
- Lumentra Inc.
- Lyngsoe Systems
- MacDonald, Dettwiler and Associates Ltd.
- Marksman Cellject
- Materials & Manufacturing Ontario
- Mattson Technology, Inc.
- Maxim Integrated Products Inc.
- MeadWestvaco Corp.
- Mercedes-Benz Canada Inc.
- Messier-Dowty Inc.
- Metso Pulp, Paper and Power
- Mircom
- Mitsubishi Electric Research Laboratories
- Mitsubishi Rayon Co., Ltd.
- Mitsui
- Moldflow Corp.
- Morgan Solar Inc.
- Morrison Hershfield Ltd.
- Mr. Robot Inc.
- Multisorb Technologies
- National Semiconductor
- NatureWorks LLC
- Neo Material Technologies
- Nike, Inc.
- Nippon Steel Corp.
- Northwest Mettech Corp.
- Nuclear Waste Management Organization
- NXP Semiconductors Netherlands B.V.
- OLI Systems Inc.
- OneChip Photonics Inc.
- Ontario Clean Water Agency
- Ontario Power Authority
- Opalux Inc.
- Opus One Solutions Energy Corp.
- Orenda Engines
- ORNGE
- Pathogen Detection Systems, Inc
- Pfizer Inc. (New York)
- Plasco Energy Group
- Pratt & Whitney Canada Inc.
- PRISED Solar Inc.
- Process Research Ortech Inc.
- Procter & Gamble
- PwC
- QTI
- Qualcomm Canada Inc.
- Qualcomm Inc.
- Qualcomm Technologies Inc.
- Quorum Technologies Inc.
- Rambus Inc.
- Raytheon Canada Ltd.
- Redline Communications Inc.
- Research in Motion Ltd.
- Robert Bosch Corp.
- Rochling Engineering Plastics Ltd.
- Sabic
- Safety Power Inc.
- Samsung Advanced Institute of Technology
- Sandvik Canada Inc.
- Saudi Basic Industries Corp. (SABIC)
- Schlumberger Canada Ltd.
- Sealed Air Corp.
- Semiconductor Research Corp.
- Semtech Corp.
- Sendyne Corp.
- Sigma Bio-Instruments Inc.
- SigmaEight Inc.
- Silicon Mitus
- Siltech Corp.
- Silver Creek Pharmaceuticals
- SIM-One
- SINTEF Energi AS
- Sirap Gema
- Solana Networks
- Solantro Semiconductor Corp.
- Solar Ship Inc.
- SolarGrid Energy Inc.
- Solvay Specialty Polymers
- St Mary's Cement Group
- Stantec Inc.
- StoraEnso
- Sulzer Metco
- Suncor Energy Inc.
- Suzano Papel e Celulose
- Synbra
- Syncrude Canada Ltd.
- Synthos
- Taiwan Semiconductor Manufacturing
- Teck Resources Ltd.
- Teledyne ISCO
- Teledyne Technologies Inc.
- TELUS
- Tembec Industries, Inc.
- Tenova GoodFellow Inc.
- Texas Instruments Inc.
- Thales Canada Inc.
- The Lubrizol Corp.
- The Miller Group
- Tolko Industries Ltd.
- Toronto Hydro
- Toronto Electric Ltd.
- Toronto Waterfront Revitalization Corp.
- Total American Services Inc.
- Total Plastics Solutions Inc.
- Toyota Motor Corporation
- Toyota Technical Center U.S.A., Inc.
- Trojan
- Ultra Electronics
- VAC Aero International Inc
- Vale Canada Ltd.
- Varilume Lighting Inc
- Vision Extrusions Ltd.
- ViXS Systems Inc.
- VTT Technical Research Centre of Finland
- Wurth Elektronik eiSos GmbH & Co. KG
- Wuzhong Instrument Company
- Xagenic Inc.
- Xilinx Inc.
- Xogen Technologies Inc.
- Xstrata Nickel
- Xylitol Canada
- Zentrum Mikroelektronik Dresden AG
- Zotefoams PLC

U of T Engineering continues to lead among all Canadian peer institutions in the share of total annual NSERC funding that we attract. This is pivotal to our overall research endeavour not only because it represents more than one-third of our research revenue (Figures 3.1a and 3.1b), but because the national re-allocation of Canada Research Chairs (CRCs) that happens every two years is based on the proportion of Tri-Council and Networks of Centres of Excellence (NCE) funding that each university receives. In 2012-13 CRCs represented an additional $3.5 million of research revenue for the Faculty. Continued growth in our NSERC funding meant that in the most recent re-allocation (2013) U of T Engineering received an additional four Tier II equivalent CRCs, bringing our total to 39. The announcement of how the new CRCs will be distributed within the Faculty is expected in fall 2014.

This year, ChemE achieved strong growth in research operating funding, securing $15.6 million compared to $12.5 million in 2011-12. The increase – a consistent trend over the past five years – is an impressive per-faculty rise in funding.

We also received six new NSERC Strategic Project Grants for projects ranging from optimizing the performance of integrated green roof photovoltaic systems to creating a heterogeneous data communication framework for mobile cloud computing. The grants are designed to increase early-stage research and training in areas that could strongly enhance Canada's economy, society and/or environment within the next 10 years.

Figure 3.3a **Canadian Peer Universities vs. University of Toronto Share of NSERC Funding for Engineering, Cumulative Five-year Share, 2008–2009 to 2012–2013**

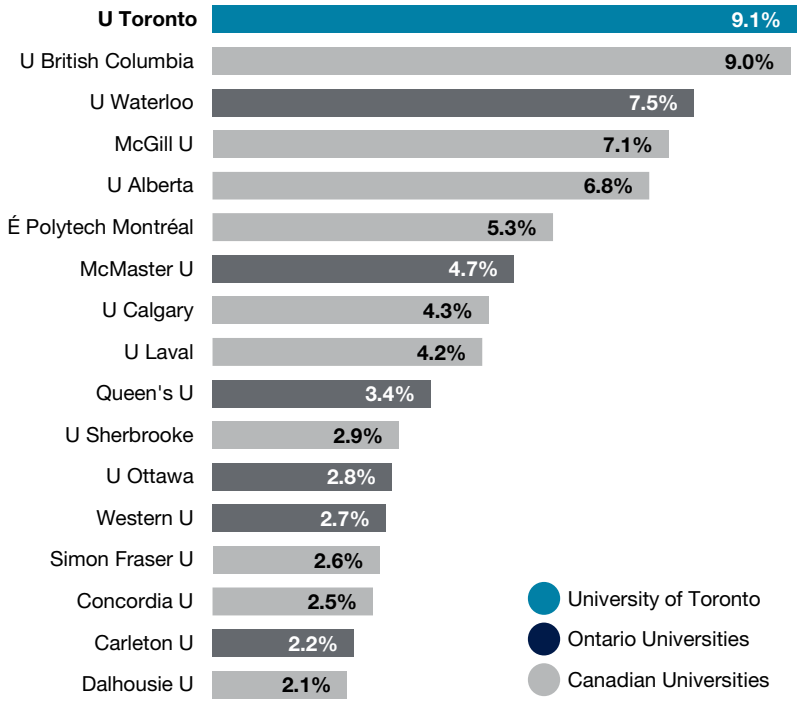


Figure 3.3b **U of T Annual Share of NSERC Funding in Engineering, 2003–2004 to 2012–2013**

2003–04	8.4%
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%

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

Figure 3.4a **Engineering Invention Disclosures by Academic Area, 2009–2010 to 2013–2014**

	2009–10	2010–11	2011–12	2012–13	2013–14	5-Yr Total
UTIAS	1.0	1.0	1.0	1.0	1.0	**5.0**
IBBME	7.0	9.3	13.3	8.4	5.9	**43.9**
ChemE	6.5	13.2	5.9	11.6	9.6	**46.8**
CivE	0.5	6.4	3.2	2.0	4.7	**16.8**
ECE	29.8	42.2	23.0	34.6	15.8	**145.4**
EngSci	0.0	0.0	0.0	0.5	1.2	**1.7**
MIE	6.7	14.1	20.5	13.1	9.1	**63.5**
MSE	1.9	4.0	2.5	3.7	2.1	**14.2**
Annual Total	**53.4**	**90.2**	**69.4**	**74.9**	**49.4**	**337.3**
University Annual Total	**136.0**	**196.0**	**158.0**	**166.0**	**146.0**	**802.0**
Engineering Percentage	**39%**	**46%**	**44%**	**45%**	**34%**	**42%**

Three out of every 10 invention disclosures filed in 2013–14 at U of T originated with our Faculty's researchers. One-third of the Faculty's 49.4 new disclosures were filed by ECE. Over the past five years across U of T, four of the top five departments for invention disclosures were in the Faculty of Applied Science & Engineering.

Figure 3.4b **U of T Invention Disclosures by Faculty, 2013–2014**

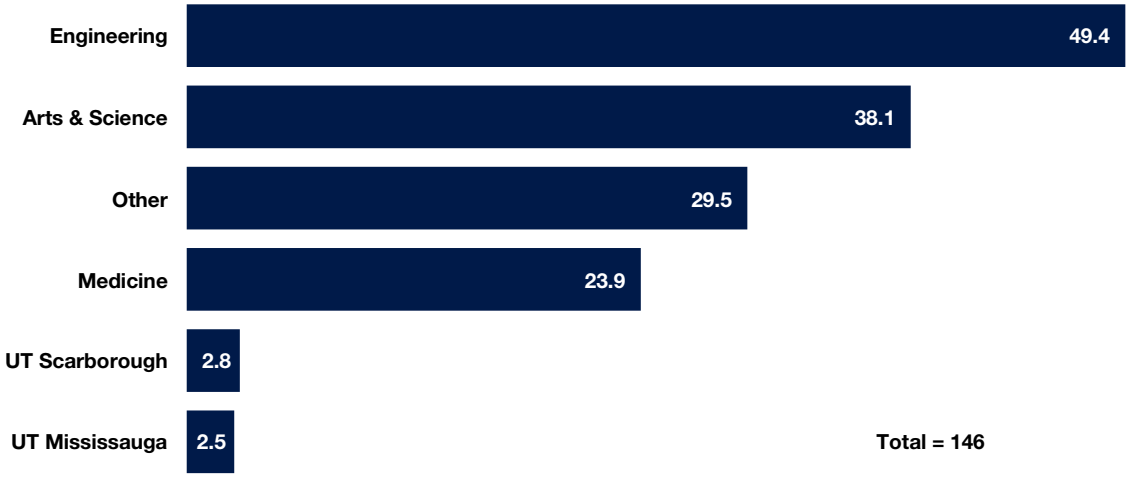
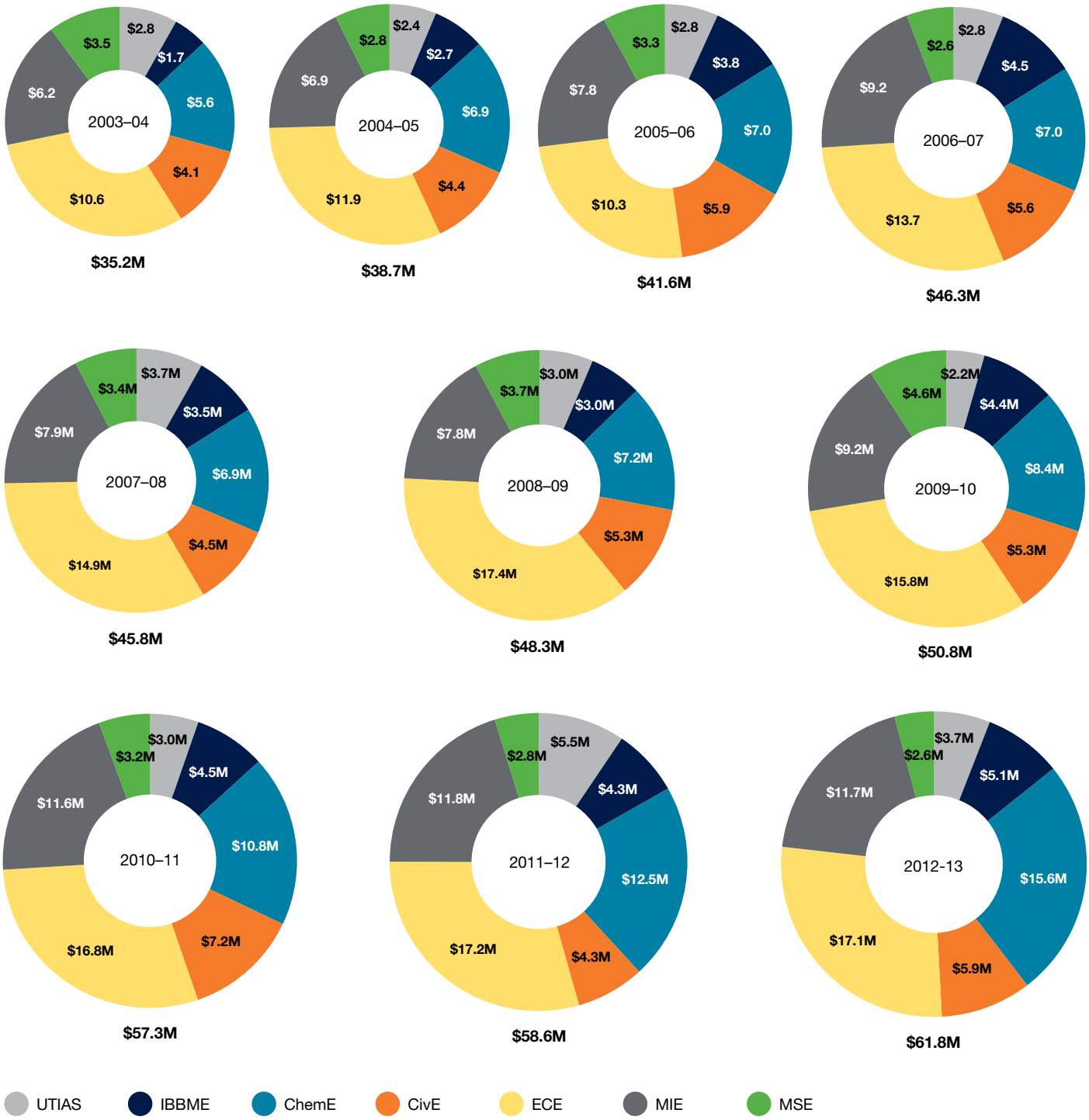


Figure 3.4c **U of T Patent Applications by Faculty, 2013–2014**

Figure 3.5 **Distribution of Research Operating Funding by Academic Area, 2003–2004 to 2012–2013**



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 2012-13 represents 66 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

The Faculty actively encourages collaborations across departments, Faculties and with the wider community to create innovations in teaching, research and technology that fuel diverse approaches to knowledge creation and education. This interdisciplinary mindset has enabled us to become one of the world's premier engineering schools.

We are establishing a strong culture of entrepreneurship, through a variety of courses and resources such as The Entrepreneurship Hatchery, to open new avenues for our students to have an impact on the world. This year, 10 of our students, from over 1,000 applicants across the nation, were chosen to participate in The Next 36 program, which trains the country's newest generation of innovators. Our Faculty's Entrepreneurship Hatchery awarded its first $20,000 Lacavera Prize to the cross-disciplinary team of Anastasiya Martyts (EngSci 1T6) and Tiange Li (Life Sciences 1T6) for their innovative camera lighting system, Modly.

The importance of collaboration and cross-disciplinary approaches is integrated into many of our course offerings. The new Multidisciplinary Capstone Design course brings together students from different programs to transform their ideas and classroom knowledge into designs that tackle challenges proposed by industry clients. By enabling the next generation of makers, we continue U of T Engineering's legacy of driving economic development, spurring innovation and offering solutions to some of the world's greatest challenges.

Our interdisciplinary minors and certificates provide additional opportunities for our students to explore their interests outside of the traditional programs. Enrollment in interdisciplinary minors continues to increase, with 825 students participating in our five minors in 2013-14. Our Engineering Business minor remains exceedingly popular. To meet demand for this minor, we have expanded the number of summer course offerings to include three joint Rotman-Engineering core courses. In September 2014, the Faculty launched the Biomedical Engineering minor and certificates in Engineering Leadership and Renewable Resources Engineering.

Selected Cross-Faculty Education Highlights

Second-Year Students' Photography Lighting System Wins The Entrepreneurship Hatchery's $20,000 Lacavera Prize

Creating a light, affordable camera lighting system to replace the heavy bulk of typical photographic equipment earned Anastasiya Martyts (EngSci 1T6) and Tiange Li (Life Sciences 1T6) The Entrepreneurship Hatchery's first $20,000 Lacavera Prize. Martyts and Li presented Modly – their modular, customizable lighting system – at The Entrepreneurship Hatchery's Demo Day in September 2013. Competing against eight other teams, the pair won the top prize sponsored by telecommunications entrepreneur Anthony Lacavera (CompE 9T7), founder, chair and CEO of Globalive Holdings.

U of T Engineering Students Take Ten of "The Next 36" Positions

Ten of the students selected from across Canada for The Next 36 program were from U of T Engineering, a record showing for the Faculty since the program's inception in 2010. This increasingly popular program – which attracted close to 1,000 applicants this year – is designed to train Canada's next generation of innovators and business leaders. Selected students are given the opportunity to develop their business ideas and put them into action with help from Canadian business leaders, and mentorship and lectures from world-class faculty over a nine-month period. The entrepreneurship-immersion program also provides winners up to $95,000 in seed investment for new ventures.

U of T Engineering Grads Make Aeronautical History

An aerospace team with strong U of T Engineering connections made history in June 2013 by winning the $250,000 AHS Igor I. Sikorsky Human-Powered Helicopter Prize, for the first-ever sustained flight of a human-powered helicopter. The prize was created in 1980 and AeroVelo Inc. – founded by U of T Engineering alumni Todd Reichert (EngSci 0T5, UTIAS PhD 1T1) and Cameron Robertson (EngSci 0T8, UTIAS MASc 0T9) – successfully met the award's rigorous conditions: a flight lasting 60 seconds and reaching an altitude of three meters while remaining in a 10-meter square space. Several U of T Engineering undergraduate students participated in the AeroVelo team, and through their collective efforts made the historical flight possible.

Women in Science & Engineering Conference a WISE Choice

U of T hosted the March 2014 Women in Science & Engineering (WISE) National Conference, which brought together more than 200 students and young alumni to celebrate careers in science and engineering while learning more about the field. Organized by WISE's U of T chapter, the event inspired participants through more than a dozen workshops, keynote speakers and panel discussions focusing on the theme: 'Experience: The Measure of Tomorrow.' The day also included two case competitions in business technology and social entrepreneurship, each with $1,000 cash prizes.

Faculty's First MOOC: Our Energetic Earth

In October 2013, the Faculty introduced its first massive open online course (MOOC) on the edX platform. Taught by CivE Professor Bryan Karney, the lectures focused on how the world's energy forces – from wind, waves, storms and currents – animate the Earth's surface and allow our planet to support life. Enrolment reached nearly 11,000.

Multidisciplinary Capstone Design Course

Sixty-five students in MIE Professor Kamran Behdinan's new Multidisciplinary Capstone Design course used competencies and knowledge from several engineering disciplines to tackle complex, real-world design projects. The course, in its first year, translated into 17 projects from an impressive group of organizations, including Defence Research and Development Canada, Atomic Energy of Canada Limited, Cameco, Bombardier Inc. and Magna International. Teams of three to four students – each from a different department – worked together on new solutions, such as software that helps pilots manage jetlag or new caterpillar tracks for an amphibious vehicle. Students were given full opportunity to apply creative and iterative design processes to address significant business needs identified by the companies with which they worked.

Undergraduate Engineering Minors and Certificates

In September 2014, the Faculty launched three new interdisciplinary minors and certificates:

Biomedical Engineering (BME) Minor

This new undergraduate BME minor prepares students for direct entry into the applied biomedical engineering industry. It has a greater biomedical focus than the existing Bioengineering minor and is designed for students who are interested in applying their engineering knowledge specifically to the healthcare sector. Course work includes pharmaceutical and therapeutic technologies, medical devices, medical diagnostics, healthcare delivery, health regulatory and policy development, medical diagnostic technologies, biomedical devices and bioinformatics. This is the first minor to include supporting co-curricular activities such as mentoring, as well as a required seminar course and optional courses in biostatics and biodesign.

Certificate in Engineering Leadership

U of T Engineering's Institute for Leadership Education in Engineering (ILead) expanded its academic courses by offering a certificate program for students in September 2014. Courses focus on the cognitive and psychological foundations of effective leadership, helping students to think analytically and systematically about leadership, and to effectively handle complex challenges. They are also taught practical approaches to becoming more productive engineers based on the premise that, for technology to become a reality, it must be translated through people.

Certificate in Renewable Resources Engineering

Our Engineering Cross-Disciplinary Programs Office has been collaborating with the Faculty of Forestry over the last two years to create a selection of interdisciplinary offerings for engineering students, highlighting expertise in sustainable resource management, bio-economics, sustainable energy production, product manufacturing and sustainable communities. These courses reflect the strong interconnections between work in renewable resources and various branches of engineering. The certificate provides recognition for a demonstrated focus in renewable resources.

In summary, we offer the following minors and certificates:

Minors

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

Certificates

- Engineering Business
- Engineering Leadership (new in 2014)
- Entrepreneurship, Innovation & Small Business
- Global Engineering
- Mineral Resources
- Nuclear Engineering
- Preventative Engineering & Social Development
- Renewable Resource Engineering (new in 2014)

Summer Course Offerings

The Faculty has continued to expand the number of summer course offerings to include all three joint core courses for the Engineering Business minor, a technical elective in Nuclear Engineering for the certificate program and an Energy Policy course for the Sustainable Energy minor. Also, for the first time, incoming first-year students were able to take online Calculus with Engineering Applications I (APS162) for credit during the summer.

It is easy to identify the popularity of the Faculty's cross-disciplinary programs through a quick summary of recent enrolment numbers. The overall number of students enrolled in minors has dramatically increased over the past seven years (Figure 4.1). The Engineering Business minor continues to experience the largest enrolment, representing 63 per cent of minor registrations. Interest in the joint Rotman-Engineering courses, created as the core of the minor and certificate, continues to surpass expectations. In 2013-14, 16 sections of the three joint core courses were offered to U of T Engineering students.

Figure 4.1 **Undergraduate Enrolment in Engineering Minors, 2007–2008 to 2013–2014**

	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013-2014
Bioengineering	111	138	195	168	145	95	55
Engineering Business					313	439	516
Environmental Engineering (Collaborative Program)	(95)	(74)	135	105	79	49	37
Robotics & Mechatronics					36	59	97
Sustainable Energy			198	241	176	139	120
Total Enrolment	206	212	528	514	749	781	825

5 Awards and Honours

External recognition in the form of awards and honours corroborates excellence, strengthens our international reputation, and enhances our ability to attract top academics and students from across Canada and around the world. U of T engineers continue to outperform all other Canadian engineering schools in the achievement of awards and honours. In 2013-14, we received more than 21 per cent of all major international and national awards, nearly double the percentage received by the next most successful school.

Members of our U of T Engineering community also won an impressive number of emerging leader/early-career awards, such as the U of T McLean Award, the Natural Sciences and Engineering Research Council's Steacie Fellowship and two Engineers Canada Young Engineer Achievement Awards.

As in previous years, our professors continue to receive widespread recognition from scientific and professional peers. We secured dozens of major awards and fellowships from national and international professional societies, including the Pulp and Paper Technical Association of Canada's John S. Bates Gold Medal, the Ontario Professional Engineers Gold Medal and the Engineers Canada Gold Medal. Moreover, six U of T Engineering professors were honoured as Fellows of The Canadian Academy of Engineering and three were made Fellows of the Engineering Institute for Canada. We also won the 2014 Killam Prize in engineering.

In addition to these research accolades, we received several awards in education including the sole Alan Blizzard Award for exemplary team collaboration presented annually from the Society for Teaching and Learning in Higher Education, as well as two high-profile honours from the American Society for Engineering Education.

The University of Toronto continues to recognize the excellence within our Faculty, honouring us in 2013 with six Inventors of the Year Awards, 11 Excellence Through Innovation Awards and a Distinguished Professor Award. In 2014, we were presented with three Inventor of the Year Awards, as well as the U of T Faculty Award and a University Professor appointment.

Selected Awards Received by Faculty Members and Alumni, 2013-2014

Prestigious awards and honours for our Faculty range from international and national to provincial and local, showcasing significant achievements in research, education and service to the profession.

MIE Professor Andreas Mandelis received the 2014 Killam Prize for his work using laser to see small differences in the human body or other materials that have previously gone undetected. MIE Professor Susan McCahan, vice-dean of undergraduate studies, won the American Society for Engineering Education (ASEE) Sharon Keillor Award for Women in Engineering Education, and MIE Chair and Professor Jean Zu won the ASEE Donald E. Marlowe Award for Distinguished Education Administration.

International

American Concrete Institute
Robert E. Philleo Award
Doug Hooton (CivE)

American Institute of Aeronautics and Astronautics
Aerospace Guidance, Navigation and Control Award
Bernard Etkin (UTIAS)

American Society for Testing and Materials
Frank E. Richart Award
Doug Hooton (CivE)

American Society for Engineering Education
Sharon Keillor Award for Women in Engineering Education
Susan McCahan (MIE)

American Society for Engineering Education
Donald E. Marlowe Award for Distinguished Education Administration
Jean Zu (MIE)

American Society of Mechanical Engineers
Fellow
Andreas Mandelis (MIE)
David Sinton (MIE)
Yu Sun (MIE)

American Society of Mechanical Engineers Heat Transfer Division
75th Anniversary Medal
Cristina Amon (MIE)
Javad Mostaghimi (MIE)

Institute for Operations Research and the Management Sciences
Fellow
Michael Carter (MIE)

Institute of Electrical and Electronics Engineers
Fellow
Wei Yu (ECE)

Institute of Industrial Engineers
Fellow
Andrew Jardine (MIE)

International Society of Engineering Asset Management
Lifetime Achievement Award
Andrew Jardine (MIE)

International Society of Edinburgh
Corresponding Fellow
Stewart Aitchison (ECE)

Tissue Engineering and Regenerative Medicine International Society
Young Investigator Award
Alison McGuigan (ChemE, IBBME)

National

Canada Mortgage and Housing Corporation
Excellence in Education Award
Heather MacLean (CivE)

Canadian Academy of Engineering
Fellow
Yu-Ling Cheng (ChemE)
Doug Hooton (CivE)
Andrew Jardine (MIE)
Mark Kortschot (ChemE)
Alberto Leon-Garcia (ECE)
Andreas Mandelis (MIE)

Canadian Academy of Health Sciences
Fellow
Paul Santerre (IBBME)

Canadian Institute of Mining, Metallurgy and Petroleum
Fellow
Vladimir Papangelakis (ChemE)

Canadian Institute of Mining, Metallurgy and Petroleum
MetSoc Award
Alexander McLean (MSE)

Canadian Society for Chemical Engineering
Process Safety Management Award
Graeme Norval (ChemE)

Canadian Society for Mechanical Engineering
Robert W. Angus Medal
Cristina Amon (MIE)

Canadian Society for Mechanical Engineering
I.W. Smith Award
Tobin Filleter (MIE)

Canadian Society for Mechanical Engineering
Fellow
Aimy Bazylak (MIE)
Craig Simmons (MIE)

Engineering Institute of Canada
Fellow
Nasser Ashgriz (MIE)
Shahrokh Valaee (ECE)
Christopher Yip (ChemE, IBBME)

Engineers Canada
Young Engineer Achievement Medal
Michael Branch (CompE 0T3)

Natural Sciences and Engineering Research Council of Canada
E.W.R Steacie Fellow
Milica Radisic (IBBME, ChemE)

Pulp and Paper Technical Association of Canada
John S. Bates Memorial Gold Medal
Honghi Tran (ChemE)

Senior Women Academic Administrator of Canada
Recognition Award
Brenda McCabe (CivE)

Society for Chemical Industry Canada
LeSueur Memorial Award
Grant Allen (ChemE)

Stem Cell Network
Till & McCulloch Award
Peter Zandstra (IBBME)

The Canada Council for the Arts
Killam Prize
Andreas Mandelis (MIE)

Women in Mining Canada
Trailblazer Awards
Samantha Espley (MinE 8T8)

Provincial

Ontario Professional Engineers Awards
Gold Medal
Michael Sefton (ChemE, IBBME)

Ontario Professional Engineers Awards
Research & Development Medal
Stavros Argyropoulos (MSE)

Ontario Professional Engineers Awards
The Engineering Medal – Engineering Excellence
J. Carlos de Oliveira (CivE MASc 0T6)

Ontario Professional Engineers Awards
The Engineering Medal - Entrepreneurship
Charles Richard Donnelly (MinE 7T6, CivE MASc 8T1)

U of T

Distinguished Professor in Global Engineering
Yu-Ling Cheng (ChemE)

Faculty Award
Jonathan Rose (ECE)

Inventor of the Year Awards, 2013
Axel Guenther (MIE, IBBME)
Peter Lehn (ECE)
Andreas Mandelis (MIE)
Milos Popovic (IBBME)
Milica Radisic (IBBME, ChemE)
Molly Shoichet (ChemE, IBBME)

Inventor of the Year Awards, 2014
Baher Abdulhai (CivE)
Samah El-Tantawy (CivE PhD 1T2)
Will Walmsley (MIE MASc 1T2)

University Professor
Molly Shoichet (ChemE, IBBME)

Note: The international, national, provincial and U of T awards listed above include honours received between June 2012 and April 2013.

Figure 5.1 Summary of Major International, National and Provincial Awards and Honours, 2004 to 2013

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
International										
AAAS Fellowship*		1	1	2	4	4	6	5	3	
Guggenheim Fellowship*	1			1						
MIT Top 35 Under 35		1			1				1	
NAE Foreign Associate*		1	1				1	1		
National										
3M Teaching Fellowship*				1						
Alan Blizzard Award				1						
Canadian Academy of Engineering Fellowship		3	2	1	3	9	8	1	7	6
Engineering Institute of Canada Awards							1	3	1	2
Engineering Institute of Canada Fellowship	1		2	2	3	4	3	3	3	3
Engineers Canada Awards				1		1	3		1	1
Killam Prize*					1					
Killam Research Fellowship*					2		2			
Royal Society of Canada Fellowship*		1	1	1	1	1	2	4	3	
Steacie Fellowship*	1	1				1			2	1
Steacie Prize*									1	
Synergy Award for Innovation	1	1	0			1			1	
Provincial										
Ontario Professional Engineers Awards	0	1	1	0	3	4	4	5	3	2
Total	**4**	**10**	**8**	**10**	**18**	**25**	**30**	**22**	**26**	**15**

Note 5.1: (*) denotes U of T performance indicator. Data shown are by calendar year (January to December). Includes faculty award recipients only. In 2014, the Faculty received an Alan Blizzard Award and Killam Prize, which are not included in 5.1. To read descriptions of the awards and honours listed above, please see Appendix G.

Figure 5.2a **Number of Major Awards Received by U of T Engineering Compared to other Canadian Engineering Faculties, 2013**

In 2013, U of T Engineering outperformed all other Canadian schools by a wide margin. More than 21 per cent of major international and national engineering awards received by faculty in Canadian engineering schools went to our professors.

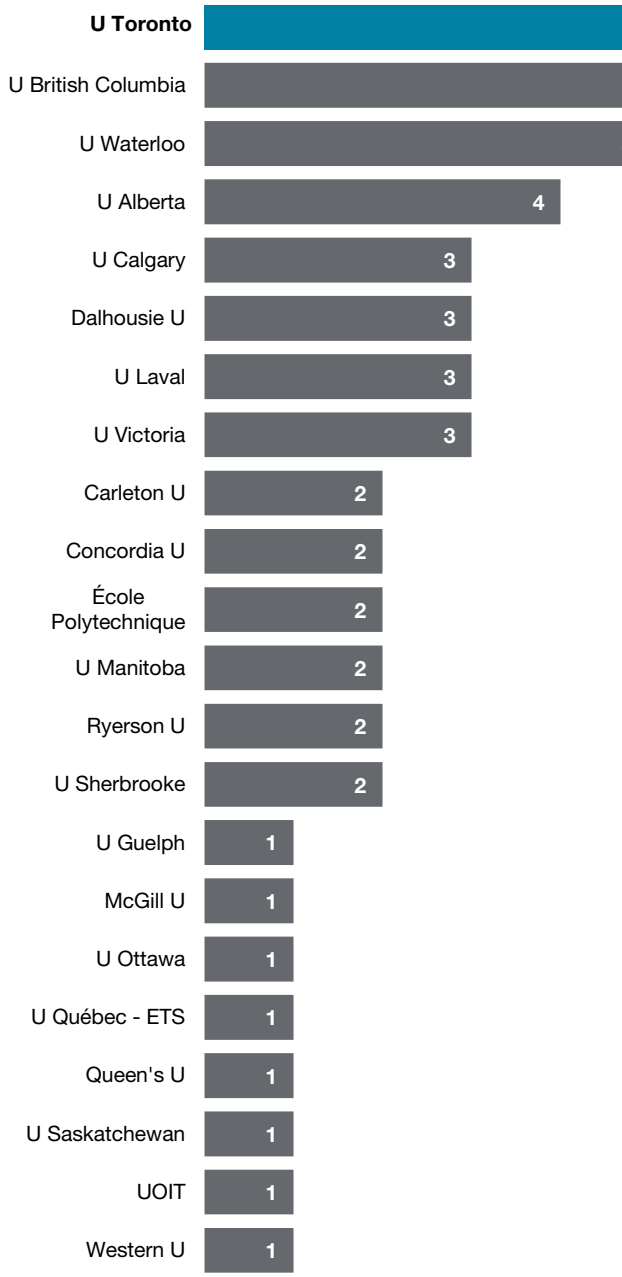
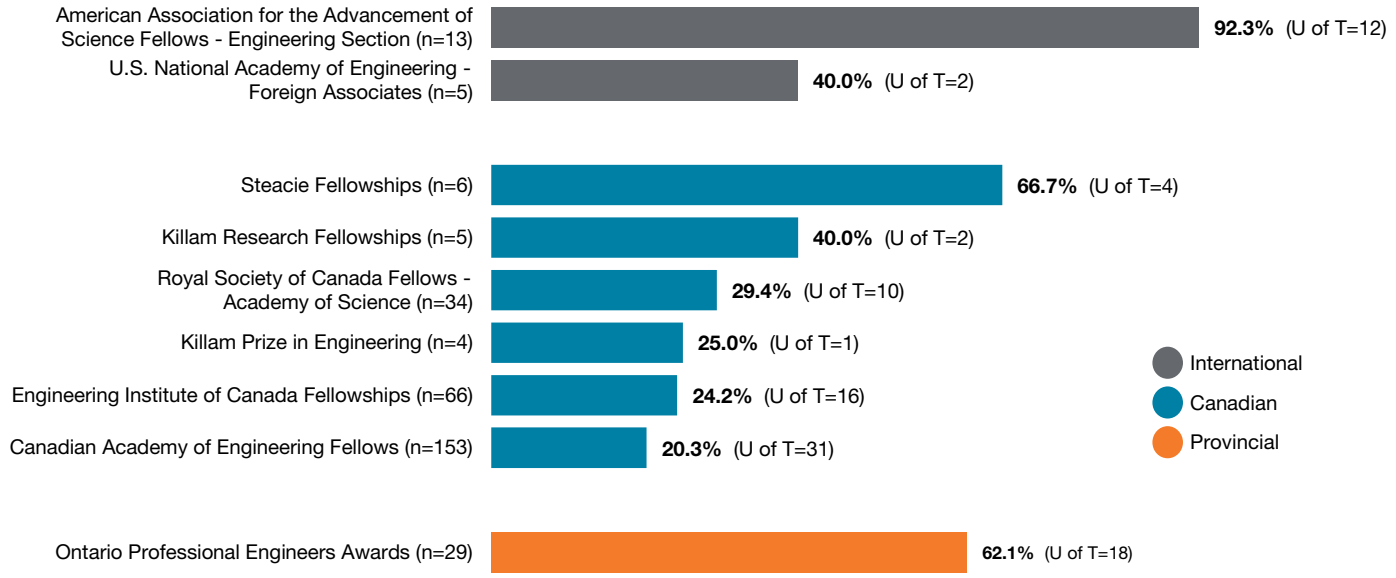


Figure 5.2b **Percentages of Engineering Faculty and Total Major Awards Received in Canadian Engineering Faculties**

	Percent of Total FTE Engineering Faculty in Canada	Percent of Total Major Awards Received by Engineering Faculties
U Toronto	5.6%	21.3%
U British Columbia	4.1%	11.5%
U Waterloo	6.2%	8.2%
U Alberta	4.4%	6.6%
U Calgary	3.7%	4.9%
Dalhousie U	2.2%	4.9%
U Laval	3.7%	4.9%
U Victoria	1.3%	4.9%
Carleton U	3.4%	3.3%
Concordia U	3.9%	3.3%
École Polytechnique	5.6%	3.3%
U Manitoba	1.8%	3.3%
Ryerson U	3.7%	3.3%
U Sherbrooke	4.9%	3.3%
U Guelph	1.0%	1.6%
McGill U	3.1%	1.6%
U Ottawa	2.8%	1.6%
U Québec – ETS	7.6%	1.6%
Queen's U	3.4%	1.6%
U Saskatchewan	1.9%	1.6%
UOIT	1.6%	1.6%
Western U	2.2%	1.6%

Note 5.2a and 5.2b: The following major awards are included: International — AAAS Fellowship (Engineering Section), MIT Top 35 Under 35, NAE Foreign Associate; National — CAE Fellowship, EIC Awards, EIC Fellowship, Engineers Canada Awards, Killam Prize (Engineering), Royal Society of Canada Fellowship (Engineering/Physical Sciences), Steacie Fellowship, Steacie Prize and Synergy Awards for Innovation.

Figure 5.3 **Number of Awards Received by U of T Engineering Faculty Compared to other Canadian Engineering Faculties, 2008 to 2013**



Selected Awards Received by Staff, 2013–2014

National

Alan Blizzard Award
Presented by the Society for Teaching and Learning in Higher Education, this prestigious national award recognizes a team whose exemplary collaboration in university teaching enhances student learning. The Faculty's Institute for Leadership Education in Engineering (ILead) team, representing a combination of faculty and staff members, garnered this year's award.

Dr. David Colcleugh
Professor Greg Evans (Associate Director)
Nick Evans
Amy Huynh
Cecilia Konney
Professor Alison McGuigan
Kristina Minnella
Estelle Oliva-Fisher
Deborah Peart
Professor Doug Reeve (Director)
Dr. Cindy Rottmann
Professor Robin Sacks
Patricia Sheridan
Annie Simpson (Assistant Director)
Wayne Stark
Brian Tran

University of Toronto

Excellence Through Innovation Awards
Tomas Bernreiter (MIE)
Helen Bright (Office of the Registrar)
Linda Espeut (ECE)
Janice Haugan (Office of the Registrar)
Karen Irving (ECE)
Jayne Leake (ECE)
Sergei Metropolitansky (Office of the Registrar)
Tom Nault (Office of the Registrar)
Dan Pettigrew (Office of the Registrar)
Jaro Pristupa (ECE)
Joe Wong (ECE)

Note: The international and U of T awards listed above include honours received between June 2012 and April 2013.
ESC = Engineering Strategic Communications; ESRRO = Engineering Student Recruitment & Retention Office

University of Toronto Engineering Faculty Awards, 2010–2011 to 2013–2014

U of T Engineering recognizes staff and faculty excellence in research, teaching, leadership and dedication to the engineering profession through their support of our Faculty's priorities and commitment to inspiring future global engineers.

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.

2013–14: Oscar del Rio (MIE)
2012–13: Mary Stathopoulos (ECE)
2011–12: Giovanni Buzzeo (CivE)
2010–11: John MacDonald (CivE)

Faculty Teaching Award

The highest teaching tribute awarded by the Faculty.

2013–14: Greg Evans (ChemE)
2012–13: Evan Bentz (CivE)
2011–12: Jonathan Rose (ECE)
2010–11: Jim Wallace (MIE)

Harpreet Dhariwal Emerging Leader Award

Presented to a staff member who leads by example in their dedication to the Faculty's mission. Recipients are held in high regard by colleagues and demonstrate potential to assume more senior leadership roles within the Faculty. This award was renamed in memory of an esteemed staff member who received this honour in 2011-12.

2013–14: Luke Ng (MSE)
2012–13: Tom Nault (Office of the Registrar)
2011–12: Harpreet Dhariwal (Office of the Dean)
2010–11: Ryan Mendell (MIE)

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.

2013–14: Lisa Camilleri (Office of the Dean)
2012–13: Sandra Walker (IBBME)
2011–12: Austra Ozolins (ECE)
2010–11: Nelly Pietropaolo (CivE)

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.

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)
2010–11: Bruno Korst-Fagundes (ECE), Steve Miszuk (Office of the Dean), Joe Wong (ECE)

Quality of Student Experience Award

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

2013–14: Susan Grant (ECE)
2012–13: Deborah Peart (ChemE, MIE)
2011–12: Shannon Osborne (MIE)
2010–11: Lesley Mak (Office of the Registrar)

Research Leader Award

Created in 2012, the Research Leader Award is 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.

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

Sustained Excellence in Teaching Award

Created in 2012, the Sustained Excellence in Teaching Award is presented to a faculty member who exhibits teaching excellence over a sustained period of time.

2013–14: Glenn Gulak (ECE)
2012–13: Tarek Abdelrahman (ECE)

Engineering Alumni Association Awards, 2012–2013 to 2013–2014

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.

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.

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.

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.

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.

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.

2013–14: Arthur Slutsky (EngSci 7T0, IndE MASc 7T2)
2012–13: Paul Cadario (CivE 7T3)

6 World Recognition by Rankings

Since the Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) and the Times Higher Education (THE) World University Ranking were launched a decade ago, the field of global rankings has matured in scope and sophistication. The results are frequently used as benchmark indicators of a university's international standing. The increasing globalization of higher education is readily visible in the growing number of the top tier institutions from outside the traditional North American and European strongholds particularly in engineering and technology where governments in countries such as Asia, have invested tremendously in university research.

In an increasingly crowded and competitive environment, U of T Engineering's position has remained essentially unchanged from the previous year across all major international rankings, where we continue to standout as the premiere engineering school in Canada and among the top 30 worldwide. We placed especially well in the 2013 Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) in engineering/technology and computer science. For the seventh consecutive year, we were identified as the nation's best engineering school, and ranked 12th worldwide – an improvement of one position from 2012 and nine positions since 2011.

Two organizations – QS World University Ranking and National Taiwan University (NTU) Performance Ranking of Scientific Papers for World Universities – have developed more detailed subject rankings in such areas as chemical engineering, civil engineering, computer science, electrical engineering, materials science and mechanical engineering. Here again, U of T Engineering has demonstrated its preeminence in Canada. In each of the past three years we have placed first in five out of six subjects in both the QS and NTU rankings. In 2013, civil engineering moved up five places, to eighth globally – the highest U of T Engineering has ever placed in any NTU subject ranking.

A key foundation for our global stature is the widely-recognized impact of our outstanding research. In addition to the NTU publication ranking noted above, the Association of American Universities has ranked U of T Engineering the seventh most-cited public institution in North America for the past four years. Among Canadian universities we have retained a commanding lead in the number of citations per publication.

Comprehensive University Rankings

Figure 6.1a Shanghai Jiao Tong Academic Ranking of World Universities (ARWU), Top 50 Universities for Engineering/Technology and Computer Sciences, 2013

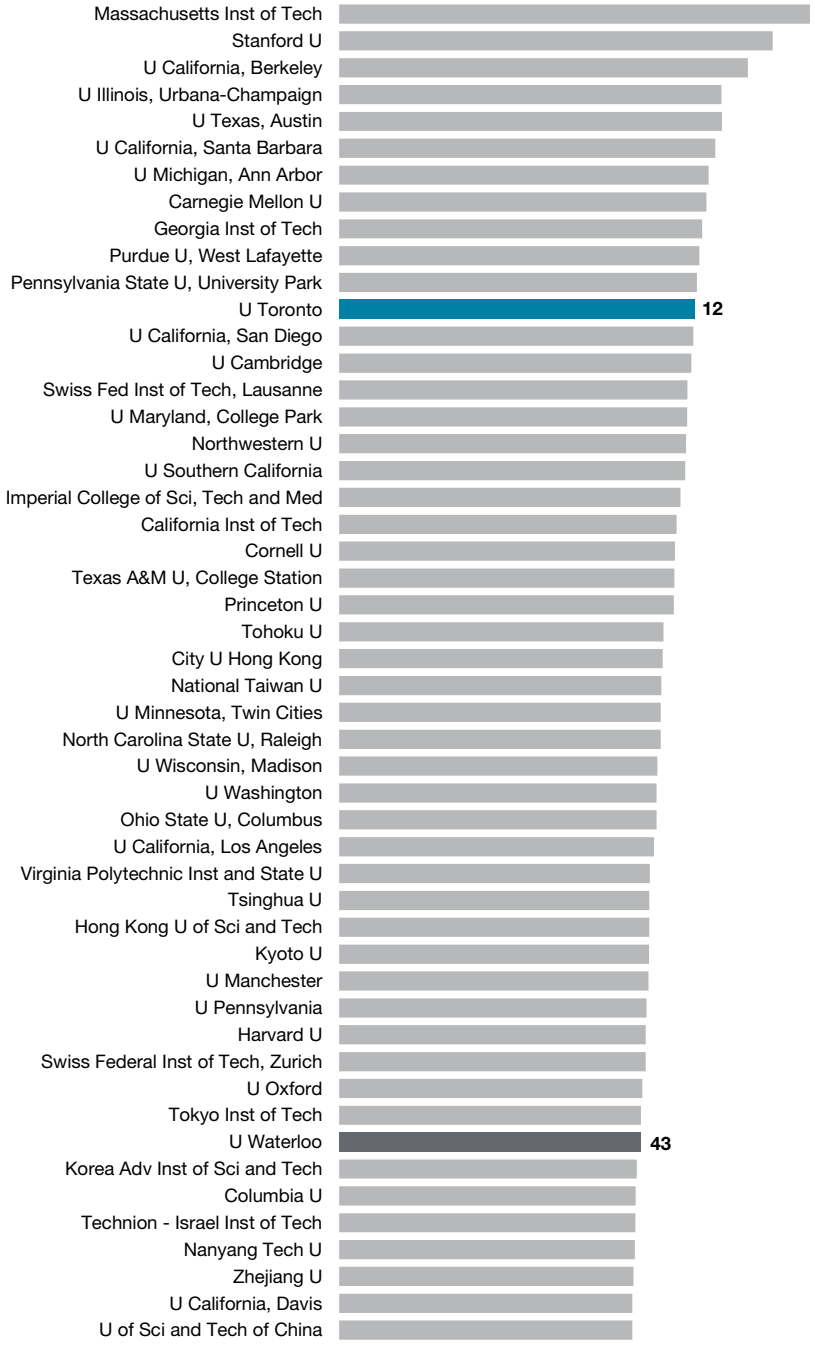


Figure 6.1b Canadian Universities in Top 100

For the second year in a row, U of T Engineering rose in the Academic Ranking of World Universities (ARWU), moving into 12th place worldwide for engineering/technology and computer science. The only other Canadian university in the top 50 is Waterloo, which remained at 43rd.

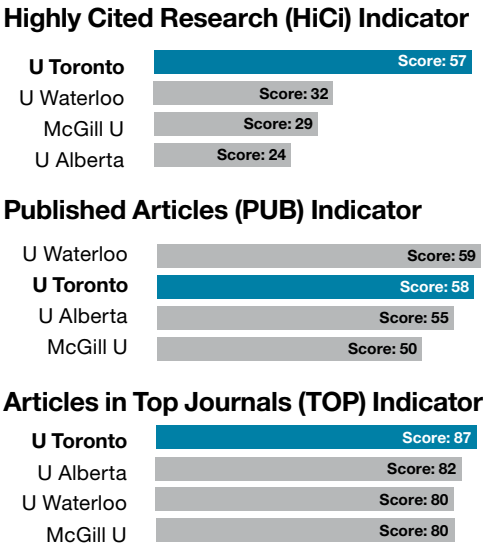
Our standing among Canadian peer institutions is shown in Figure 6.1b, while Figure 6.1c indicates how we score relative to these same peers in each of the three indicators that constitute the ARWU's evaluation methodology:

- Highly-cited research (HiCi)
- Published articles (PUB)
- Percentage of articles published in the top 20 per cent of journals in the field (TOP)

A fourth measure, total engineering-related research expenditures (FUND), is applied only to U.S. institutions.

The ARWU is the longest-running of all the global rankings. Although its evaluation criteria are more narrowly focused than either the THE or QS rankings, its methodology is generally considered one of the most objective, transparent and consistent assessment of the world's research-intensive universities.

Figure 6.1c Scoring Analysis of Canadian Universities in Top 100



Note 6.1c: In addition to HiCi, Pub and TOP, the ARWU uses a fourth indicator called Research Expenditure (FUND). FUND is not used to rank Canadian institutions and is therefore not reported here.

The publication of its 2013 results marked the 10th anniversary of the Times Higher Education (THE)-Thomson Reuters World University Rankings, making it second only to the ARWU (see Figure 6.1a) as the longest-running survey of its kind. Even more than its age, what sets THE apart as an influential assessment of global, research-intensive universities is the breadth of its evaluation, aiming 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)
- Industry income and innovation (2.5 per cent)
- International outlook: staff, students and research (7.5 per cent)

U of T Engineering's ranking remained at 22nd globally, and rose to 15th in North America (Figure 6.2b). Our standing as Canada's premier engineering school was further solidified as the University of British Columbia (UBC), the only other Canadian institution in the top 50, moved from 39th to 48th. Mirroring a prominent trend across all global rankings, eight of the universities that moved ahead of UBC were from outside North America, including four from Asia.

Figure 6.2a Times Higher Education–Thomson Reuters World University Rankings, Top 50 Universities for Engineering and Information Technology, 2013

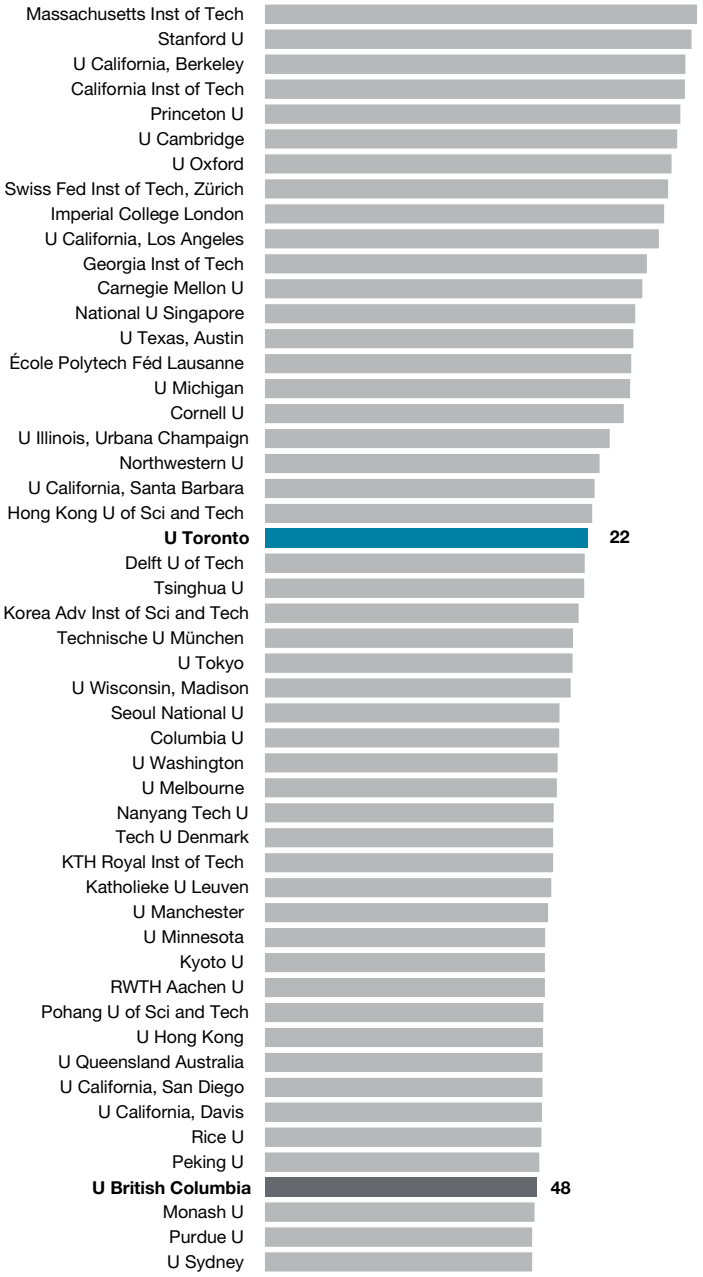


Figure 6.2b Top 25 North American Universities for Engineering and Information Technology, 2013

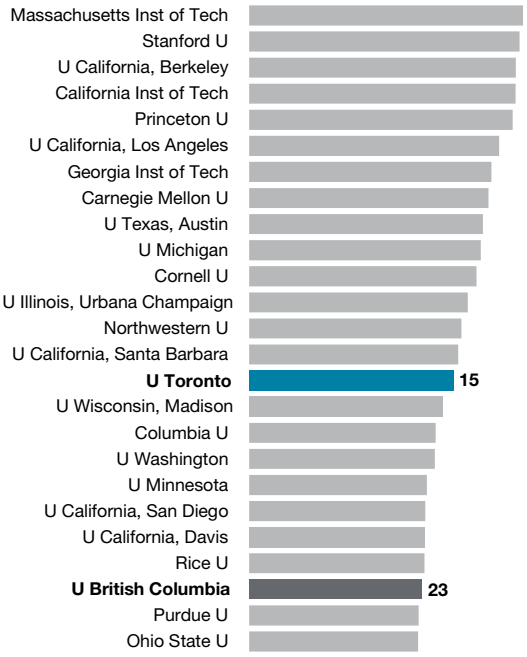


Figure 6.3a **QS World University Rankings and U.S. News & World Report World's Best Colleges and Universities, Top 50 Universities for Engineering and Information Technology, 2013**

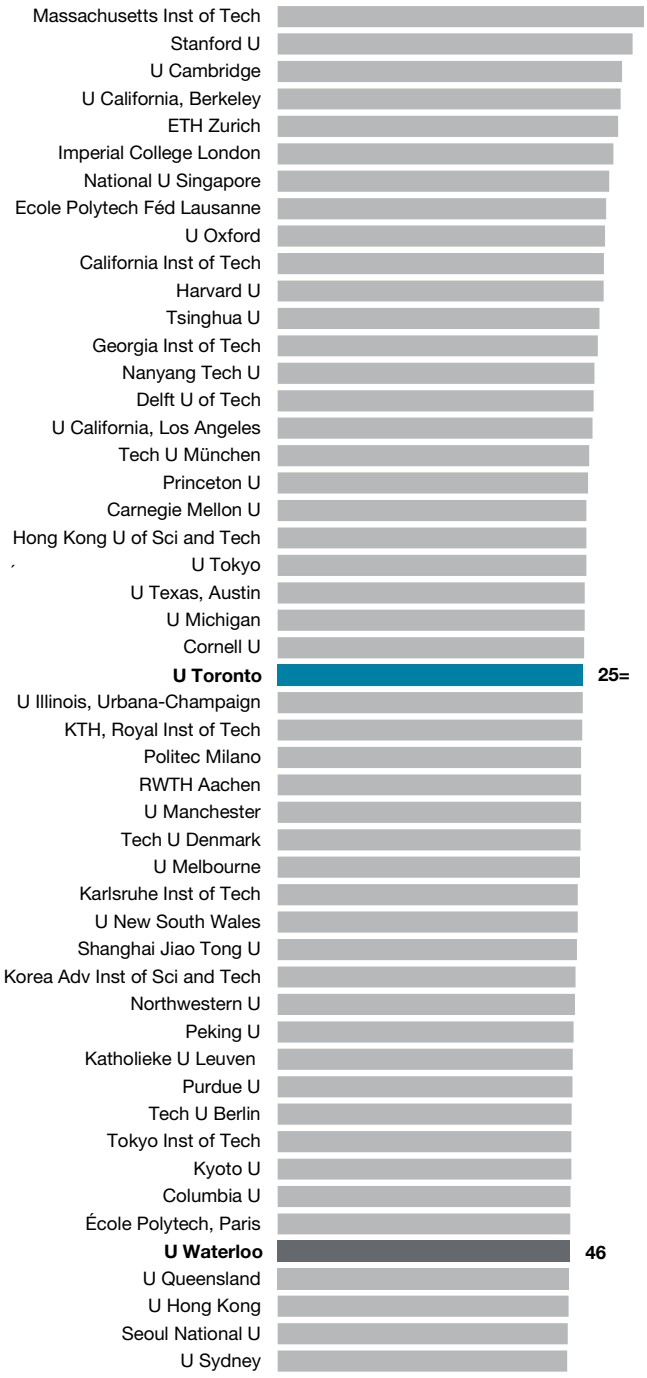
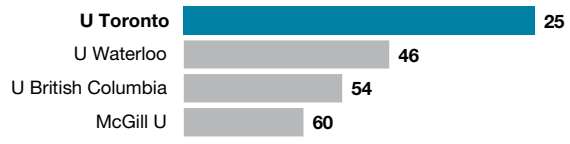


Figure 6.3b **Canadian U15 in Top 100 for Engineering and Information Technology, 2013**



Amid stiff international competition and considerable movement in the top ranks, U of T Engineering retained the 25th position globally and first in Canada in the 2013 QS World University Rankings. Among our Canadian peers, Waterloo moved up to 46th, but both UBC and McGill moved out of the top 50 in the world, and McGill no longer appears in the top 20 in North America, as shown in Figures 6.3b and 6.3c.

In the discipline-specific scoring shown in Figure 6.3d, U of T again exceeded all other Canadian engineering schools in five out of six branches of engineering and information technology.

The QS World University Ranking draws on four criteria, weighted differently depending on the subject area: Academic Reputation, Employer Reputation, Citations Per Paper and H-Index. The heavy emphasis on reputation is the key distinction of the QS ranking. The H-Index, first included in 2012, attempts to measure both the productivity and impact of published work based on citations.

Figure 6.3c **Top 20 North American Universities for Engineering and Information Technology, 2013**

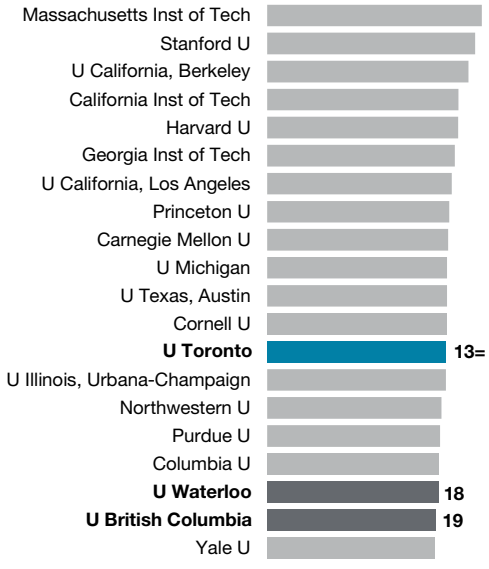
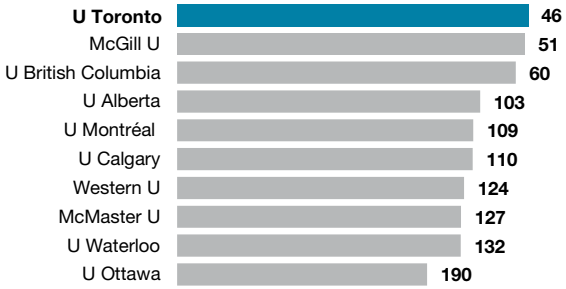
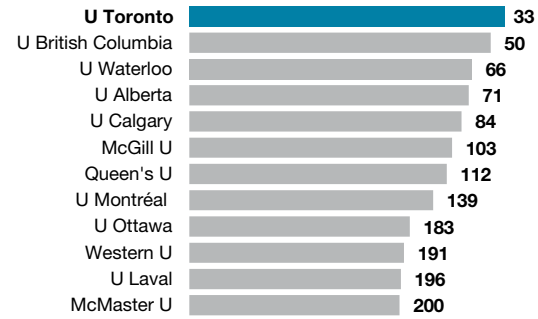


Figure 6.3d **Canadian Universities in QS World Ranking by Discipline for Engineering and Information Technology, 2013**

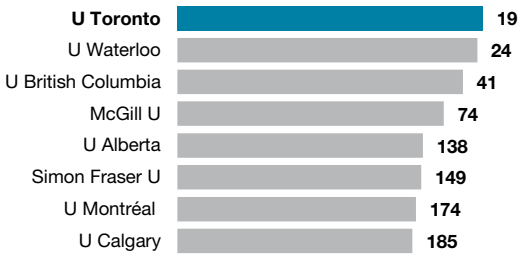
Chemical Engineering



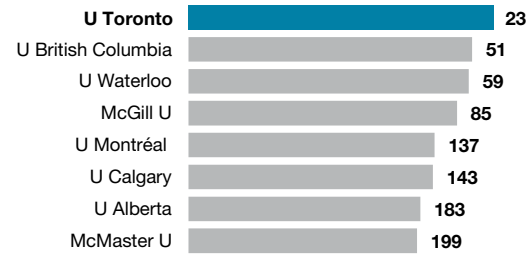
Civil & Structural Engineering



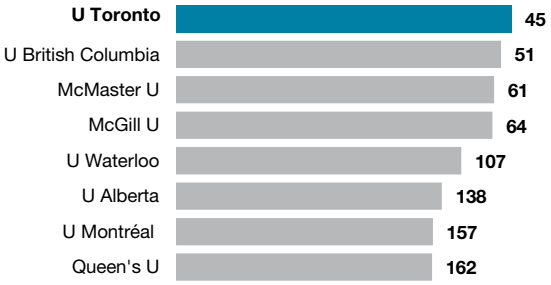
Computer Science & Information Systems



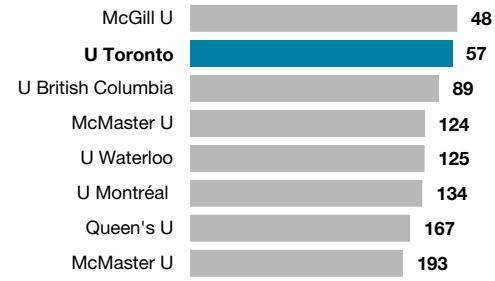
Electrical & Electronic Engineering



Materials Sciences



Mechanical, Aeronautical & Manufacturing Engineering



Rankings Based on Publications and Citations

The international ranking administered by National Taiwan University (NTU) places U of T Engineering 28th among world universities and at the top of the list in Canada. In the engineering disciplinary field, NTU uses the publication of engineering papers as the basis on which to identify and compare the top 300 universities in the world.

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 (2002-12) [10 per cent]
- Total number of articles published in the current year (2012) [15 per cent]

Research Impact

- Total number of citations in the past 11 years (2002-12) [15 per cent]
- Total number of citations in the past two years (2011-12) [10 per cent]
- Average number of citations over the past 11 years (2002-12) [10 per cent]

Research Excellence

- H-index (measures productivity and impact of published work) of the past two years (2011-12) [10 per cent]
- Number of highly-cited papers in the past 11 years (2002-12) [15 per cent]
- Number of papers published in high-impact journals in the current year (2012) [15 per cent]

In NTU's breakdown of engineering and information technology subject areas (Figure 6.4b), U of T Engineering placed first among Canadian institutions in five out of six subject rankings.

Civil Engineering moved up five places and now stands at eighth globally, the highest that U of T Engineering has ever placed in any NTU subject ranking.

Figure 6.4a **National Taiwan University (NTU) Performance Ranking of Engineering Papers for World Universities, 2013**

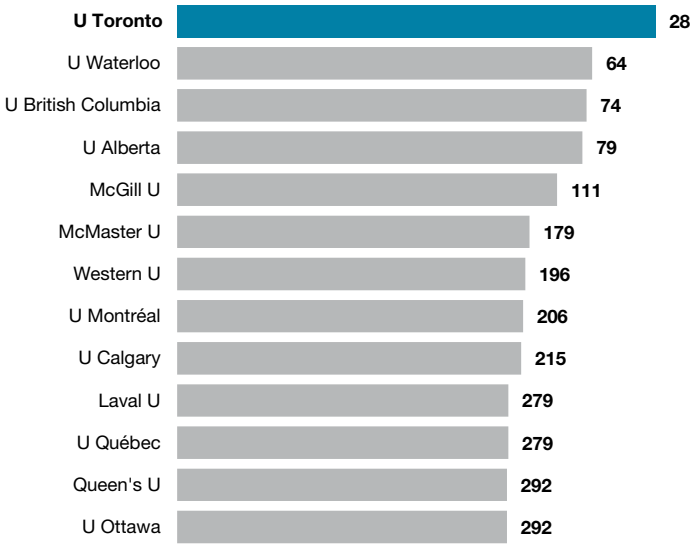
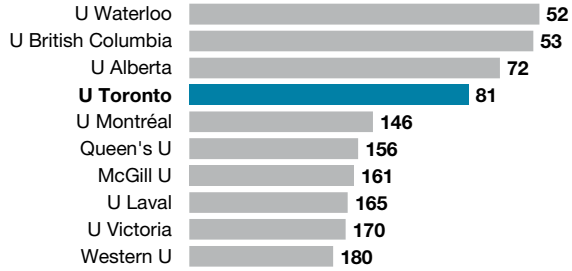


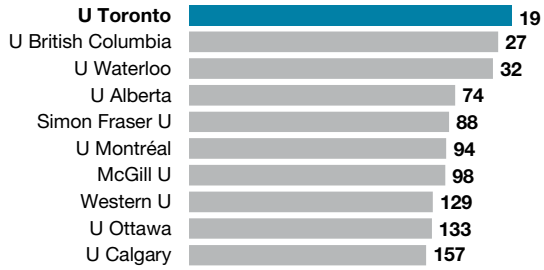
Figure 6.4b **Canadian Universities in NTU Performance Ranking of Engineering Papers by Subject, 2013**

Chemical Engineering

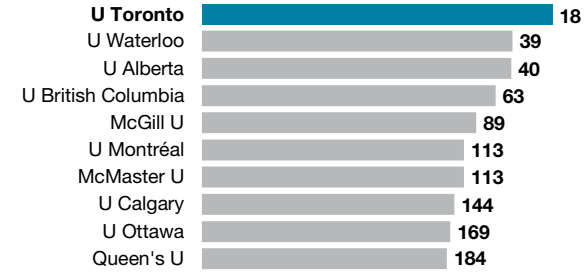


Civil Engineering

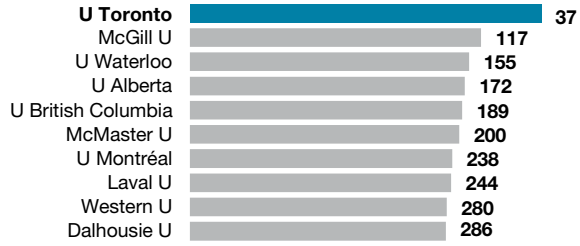
Computer Science



Electrical Engineering



Materials Science



Mechanical Engineering

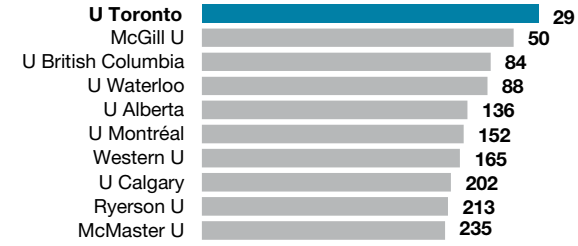
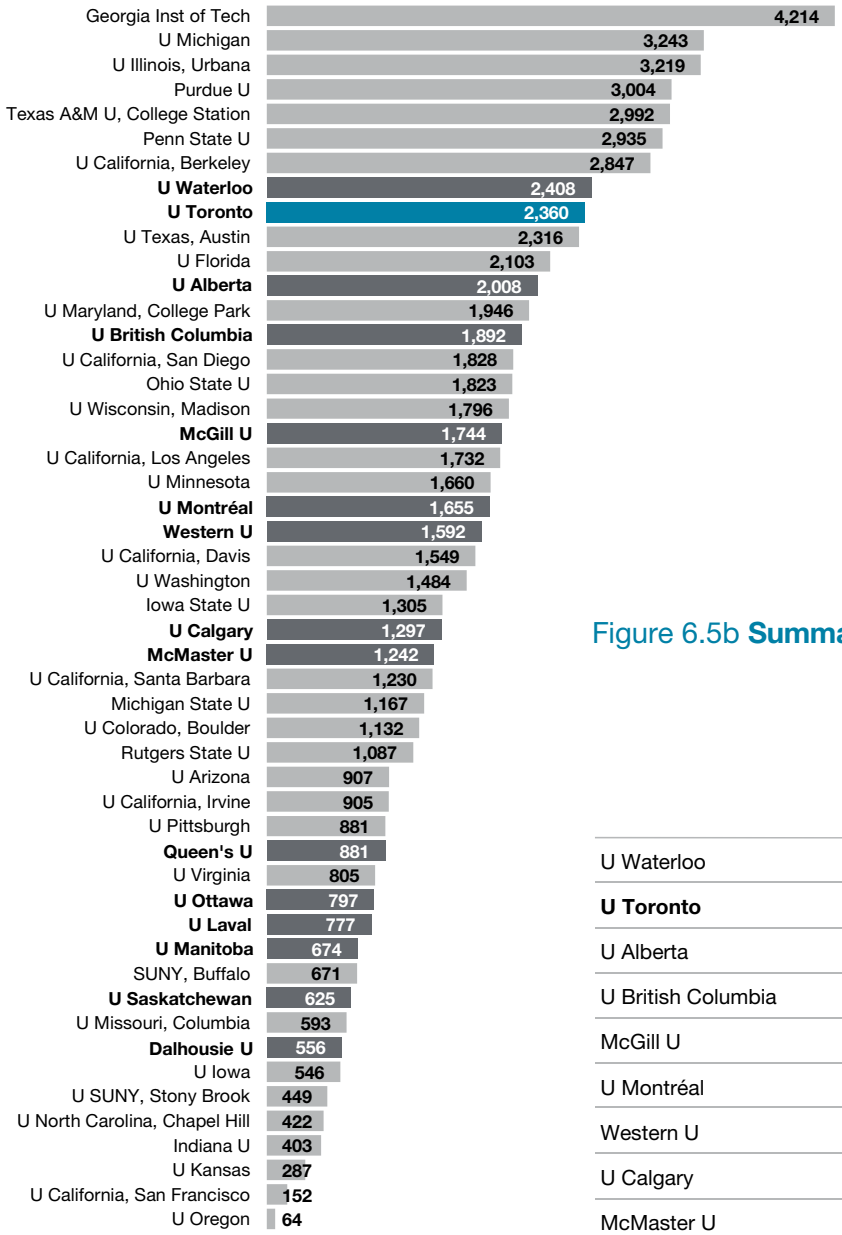


Figure 6.5a **Number of Engineering Publications Indexed by Thomson Reuters Association of American Universities (AAU) Public and Canadian Peer Institutions, 2008 to 2012**



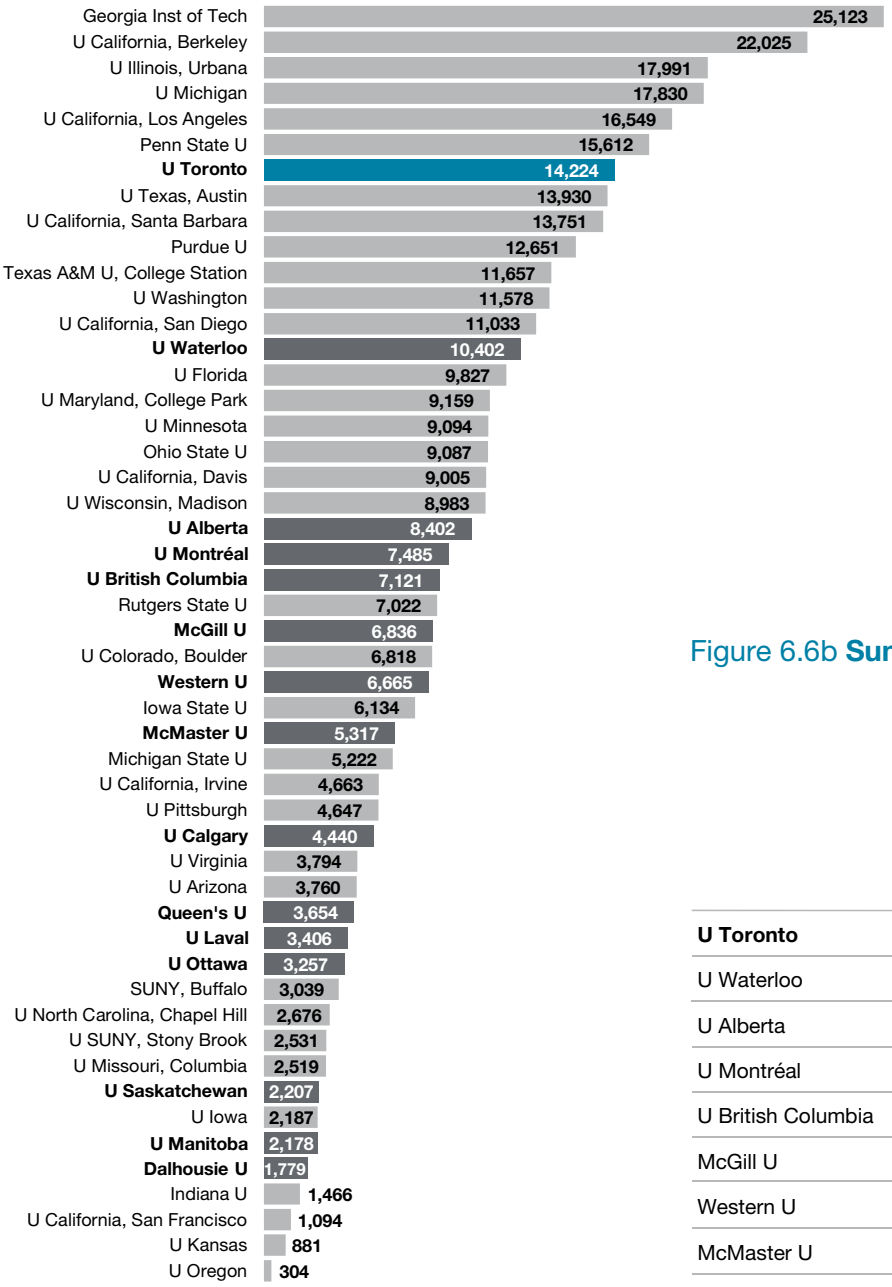
The AAU index measures research output, productivity and intensity based on publication counts. In the two years since this measure was last updated in our Annual Report, U of T Engineering moved to ninth in North America and second in Canada, just behind the University of Waterloo, for publication counts between 2008 and 2012. A total of 2,360 papers were indexed for U of T.

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

	Publications	Faculty Count	Publications per Faculty	Rank on Pub per Faculty
U Waterloo	2,408	276	8.7	7
U Toronto	**2,360**	**241**	**9.8**	**5**
U Alberta	2,008	180	11.2	3
U British Columbia	1,892	187	10.1	4
McGill U	1,744	137	12.7	2
U Montréal	1,655	238	6.9	11
Western U	1,592	94	17.0	1
U Calgary	1,297	145	8.9	6
McMaster U	1,242	150	8.3	8
Queen's U	881	150	5.9	13
U Ottawa	797	118	6.8	12
U Laval	777	206	3.8	15
U Manitoba	674	82	8.3	9
U Saskatchewan	625	84	7.4	10
Dalhousie U	556	95	5.8	14

Note 6.5b: U15 refers to the group of 15 leading research-intensive universities in Canada. Faculty counts for analysis of U15 publications per faculty member are from the Engineers Canada 2012 Resources Report. Western U faculty count corrected based on 2011 data.

Figure 6.6a **Number of Engineering Citations Indexed by Thomson Reuters Association of American Universities (AAU) Public and Canadian Peer Institutions, 2008 to 2012**



AAU index citation counts are based on the total number of papers cited over a five-year period, as well as the intensity of those indexed. With a 29 per cent increase over the 2006 to 2010 reporting period, U of T Engineering remained the seventh most cited public institution in North America, a position we have held for the past four years. We ranked second in Canada for citations per faculty after Western U 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	**14,224**	**241**	**59.0**	**2**	**6.0**	**1**
U Waterloo	10,402	276	37.6	6	4.3	4
U Alberta	8,402	180	46.7	4	4.2	7
U Montréal	7,485	238	31.4	8	4.5	2
U British Columbia	7,121	187	38.1	5	3.8	11
McGill U	6,836	137	49.9	3	3.9	10
Western U	6,665	94	71.1	1	4.2	6
McMaster U	5,317	150	35.6	7	4.3	5
U Calgary	4,440	145	30.6	9	3.4	13
Queen's U	3,654	150	24.3	13	4.1	8
U Laval	3,406	206	16.6	15	4.4	3
U Ottawa	3,257	118	27.6	10	4.1	9
U Saskatchewan	2,207	84	26.2	12	3.5	12
U Manitoba	2,178	82	26.7	11	3.2	14
Dalhousie U	1,779	95	18.7	14	3.2	15

Summary of Ranking Results

Over the last three years our global position has remained consistently strong in spite of the increasing competitiveness of the international rankings. In 2013, across all major international rankings, our Faculty ranked as the leading engineering school in Canada, within the top 15 institutions (10 public) in North America and among the top 30 worldwide. Although no ranking can decisively illustrate a school's performance, world-class ranks such as the ones discussed increase our Faculty's ability to attract top academics and students from across the globe.

Figure 6.7a **Summary of U of T Engineering's Performance in International Rankings Relative to the World, North America and Canada, 2011 to 2013**

		2011			2012			2013		
		World	North America	Canada	World	North America	Canada	World	North America	Canada
Shanghai Jiao Tong Academic Ranking of World Universities (ARWU) for Engineering / Technology and Computer Sciences	August 2013	21	19	1	13	13	1	12	12	1
Times Higher Education (THE) – Thomson Reuters World University Rankings for Engineering and Technology	October 2013	18	14	1	22	16	1	22	15	1
QS World University Ranking for Engineering and Technology	September 2013	21	11	1	25	12	1	25	13	1
National Taiwan University (NTU) Performance Ranking of Scientific Papers for World Universities	October 2013	26	12	1	27	12	1	28	12	1

Figure 6.7b **Summary of U of T Engineering's Performance in International Rankings Relative to the World, North America and Canada, by Subject or Category, 2011 to 2013**

		2011			2012			2013		
		World	**North America**	**Canada**	**World**	**North America**	**Canada**	**World**	**North America**	**Canada**
Academic Ranking of World Universities for Engineering / Technology and Computer Sciences, Scoring Detail by Category	August 2013									
– Highly Cited (HiCi)		14	14	1	14	14	1	14	14	1
– Publications (PUB)		32	11	1	29	9	1	29	11	2
– Publications in Top Journals (TOP)		72	42	1	65	38	1	38	27	1
– Research Expenditure (FUND)		25	25	1						
QS World University Rankings by Subject	May 2013									
– Chemical Engineering		14	8	1	27	13	1	28	12	1
– Civil & Structural Engineering		20	10	1	37	16	1	44	11	1
– Electrical & Electronic Engineering		13	8	1	23	13	1	19	10	1
– Materials Science		27	19	1	30	18	1	40	17	1
– Mechanical, Aeronautical & Manuf. Eng.		31	20	1	58	23	2	58	20	2
– Computer Science & Information Systems		10	8	1	15	9	1	16	8	1
NTU Performance Ranking of Scientific Papers for World Universities by Subject	October 2013									
– Chemical Engineering		59	20	2	68	24	4	81	25	4
– Civil Engineering		24	11	1	13	5	1	8	3	1
– Electrical Engineering		15	9	1	17	11	1	18	10	1
– Materials Science		39	16	1	40	15	1	37	15	1
– Mechanical Engineering		31	16	1	36	17	1	29	13	1
– Computer Science		17	9	1	18	12	1	19	12	1

7 Advancement

In 2013-14, U of T Engineering experienced our most successful fundraising year yet. Alumni, students and friends from around the world continued to rally behind the ambitious goals in our Boundless Campaign, supporting our vision for excellence in engineering research, education and innovation. With a record number of major donors, we raised almost $22 million this year, which brings us to more than half of our $200-million Engineering Campaign goal.

The Faculty made significant progress in raising funds for the forthcoming Centre for Engineering Innovation & Entrepreneurship (CEIE) building. The Centre will be a vibrant new hub for faculty, students, alumni and industry partners to collaborate on addressing some of the most pressing issues our country and world face. As the core of our fundraising campaign, the CEIE will enable a leap forward in how we drive innovation, foster an entrepreneurial culture and cultivate global engineering leaders.

This year, the Faculty further strengthened ties with international alumni community with over 60 events and additional volunteer opportunities. Throughout Asia-Pacific, for example, Dean Cristina Amon hosted gatherings in the fall of 2013 and the spring of 2014 that engaged alumni and generated excitement about the CEIE building, motivating groups in Hong Kong, Indonesia, Malaysia, Singapore, South Korea and Taiwan to enthusiastically donate towards named nationality spaces in the new Centre.

Philanthropic Support

U of T Engineering continues to actively nurture a culture of advancement among our alumni, faculty, students and industry partners. Through a series of philanthropic initiatives that foster dialogue and collaboration, the Faculty unlocks new opportunities for our global community to innovate together – investing their time, talents and funds towards our Faculty's pioneering research and education.

Throughout 2013-14, U of T Engineering raised $21,973,281 – nearly double the funds raised the previous year. More than half of this support was directed towards the CEIE building, which will further inspire creativity and 21st-century learning and innovation across our Faculty.

We attracted several major gifts this past year to support research, education and entrepreneurship. Bill (ChemE 6T7) and Kathleen Troost donated $2 million to support ChemE's Unit Ops Lab, and the Faculty established new scholarships through the J. Edgar McAllister Foundation-Troost Family Award for Engineering. Gerald Heffernan (MMS 4T3) expanded his legacy of support for entrepreneurship at U of T Engineering through a $5-million gift, half of which will fund the Heffernan Commercialization Fellowships.

In addition to major gifts, we continue to realize growth in our discretionary annual giving. The Skule Society remains a significant source of undesignated revenue, and the program generated in excess of $1 million again this year.

U of T Engineering also launched our first Faculty and Staff Campaign, co-chaired by former Dean and Professor Emeritus Michael Charles, Professor Brenda McCabe, Barbara McCann and Arlene Smith. The early success of the initiative – over $200,000 raised in donations – demonstrates our community's unwavering commitment to our vision.

Figure 7.1a **Advancement Results, 2013–2014**

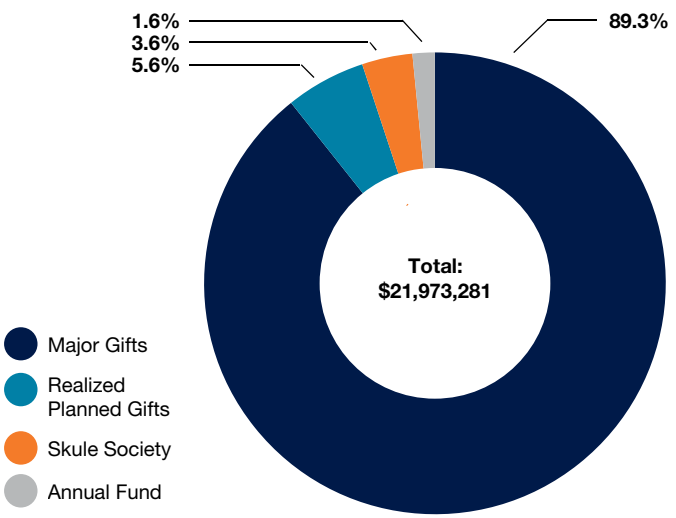
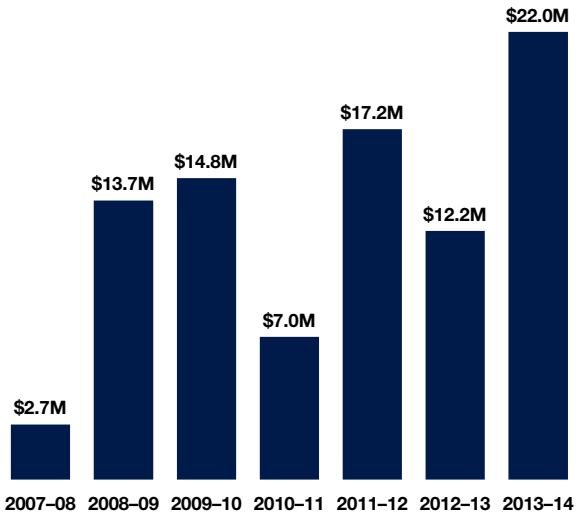
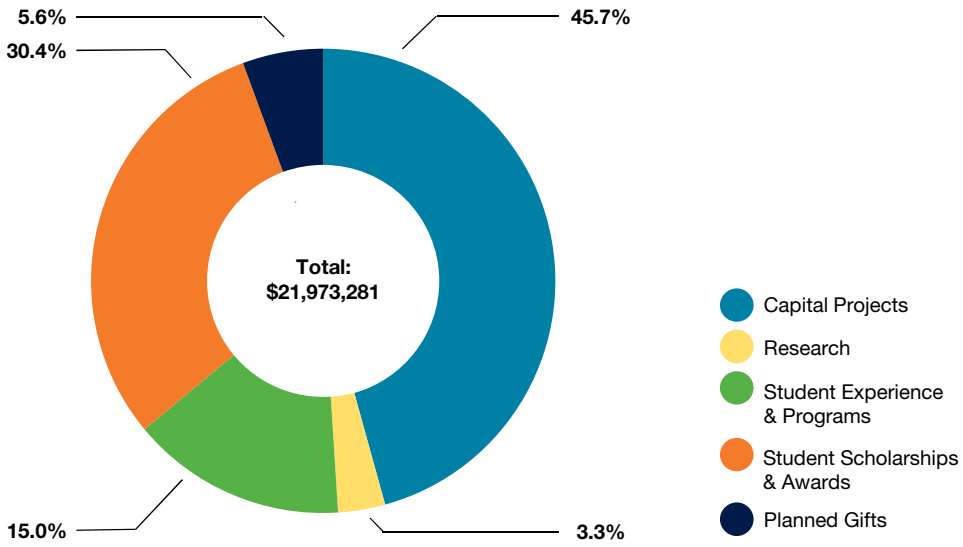


Figure 7.1b **Philanthropic Support, 2007–2008 to 2013–2014**



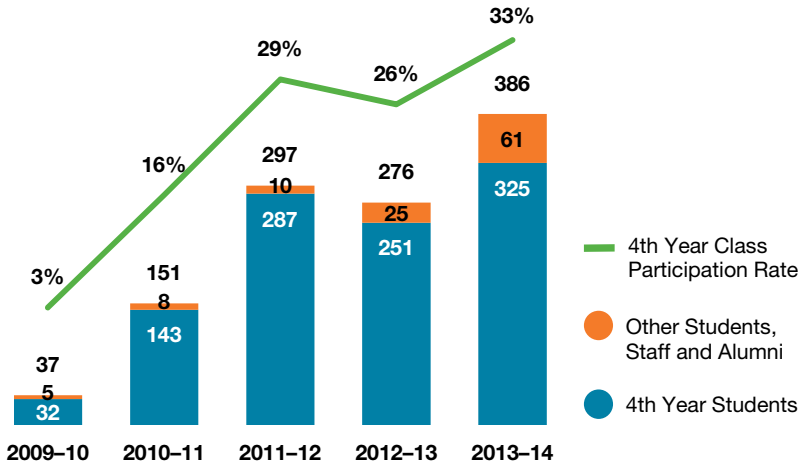
Note 7.1a, 7.1b and 7.1c: Data are shown by fiscal year (i.e., May to April).

Figure 7.1c **Gift Designations, 2013–2014**



After dwindling in the 1990s, the Graditude senior-class giving program has been successfully reinvigorated in recent years. The campaign, which delegates all raised funds to student clubs and activities, has realized a significant increase over the past five years (Figure 7.1d), with one third of students in their fourth year now giving back generously. This is especially noteworthy when compared with the U of T-wide statistic of less than one per cent young alumni (those with five years or less since graduation) giving back.

Figure 7.1d **Gratitude Participation, 2009-2010 to 2013–2014**



Initiatives and Projects for 2013–2014

Centre for Engineering Innovation & Entrepreneurship

The Centre for Engineering Innovation & Entrepreneurship (CEIE) building is the cornerstone of our Faculty's Boundless fundraising campaign. The Centre heralds a new era for U of T Engineering, empowering our students and faculty to work together across disciplines to address critical global challenges. The building will feature an interactive auditorium, Technology Enhanced Active Learning (TEAL) rooms, light fabrication facilities and collaborative spaces for many of our recently launched multidisciplinary research centres and institutes.

Completing the fundraising for the CEIE is a core priority for the Faculty, and we are more than halfway towards our goal. We have fundraised $10.9 million for the CEIE building this past year, securing funds of $65 million to date. Alumni and students have committed to our vision by donating towards the facility this past year. Through these generous donations, we have named the auditorium (Lee and Margaret Lau), the basement for student club activities (Engineering Undergraduate Society), meeting rooms (alumni chapters in Asia-Pacific, Hatch alumni) and spaces for The Entrepreneurship Hatchery (Gerald Heffernan) and the Centre for Global Engineering (Paul Cadario).

Asia

Momentum in Asia-Pacific continues to grow, evolving into a robust program of alumni and philanthropic engagement, with a focus on the CEIE. Campaign committees in Hong Kong, Indonesia, Malaysia, Singapore, South Korea and Taiwan are working towards ambitious goals to name nationality TEAL rooms in the new CEIE building.

During two trips to Asia-Pacific this year, Dean Cristina Amon engaged with our alumni communities, liaised with Canadian trade commissioners in the region and celebrated the tremendous alumni support for the Centre. To date, we have successfully raised over $4.7 million from our generous alumni in the region – bringing the Faculty to more than 80 per cent of our $5.75-million goal for the Asia-Pacific nationality spaces.

Alumni Events and Engagement

U of T Engineering has a loyal and large alumni base (40,000 graduates) who treasure their campus experiences at Skule. We develop meaningful opportunities for alumni to engage with faculty members, students and fellow graduates. A series of topical events, volunteering options and regular communications strengthen our global alumni network, while highlighting our Faculty's deep relevance in many industries and regions around the world. Such activities cultivate relationships, foster new industry collaborations and encourage alumni to support our ambitious goals.

In 2013-14, we hosted a total of 61 alumni events across the globe (Figure 7.2). BizSkule events in San Jose and Toronto showcased engineering leadership with compelling speakers and panels, while Skule events in Hong Kong, Jakarta, Seoul, Singapore and Taipei shared the inspirational and unique design of the forthcoming CEIE building.

This year, over 12 per cent of our global alumni community engaged with the Faculty in different ways. This number has risen from nine per cent last year, and takes us closer to our goal of 18 per cent by the end of 2016, in conjunction with the end of the Boundless Campaign.

Our volunteers are also actively engaged, with over 150 participating in various committees and advisory boards both at the Faculty and University level. This year we also established new methods to connect with and involve our alumni in U of T Engineering activities. We launched regional alumni chapters in Hong Kong, Singapore and Taiwan, strengthening our ties to the Asia-Pacific region. Additionally, we created a Young Alumni Board – comprised of recent graduates who are donors and recognized leaders in their fields – to engage younger alumni in fundraising and community-building initiatives.

Figure 7.2 **Alumni Events by City, 2013-2014**

Toronto	47
Calgary	3
Hong Kong	3
Taipei	2
Singapore	2
San Francisco	1
San Jose	1
Jakarta	1
Seoul	1
Total	**61**

Gift Highlights for 2013–2014

Gerald Heffernan – $5 million

Gerald Heffernan's (MMS 4T3) contributions to the University and to the community demonstrate how engineering talent and business determination can be fostered and combined to create new industries. Half of his recent $5-million gift will fund Heffernan Commercialization Fellowships, which enable U of T graduate students to commercialize research outcomes and spark new technology companies – something the Heffernan/Co-Steel Innovation Post-Graduate Fellowships have done since 1997. The other half will provide space for The Entrepreneurship Hatchery at its new home in the CEIE building. Heffernan's donation further strengthens our Faculty's entrepreneurial culture and provides new opportunities for students to turn new ideas into successful startups.

Lee & Margaret Lau – $2.5 million

Lee (ECE 7T7, MASc 8T2) and Margaret Lau have been generous supporters of the University of Toronto for more than three decades. Their commitment to the University has included funding an endowed research chair in Lau's home department and supporting research conducted by the Faculty of Medicine. Lau co-founded ATI Technologies, one of the two top suppliers of leading-edge computer graphics hardware in the world. Since selling the company, he has become an investor, encouraging new entrepreneurial ventures and working with young U of T entrepreneurs through the Rotman School of Management's Creative Destruction Lab, the Next 36 and The Entrepreneurship Hatchery. Through a generous gift of $2.5 million, Lee and Margaret Lau have invested in a unique, cutting-edge auditorium in the new CEIE building that aims to enable change to pedagogical practices and improve how the next generation of engineers will learn and create.

Paul Cadario – $1 million

Paul Cadario (CivE 7T3) has dedicated his career improving living standards in the developing world. A former senior manager at the World Bank, Cadario is a long-time volunteer and supporter of the University of Toronto. He is a dedicated member of the Civil Engineering Advisory Board and the Faculty of Applied Science & Engineering's Campaign Executive. He has also served on the Engineering Alumni Association Executive, as an Engineering Class Leader and as president of the University of Toronto Alumni Association. Cadario's generous $1-million commitment to strengthen the Centre for Global Engineering (CGEN) is a critical contribution to the education of generations of global engineers. His gift will support the creation of the new home for CGEN in the CEIE building.

The University of Toronto Engineering Undergraduate Society – $1 million

Every undergraduate in the Faculty of Applied Science & Engineering is a member of the Engineering Undergraduate Society. Founded in 1885, the Engineering Undergraduate Society is the oldest formal engineering organization in Canada. Together with its constituent "course clubs" (one for each program), the society plans and operates many student activities and services. It is the focal point for the traditional unity of spirit among engineering students that continues throughout its members' professional careers. They are committed to the Faculty's vision, and have expressed that collective commitment with a $1-million gift to fund student club spaces in the new CEIE building.

8 Communications

From our leading-edge research to our innovative educational programs, U of T Engineering continues to share a wealth of stories that underscore our excellence, accomplishment and global impact. This year, we enhanced our Faculty-wide communications to better capture and leverage these stories for our strategic benefit.

We created new marketing materials that improve our ability to communicate our strengths, contributions and successes, and to create excitement among donors and industry partners; these include a new externally-focused annual report and a corporate brochure. These resources further our ability to meet the ambitious goals outlined in the Faculty's Academic Plan and Boundless Campaign.

Stakeholders increasingly access our online content through smartphones and tablets. We have addressed this shift in 2013-14 by introducing new websites with a broad range of mobile-friendly functionality, empowering us to boost online engagement and share vital information, announcements and stories.

Furthermore, we also initiated new tools that promote information sharing, skills development and collaboration among the Faculty's 30+ communicators. These enable us to increase the quality of our storytelling on all fronts, and to better position U of T Engineering as a leader among the world's very best engineering schools.

Selected Communication Projects for 2013–2014

Enhancing Donor Communications

This past year, we created several new communications tools to better engage with private donors, industry partners and other external audiences. We developed our first external-facing annual report, called *Where Innovative Thrives – Year in Review 2013*, that provides a concise snapshot of the Faculty's education and research activities, as well valuable information on our awards, finances, philanthropic progress and an update on the Centre for Engineering Innovation & Entrepreneurship (CEIE).

We also designed a new customizable corporate brochure that conveys our strengths in research, education and collaboration to potential and existing industry partners. Containing a broadly focused booklet with department- and topic-specific inserts, the resource informs stakeholders of the many advantages of partnering with, and supporting, U of T Engineering.

Creating a Consistent and Mobile-Friendly Web Presence

Responding to global shifts in how people access and disseminate content online, the Faculty continues to design and implement websites that are mobile- and tablet-friendly, accessible to people with disabilities and more easily shared via social media channels. This year we moved several Faculty websites to a more modern platform in WordPress, enabling us to deploy a new website template that is responsive, simpler to use and facilitates more consistency across the Faculty.

Strengthening our Storytelling across the Faculty

To further hone our Faculty's storytelling abilities, we created and streamlined several internal tools for our network of 30+ communicators, such as a new Engineering Communications Network (ECN) Hub and an email listserv. The ECN Hub is a one-stop online resource for relevant information, style guides, templates and contact lists, as well as discussion boards for ECN members to ask questions and share solutions. A new listserv email-blast service provides an easy way to distribute news and announcements for all communicators. The Faculty also now offers video tutorials for a wide range of communication skills development, together with consultation and workshops on website accessibility, writing and our new web platform.

Media Coverage

In 2013-14, our Faculty has increased public exposure received from media outlets in Canada and around the world. Our three most significant stories were the first sustained flight of a human-powered helicopter by two U of T Engineering alumni (July 2013), an invisibility-cloaking device from two ECE researchers (November 2013) and growing interest in smart traffic lights invented by several U of T civil engineers (November 2013 and April 2014). Other popular stories included the development of iron-fortified tea (November 2013) and the release of a novel photo-tagging algorithm (December 2013).

We realized the biggest impact online, with nearly three quarters of coverage appearing in online news outlets, blogs and other websites (Figure 8.1a). We also garnered a considerable amount of radio stories, at nearly 13 per cent, in part because of a substantial radio presence at this year's Engineering Science Praxis II Showcase.

International media showed strong interest in U of T Engineering, with almost half of all stories coming from outlets outside of Canada, and 14 per cent from outside North America (Figure 8.1c).

Figure 8.1a **U of T Engineering Media Stories by Channel, 2013–2014**

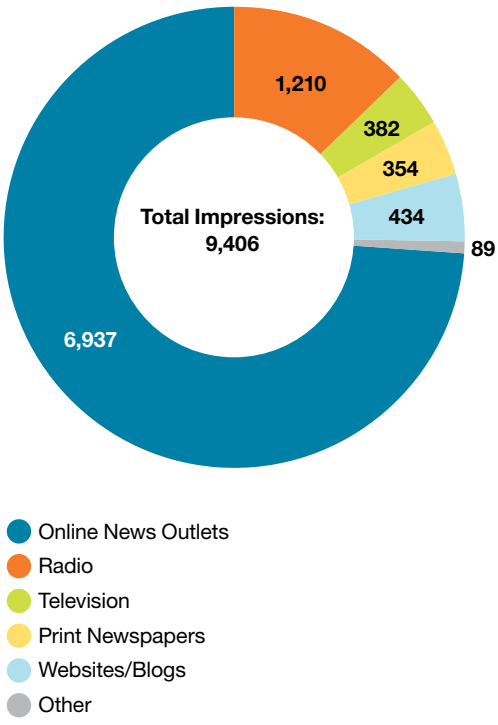


Figure 8.1b **Proportion of U of T Engineering Media Stories by Area, 2013–2014**

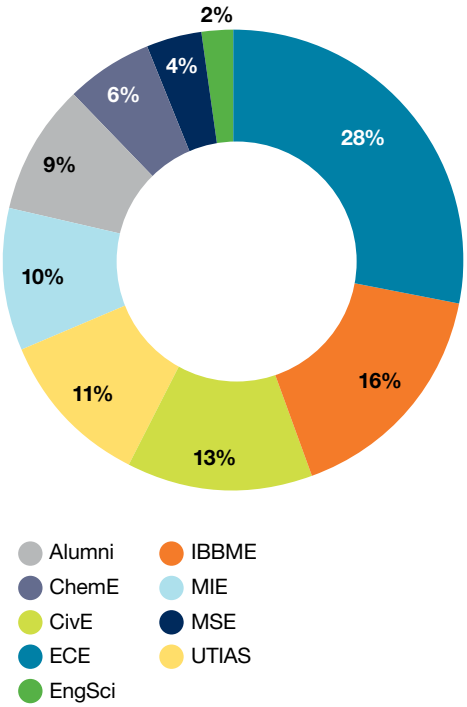


Figure 8.1c **Proportion of U of T Engineering Media Stories by Location, 2013–2014**

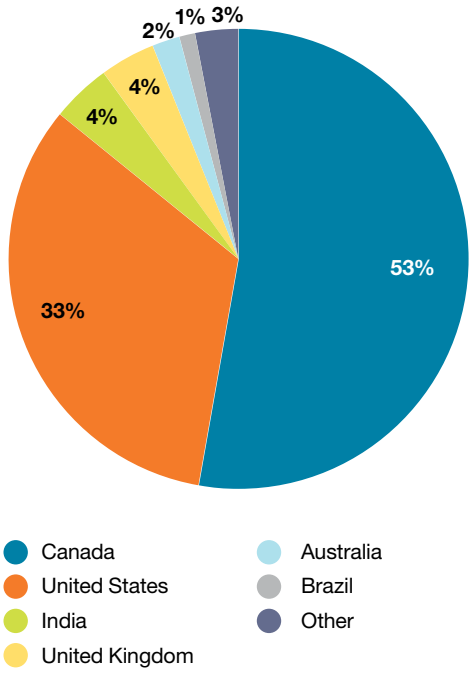
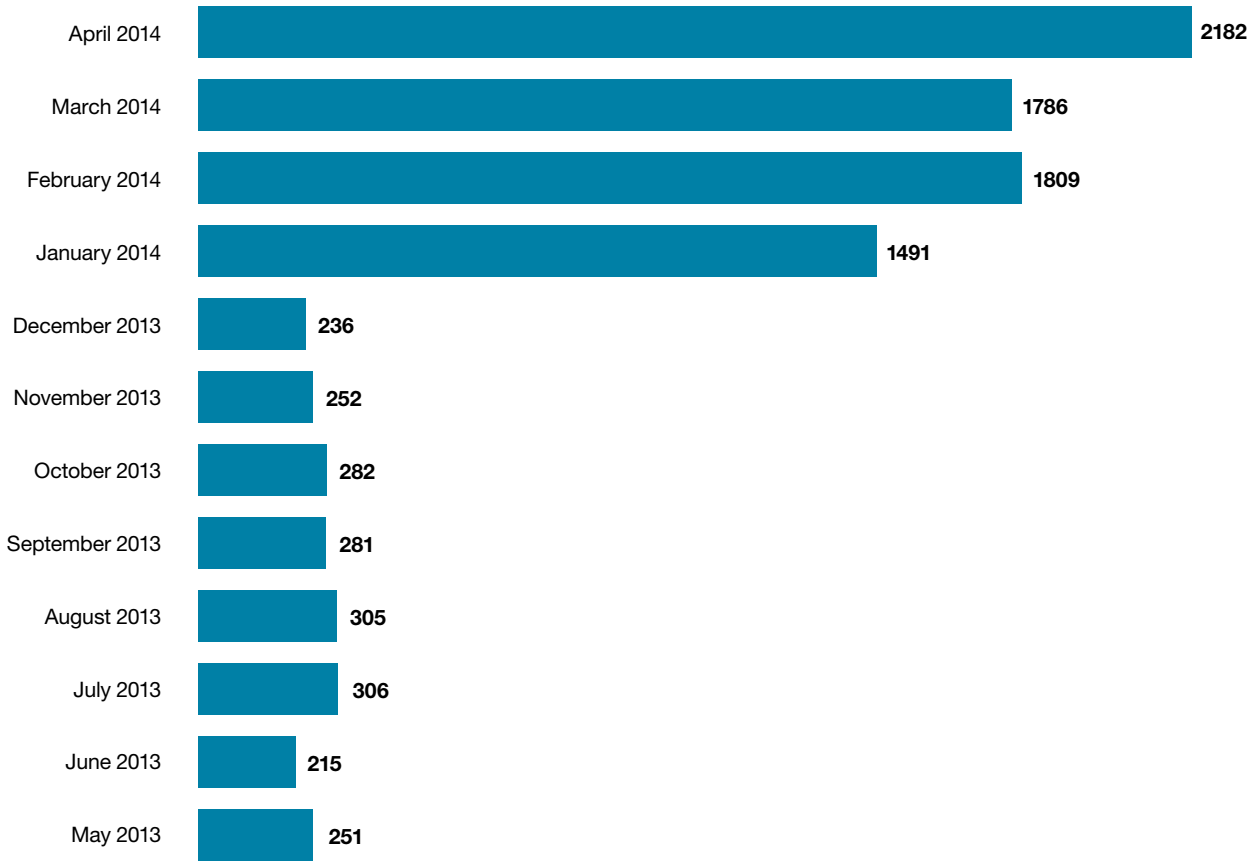


Figure 8.1d **Media Coverage by Month, 2013–2014**



Note 8.1a, 8.1b, 8.1c and 8.1d: A comparison to previous years is not possible for the number of stories due to a mid-year changeover in media monitoring keywords through our monitoring service, MediaMiser. Mediamiser is also used by U of T Strategic Communications.

Figure 8.1e **Engineering Story Traffic on U of T News Website, 2013–2014**

Story	Date Posted	Reads
Smarter traffic lights win global recognition for U of T grad	November 6, 2013	36,968
An invisibility cloak that actually works	November 13, 2013	34,275
U of T Engineering grads make aeronautical history	July 11, 2013	11,408
Canadian-made electric car comes to U of T	July 26, 2013	4,585
Convocation 2013: five U of T health leaders to watch	June 4, 2013	4,463
Jedi Wars: high-flying stunts at gesture-control robotics competition	March 26, 2014	4,027
Gifted students from Sub-Saharan Africa embrace U of T	November 18, 2013	3,659
New algorithm finds you, even in an untagged photo	December 3, 2013	3,523
Saving lives one cup of tea at a time	August 2, 2013	3,073
Convocation 2013: have degree, will work	June 6, 2013	2,484
U of T's robots crawl, swim and fly across the MarsDome	April 30, 2013	2,303
2014 Killam Prize winners: Andreas Mandelis and Sajeev John	April 9, 2014	2,287
U of T researchers identify 10 dangerous cardiac 'hot spots' in Toronto	May 3, 2013	2,186
Meet 18 new Fellows of the Canadian Academy of Health Sciences	September 24, 2013	2,159
Ford Motor Company partners with U of T to make greener, lighter cars	October 25, 2013	2,151
Investors back U of T spinoff with more than $2 million	September 17, 2013	2,080
Meet U of T's Inventors of the Year	May 17, 2013	2,072
Spotlight on Startups: U of T students prep Canada's largest startup career expo	November 22, 2013	2,012
David Miller: What students need to be leaders	March 17, 2014	1,857
Aboriginal homelessness among issues 15 Canada Research Chairholders set to tackle	November 15, 2013	1,776
Great 2013 research stories at U of T	December 19, 2013	1,627
DNA-built nanoparticles safely target cancer tumours	January 27, 2014	1,626
Innovations for developing countries: Grand Challenges Canada	November 21, 2013	1,623
U of T breakthrough allows fast, reliable identification of pathogens	June 12, 2013	1,513
TEDx: invisible technology, genetic recipes and Spaceglasses	September 24, 2013	1,491
Total Number of Reads		**137,228**

Online Activity

Our Faculty's main website (engineering.utoronto.ca) continues to attract a growing number of visitors from around the world, providing them with valuable information about our programs and activities. We received 237,134 unique visits in 2013-14, an increase of over 12 per cent from the previous year. These visits were received from people in 212 countries and 8,104 cities – the most locations ever recorded – demonstrating a rising international interest in U of T Engineering.

One in eight visitors (12.7 per cent) to the main Engineering website now access our site through mobile devices, such as smartphones and tablets – almost double the number from two years ago (6.4 per cent). This growth validates our Faculty's focus on upgrading our websites to be responsive, mobile-friendly and faster loading.

Social media channels played an increasing role in steering audiences to our online content. For example, nearly 8,000 referrals to the main Engineering website came from Facebook – a proportional increase of approximately 50 per cent over last year.

The number of international visitors to our recruitment-focused Discover Engineering website (discover.engineering.utoronto.ca) demonstrates the value of the Faculty's ongoing recruitment efforts in strategic locations (Figure 8.2b). Over one third of visitors to the site came from areas outside of Canada, with significant visits from people in China, India, the United Arab Emirates, Pakistan and Brazil.

Figure 8.2a Summary of Analytics for engineering.utoronto.ca, 2012–2013 to 2013–2014

	2012–2013	2013–2014
Total number of visits	360,615	379,915
Number of unique visitors	210,864	237,134
Average number of pageviews per visit	2.3	2.2
Average amount of time spent on site	2:56 min	2:47 min
Number of cities visitors came from	6,538	8,104
Number of countries visitors came from	197	212

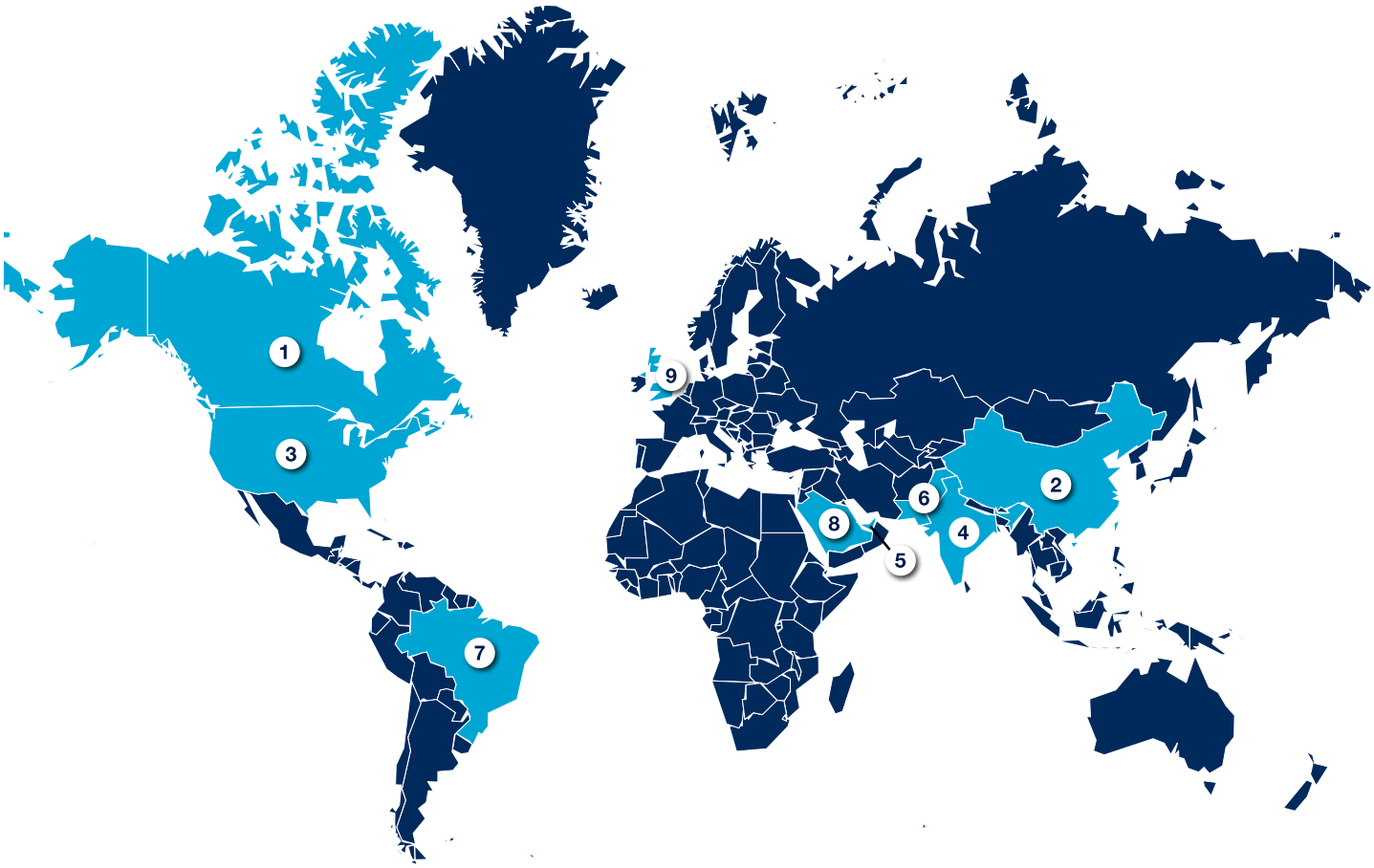
During the past year, U of T Engineering launched several new sites across the Faculty, including:

- Engineering Communications Network Hub (ecn.engineering.utoronto.ca)
- Institute for Leadership Education in Engineering (ilead.engineering.utoronto.ca)
- University of Toronto Institute for Multidisciplinary Design & Innovation (imdi.mie.utoronto.ca)

We also renovated and re-launched websites for:

- Centre for Microfluidic Systems (torontomicrofluidics.ca/cms)
- Centre for Global Engineering (cgen.utoronto.ca)
- The Edward S. Rogers Sr. Department of Electrical & Computer Engineering (ece.utoronto.ca)
- Engineering Alumni & Friends (alumni.engineering.utoronto.ca)
- Engineering Career Centre (engineeringcareers.utoronto.ca)
- Engineering Graduate Studies (gradstudies.engineering.utoronto.ca)
- Institute of Biomaterials & Biomedical Engineering (ibbme.utoronto.ca)
- Institute for Sustainable Energy (energy.utoronto.ca)
- The Entrepreneurship Hatchery (hatchery.engineering.utoronto.ca)
- University of Toronto Institute for Aerospace Studies (utias.utoronto.ca)

Figure 8.2b **Visitors to discover.engineering.utoronto.ca: Top 9 Countries, 2013-2014**



1. Canada: 160,759 visitors (61.2%)
2. China: 13,259 visitors (5.0%)
3. United States: 11,696 visitors (4.5%)
4. India: 11,532 visitors (4.4%)
5. United Arab Emirates: 4708 visitors (1.8%)
6. Pakistan: 4,624 visitors (1.8%)
7. Brazil: 3,454 visitors (1.3%)
8. Saudi Arabia: 3,025 visitors (1.2%)
9. United Kingdom: 2,798 visitors (1.1%)

Note 8.2: Website statistics (from Google Analytics) represent data collected between July 2013 and June 2014.

9 International Initiatives

The field of engineering is driving economic development, spurring innovation and offering solutions to some of the world's biggest challenges. The remarkable contributions U of T Engineering's talented researchers and students to both education and research continue to elevate our international standing.

Our Faculty is ranked as the top engineering school in Canada by a significant margin in all international rankings, and we place 12th on the 2013 Academic Ranking of World Universities (ARWU). This reputation, in turn, enables us to attract some of the brightest faculty and students to our ranks.

Our collaborative and interdisciplinary research agenda has a direct impact on society and quality of life across the globe. One example is the multidisciplinary research on Ambulance Emergency Response Optimization (AERO), carried out by the Centre for Global Engineering (CGEN), which received funding from Grand Challenges Canada for its research to reduce ambulance response times in the developing world's bustling major cities.

U of T Engineering is dedicated to educating global engineers and enriching our student experience. We are the world-leading participant in Brazil's Science without Borders (SwB) program, hosting more SwB engineering students than any other school. We also created a cross-cultural capstone course that allows undergraduate students from our mechanical and industrial engineering programs to work on client-based projects in collaboration, both in person and virtually, with counterparts at Peking University in China. The tremendous opportunities for our students to collaborate across fields and geographic boundaries serve to prepare the next generation of engineers to be global leaders.

Selected Highlights of Global Impact for 2013–2014

Professor Brews Life-Saving Tea

ChemE Professor Emeritus Levente Diosady has created iron-fortified tea leaves to help fight iron deficiency, which is responsible for nearly 600,000 perinatal deaths and more than 100,000 maternal deaths a year. Professor Diosady was awarded a $250,000 grant for his research from the prestigious competition, Saving Lives at Birth: A Grand Challenge for Development. The international competition is designed to identify transformative prevention and treatment approaches for pregnant women and newborns in the developing world.

New Insights Into How Materials Transfer Heat Could Lead to Improved Electronics

Integrated circuits and other electronic parts have been shrinking in size and growing in complexity and power for decades. As circuits get smaller, it is increasingly difficult to dispel waste heat. Further advances in electronics will require ways of tracking heat transfer in products ranging from smart phones to computers to solar cells. In partnership with Carnegie Mellon University, Dan Sellan (MIE PhD 1T2) and Dean Cristina Amon from Mechanical & Industrial Engineering, have published new insights into how materials transfer heat through atomic vibrations in packets called phonons. Their findings could eventually lead to smaller, more powerful electronic devices.

U of T Engineers Win Grants from Grand Challenges Canada

U of T Engineering professors received strong support for health-related research in the developing world through grants from Grand Challenges Canada (GCC), a Government of Canada initiative to support bold ideas that promise to create a significant impact on global health. Four of eight grants awarded to U of T went to our professors: Timothy Chan (MIE), Radhakrishnan Mahadevan (ChemE), Javad Mostaghimi (MIE) and Edmond Young (MIE). Their research applications range from implementing a low-cost test for diagnosing malaria in Tanzania to reducing ambulance response times in Bangladesh. The U of T researchers received a collective $890,095 from GCC, through its Stars in Global Health program.

Centre for Global Engineering Unites Grad Students in Fight Against Malnutrition

The Interdisciplinary Approach to Global Challenges course offered through our Centre for Global Engineering (CGEN) brought together graduate students from across the University to explore solutions to childhood malnutrition in Bangladesh. Women in Dhaka earn a living primarily through full-time work in the city's garment industry, which limits their ability to breastfeed. The team of Marta Blackwell from the Munk School of Global Affairs; Micaela Collins from the Dalla Lana School of Public Health; Scott Genin (ChemE) from U of T Engineering; and Puja Madhok from the Rotman School of Management designed a multi-user breast pump with a sand-based heating device. The device pasteurizes breast milk, allowing it to be stored longer without refrigeration. The group proposed partnering with local clinics to give mothers working in the garment industry access to the pump twice a day.

International Symposium on Technology and Society Comes to U of T

U of T Engineering hosted a three-day conference in July 2013 entitled, 'Smart World: People as Sensors,' organized by the International Symposium on Technology and Society. The event attracted future-minded thinkers from around the globe, including ECE Professor Steve Mann, an innovator in computational photography. Attendees also heard from Ray Kurzweil, director of engineering at Google, and Marvin Minsky, co-founder of the Massachusetts Institute of Technology's artificial intelligence laboratory. Participants debated a range of possibilities and implications of a 'smart world,' including its impact on daily life, privacy and government policy.

EngSci Students Win Spot in International Engineering Competition

A team of four Engineering Science students earned a spot to compete at the first-ever International Engineering Competition in September 2013 after placing second in the senior design team category at the Canadian Engineering Competition in March 2013. The team was made up of Jun Tao Luo (EngSci 1T4), Zane Luo (EngSci 1T4), Aleck Wu (EngSci 1T4) and Ling Zhong (EngSci 1T4). The competition was organized by the Canadian Federation of Engineering Students and featured 150 teams competing in seven categories – extemporaneous debate, consulting engineering, engineering communications, innovative design, junior design team, senior design team and re-engineering.

Selected International Partnerships for 2013–2014

Global Cities

The University of Toronto is collaborating with the University of Sao Paulo (USP) on Global Cities, a proposed research plan to improve transportation systems – thereby enhancing the functioning, quality of life and productivity of cities. A delegation, including CivE Professor Eric Miller – research director of the University of Toronto Transportation Research Institute (UTTRI) – visited USP to plan a conference for October 2014. The conference will bring together researchers from both institutions to create the joint research program around the themes of innovation and the role of universities; infrastructure, resilience and sustainability; healthy cities; socio-economic polarization; and social diversity and economic development.

Globex Summer Program at Peking University

The Global Educational Exchange – Globex – is an initiative for educational exchange and research collaboration between Peking University (PKU) in Beijing, China, and select foreign schools of engineering (including Stanford University in the US and the University of Cambridge in the UK). Mechanical & Industrial Engineering (MIE) is the first Canadian partner, with seven MIE students participating in 2013. Through the program, our students were given the opportunity to take part in an intensive four-week summer program at PKU, exposing them to new ideas, research, people and culture. PKU is the top university in Mainland China, renowned for both teaching and research. It ranked among the top 50 schools internationally according to the Times Higher Education World University Rankings.

MIE Cross-Cultural Capstone Design Projects

Select undergraduates in our mechanical and industrial engineering programs collaborated with students at Peking University (PKU) in Beijing, China, throughout the year for their fourth-year course requirement in capstone design. Teams of students from both countries worked collaboratively on client-based projects, bringing together different global perspectives to create solutions to problems presented by companies such as General Motors, Bombardier Inc., Litens Automotive Group and Siemens. Our students travelled to China in November 2013 to meet their cross-cultural project teams and supervisors, with whom they were communicating virtually during the fall. PKU students visited Toronto in April 2014 for final group presentations. Incorporating this international element into the capstone design course further prepares our students to become innovative and globally-minded engineers.

Can Plants Teach us How to Build Better Solar Cells?

ECE Professor Ted Sargent, the Faculty's vice-dean, research, has garnered $1 million through the Connaught Global Challenge to investigate what we can learn from plants about making the best use of the sun's energy. The funding allows Professor Sargent and co-investigators to merge previously disparate fields of study, potentially opening up a new avenue for creating inexpensive, efficient and clean energy capture technologies. Part of the funding will be directed towards hosting a distinguished visitor and a symposium. These endeavours promise to create new partnerships and research ventures in a ground-breaking field.

Science without Borders Sends Brazilian Students to U of T

The Faculty hosted 340 students from Science without Borders (SwB), a Brazilian government program that sends Brazilian university students for one year to study at the best international schools. The program enables our students and those from Brazil to share diverse perspectives, deepen knowledge and form collaborations that can lead to enriching experiences. U of T Engineering was the top program choice in the world for SwB applicants. Some students so enjoyed the program they extended their exchange by a year. In addition, U of T recently approved participation in SwB's PhD program. In March 2014, Dean Cristina Amon and several senior staff and faculty toured Brazil to help promote the new program. We are prepared to welcome our first group of doctoral students in fall 2014.

10 Financial and Physical Resources

The Faculty's Academic Plan goals are inextricably linked to our financial and physical resources. The ability to achieve our research and education mission is impacted, in part, by the availability of adequate resources. We remain a careful steward of fiscal health and continue to maintain a strong financial position through a steady rise in revenues – which grew by 7.9 per cent in 2013-14 – coupled with prudent cost containment and improved investment performance. Our marked progress with Boundless: The Campaign for the University of Toronto enables us to enhance our infrastructure and provide students with new academic opportunities and financial support.

In its fourth year, the Dean's Strategic Fund (DSF) provides start-up funding to implement strategic projects and foster collaborations that have broad impact within our Faculty. Since its inception, the DSF has provided over $10 million for various initiatives designed to further multi-departmental and collaborative goals. In 2013, we launched the Engineering Instructional Innovation Program (EIIP) as an extension of the DSF. Fostering curriculum innovation through this strategic investment will ultimately lead to better pedagogy in select large undergraduate courses and improvements in the learning experience for our students.

Challenged with constrained budgets and the need to continually upgrade physical infrastructure, we turn to our academic priorities to determine how best to balance, maintain and strengthen our resources to achieve our academic goals. Our Faculty's significant space limitations will be partially alleviated by the addition of the Centre for Engineering Innovation & Entrepreneurship (CEIE). The CEIE is the central component of our $200-million fundraising initiative, part of Boundless: The Campaign for the University of Toronto. It will serve as the hub of U of T Engineering's collaborative learning and interdisciplinary research, housing interactive spaces for learning, as well as a number of multidisciplinary research centres and institutes.

We continue to creatively address our infrastructure challenges by maximizing the use of our spaces and strategically renovating and repurposing select facilities. Examples include renovations to BioZone – a centre of state-of-the-art research in bioengineering for sustainable energy, the environment and health – and the new laser/combustion lab at the University of Toronto Institute for Aerospace Studies. Ongoing implementation of audits of our existing campus space has enabled us to utilize space more efficiently and make decisions on the most impactful use of our resources.

Total Revenue and Central Costs

The Faculty's total revenue and associated central costs are reflected in Figures 10.1, 10.2 and 10.3. Revenue in 2013-14 grew to $183.8 million, representing a rise of 7.9 per cent over 2012-13. Total central costs grew 3.4 per cent to $84.8 million.

Central costs are composed of the student aid levy, university fund contribution and university-wide costs, which experienced year-over-year increases of 4.2 per cent, 8.0 per cent and 2.0 per cent respectively (Figures 10.2 and 10.3).

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 that we continue to attract the very best students regardless of their financial situation.

University-wide cost increases were held slightly under two per cent, despite collective bargaining wage increases of more than four per cent and a mandated 13 per cent increase to pension deficit funding through targeted cost reductions.

As a result, net revenue (Figure 10.3) increased 12 per cent to $99 million in 2013-14, which is more than double the previous year's increase.

Figure 10.1 **Total Revenue, 2006–2007 to 2013–2014**

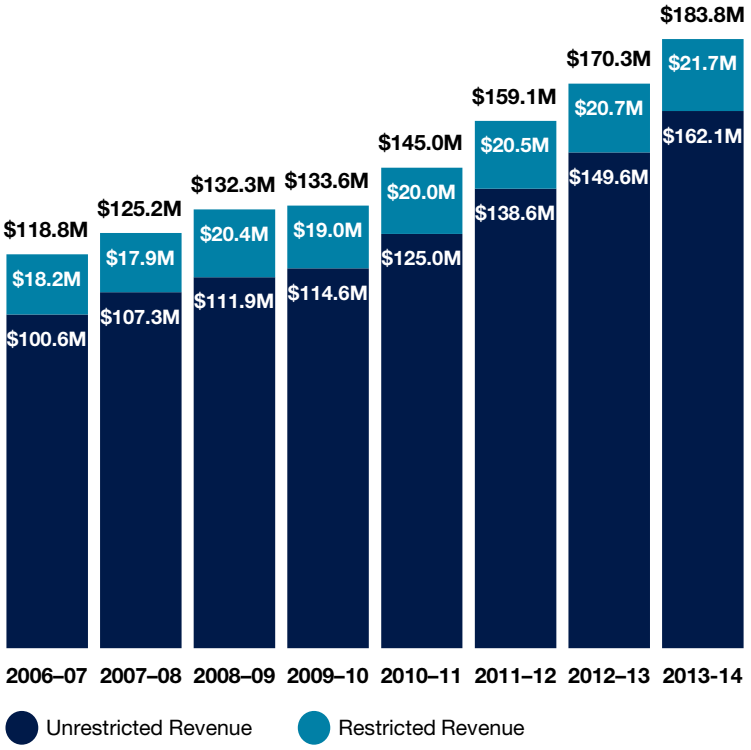
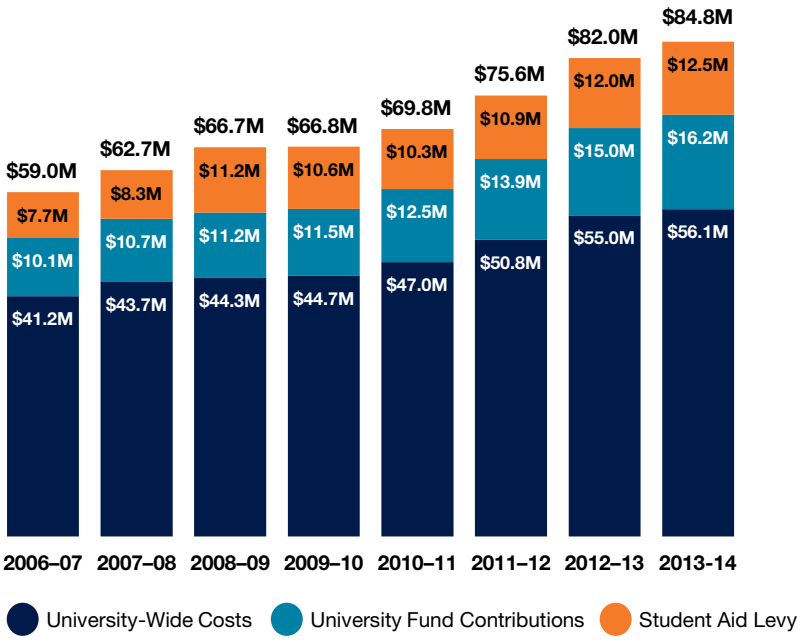


Figure 10.2 **Total Central Costs, 2006–2007 to 2013–2014**



Note 10.1 and 10.2: Data are shown by fiscal year (May to April). For example, 2013–14 represents the financial cycle starting in May 2013 and ending in April 2014.

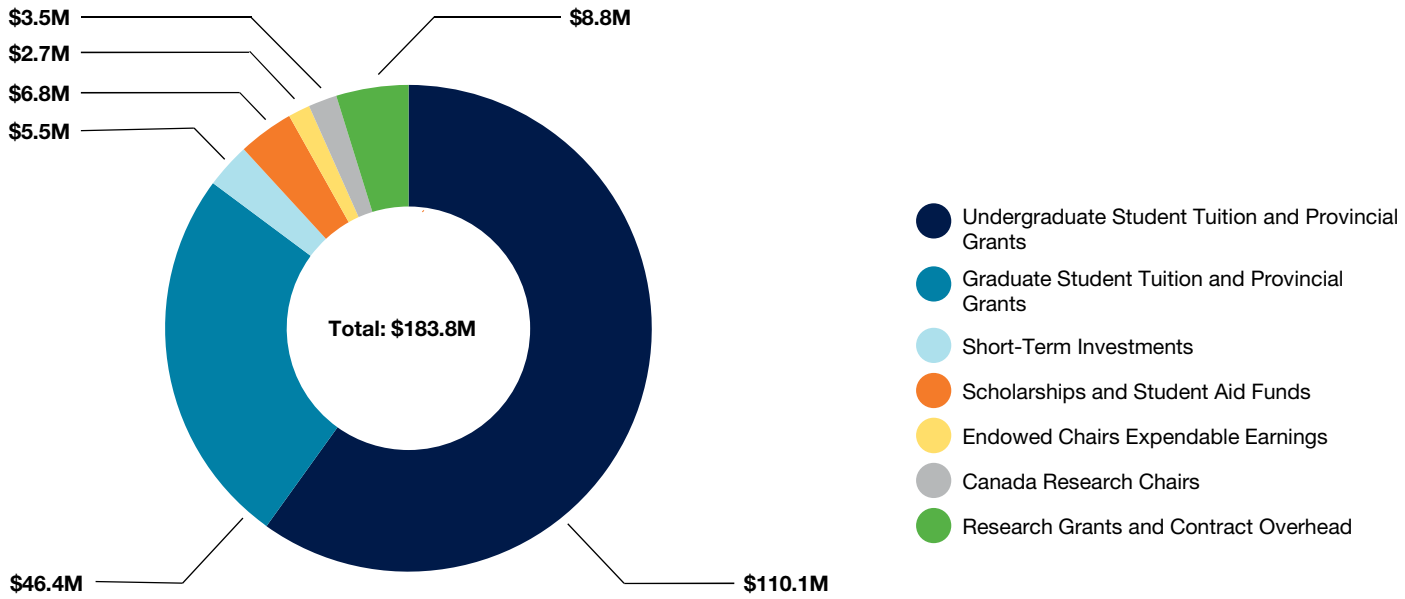
Figure 10.3 **Budget Data, 2006–2007 to 2013–2014**

	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013-14
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**
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
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
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**
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
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
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
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**

Budget Overview for 2013–2014

Our revenue sources, attributed central costs and budget breakdown for 2013-14 are shown in Figures 10.4, 10.5 and 10.6 respectively. Revenues increased primarily due to rising enrolments of international undergraduate and graduate students, and tuition increases. This revenue growth, combined with a prudent operating budget and careful fiscal management, has allowed us to rebuild reserves, upgrade much-needed infrastructure and invest in the Dean's Strategic Fund (DSF) initiatives.

Figure 10.4 **Revenue Sources, 2013–2014**



Note 10.3 and 10.4: Data are shown by fiscal year (May to April).

Figure 10.5 **Revenue Distribution, 2013–2014**

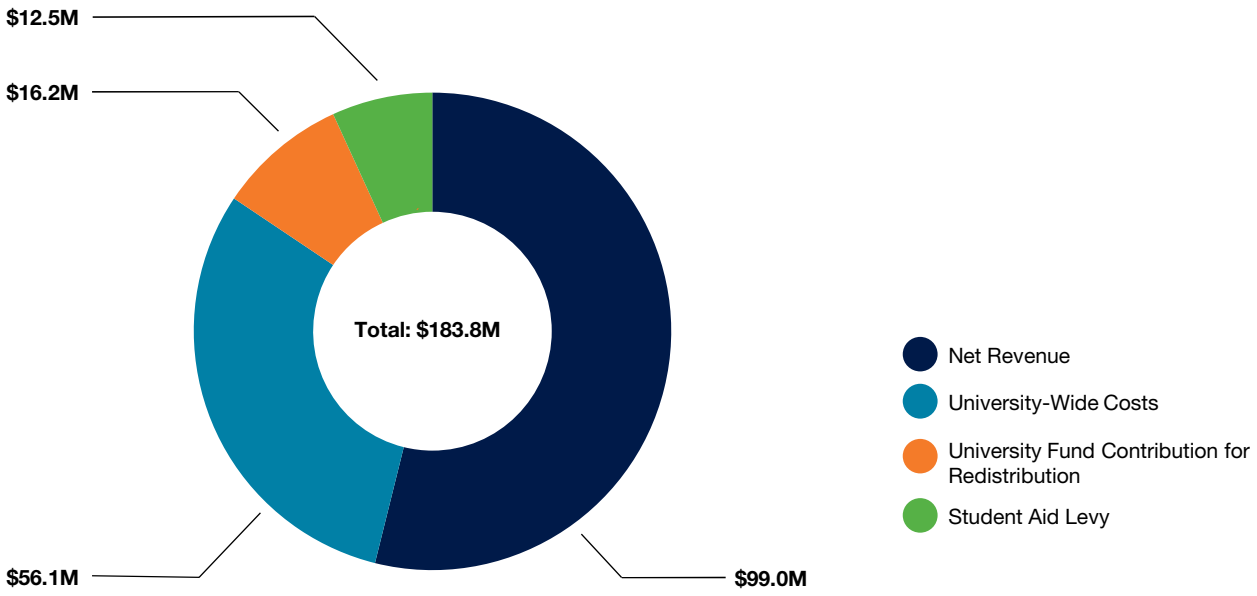
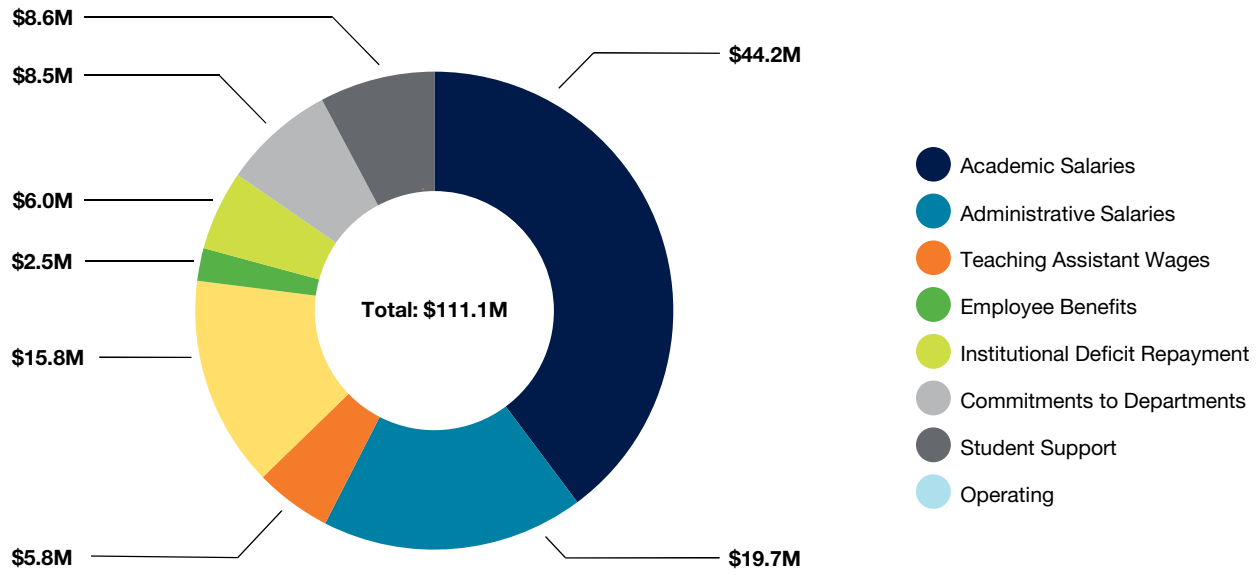


Figure 10.6 **Total Operating Budget: Breakdown by Expense, 2013–2014**



Note 10.5 and 10.6: Data are shown by fiscal year (May to April).

Dean's Strategic Fund

The Dean's Strategic Fund (DSF) was launched in 2010 to support strategic Faculty initiatives. Since inception, it has committed over $10 million to projects designed to further goals identified in our Academic Plan, such as enhancing the student experience and fostering multidisciplinary collaboration.

Proposals funded in 2013-14 include:

- A three-day international symposium entitled 'Nanomaterials for Energy,' scheduled for October 2014 as part of the Connaught Global Challenge program, which will bring together industry partners and 30 of the world's leaders in sustainable energy to U of T. The symposium creates an opportunity for 300 U of T graduate students to participate in talks, poster sessions and networking events with internationally renowned researchers and industry experts.
- Institute for Research on Exposomics Based Assessment (IREBA) is a multi-disciplinary research collaboration between our Faculty and the Dalla Lana School of Public Health. The funds provided will create a platform to study the interactions between the human genome and cumulative environmental exposure – believed to be the underlying cause of many chronic diseases. The institute will bring together a critical mass of expertise to support large international-calibre research proposals, pilot studies, and experimental tools and techniques.

Engineering Instructional Innovation Program

The Engineering Instructional Innovation Program (EIIP) was launched in 2013 to provide funds to develop innovative teaching approaches for large undergraduate courses that have broad impact across the curriculum. The EIIP supported five inaugural projects, ranging from digital course enhancements to lab renovations. The program is intended to create educational innovations that will lead to enhanced pedagogy and improvements in the learning experience of our students.

Funded through an ancillary reserve of the Dean's Strategic Fund (DSF), the EIIP is supporting three new projects starting in September 2014.

Project Title	Project Leads	Description
Engineering Case Studies for Ethical Decision-making	Doug Reeve (ILead)	This project will assemble a collection of case studies on ethical issues to improve students' abilities to make informed and meaningful decisions.
Proposal to Revise Electrical and Computer Engineering Course ECE216: Signals and Systems	Stark Draper (ECE)	This curriculum renovation will update the department's core second-year class by incorporating innovative approaches that motivate students to connect better with course material.
Developing Effective Teamwork Skills in Technical Courses Using Team-based Learning	Greg Evans (ILead)	This initiative aims to create resources to support instruction of team effectiveness in all types of courses.

Infrastructure and Facilities

Physical infrastructure provides the necessary underpinnings for world-class education and research. Infrastructure improvement, through the addition, renovation and careful utilization of space, remains an ongoing priority for the Faculty and a focus of our fundraising efforts.

Figure 10.7 **Summary of Buildings Occupied by Engineering, 2013–2014**

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**	1,670				4,849	4,194				10,713
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		1,488	3,626				6,572
WB	**Wallberg**	375			8,135		130			1,327	9,967
CX	**245 College**	513									513
RM	**256 McCaul**	528									528
	Total Area	**5,631**	**575**	**5,981**	**9,067**	**7,652**	**15,967**	**3,082**	**11,465**	**4,518**	**63,938**
		63,938 NASMs									

Note 10.7: As of May 22, 2014 U of T Engineering has permanently vacated the space at 245 College St. A map of the buildings within the Engineering precinct is available in Appendix J.

Projects Completed in 2013–2014

Laser/Combustion Lab Renovation – UTIAS Downsview

A former machine shop has been converted to a laboratory for research into fluid mechanics and turbulent combustion of jet flames. Research in this lab involves using lasers to diagnose the combustion process in jet flames fuelled by gases such as methane and hydrogen.

BioZone Phase IV – Wallberg Building

At BioZone, nine principal investigators and 90 graduate students, postdoctoral fellows and research associates collaborate to develop viable solutions for urgent societal needs in energy, the environment and health. The centre has undergone several phases of renovation toward making it a top-level facility. In December 2012, the centre officially revealed its renovated and expanded space on the roof of the Wallberg Building. Its fourth phase, now complete, created a shared Bioprocess Engineering Laboratory in Wallberg. The lab is suitable for large-scale bioreactor experiments for fermentation, bioenergy and biological waste treatment research.

New Teaching Computer Lab – Lassonde Mining Building

Mechanical & Industrial Engineering's undergraduate computer teaching lab was relocated from the fourth floor of the Haultain Building to the first floor of the Lassonde Mining Building. The new lab features an advanced audio-visual system, upgraded computer hardware and can accommodate up to 65 workstations – more than double its previous capacity.

Other completed projects include:

- Installed energy efficient LED lighting (Sandford Fleming Building).
- Created an additional Engineering Science faculty office (Bahen Centre for Information Technology).
- Upgraded the staff house at Civil Engineering's Gull Lake Survey Camp to improve the living accommodations for instructional staff.
- Completed architectural finishes to the Robotics Vicon Lab and graduate student space (UTIAS).
- Installed a large-scale projection system, tied to the Faculty's digital display network, which allows the Engineering Society (EngSoc) and its affiliated clubs to display digital banners (Sandford Fleming Building – the Pit).

Projects Underway

Centre for Engineering Innovation & Entrepreneurship (CEIE)

The Centre for Engineering Innovation & Entrepreneurship (CEIE) will bring together the talents of our entire Faculty and become a vibrant hub for faculty, students, alumni and industry partners to create the next engineering innovations, strengthen entrepreneurial activities, and enhance collaborative research and learning.

The landmark building will be located in the heart of the St. George Campus, adjacent to Convocation Hall. Governing Council has approved the project and we are now in the process of seeking rezoning consent from the City of Toronto.

Toronto-based Montgomery Sisam Architects, in collaboration with U.K.-based Feilden Clegg Bradley Studios, have been chosen as the architects for the new building. The CEIE will move beyond the traditional lecture hall and classroom with unique collaborative learning and hands-on design space. For example, the lower level will house flexible facilities that serve the Faculty's more than 80 student clubs involving some 1,700 students. The first floor will contain an auditorium that incorporates wireless communications systems, tables that facilitate student group activities, and a large stadium-style projection wall that allows a clear view of even the smallest objects or experiments. The CEIE building will also boast several innovative collaborative learning and hands-on design spaces for students, including Technology Enhanced Active Learning (TEAL) rooms and light fabrication facilities.

Electrical Energy Systems Lab – Galbraith Building

The first phase of the redesign and development of the high-voltage electrical infrastructure supporting the lab is underway with the second phase scheduled for completion in 2015. The lab upgrade will improve safety and support

new courses and research by enhancing facilities for creating micro-grids, studying renewable energy and enabling smart grid studies, while allowing for the development of new experimental systems.

Nano for Energy Lab Renovation – Galbraith Building

A former undergraduate teaching lab is being converted to a clean, high-tech space that will include four fume hoods, a wet bench and a dedicated HVAC system.

Ontario Centre for Characterization of Advanced Materials (OCCAM) Lab Renovations – DL Pratt Building

OCCAM is an interdisciplinary collaboration between Chemical Engineering & Applied Chemistry and Materials Science & Engineering. The new electron microscope facility, combined with major upgrades to the surface science capabilities in Surface Interface Ontario (SI Ontario), will merge electron microscopy and surface analysis instrumentation to ultimately create OCCAM, a central analytical facility that will be unique in Canada and rare in the world.

Gas Turbine Combustion Research Lab Renovation – UTIAS Downsview

This new research lab is being designed in tandem with the associated combustion wind tunnel, the main piece of equipment for the lab. Research will focus on combustion at high pressures and inflow temperatures. When complete, it will handle a minimum of 50 atmospheres of pressure and temperatures of up to 3,000°F using a small-scale wind tunnel for the combustion process.

Other ongoing projects include:

- Installing additional hallway study seating to accommodate approximately 88 students (Bahen Centre for Information Technology).
- Installing electronic access control system to improve security (Wallberg Building - DL Pratt Building complex).

Space Audits

U of T Engineering conducts regular audits to determine our infrastructure needs and the most efficient use of space. We undertook three key audits over the past three years:

- Student club and study space (completed fall 2011)
- Meeting rooms (shared implementation completed 2013)
- Undergraduate teaching labs (in progress)

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, MIE and MSE. While TrackOne is not an academic unit, it is also included as an academic area in specific contexts in the Undergraduate Studies chapter.
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 within this Institute are referred to as BioMedE.
IndE	Graduates from the Department of Mechanical & Industrial Engineering (MIE) who studied the discipline of Industrial Engineering.
MechE	Graduates from the Department of Mechanical & Industrial Engineering (MIE) who studied the discipline of Mechanical Engineering.
MIE	Department of Mechanical & Industrial Engineering Graduates of Mechanical Engineering are designated as MechE; graduates of Industrial Engineering are designated as IndE.
MinE	Graduates from the Department of Civil Engineering (CivE) who studied the discipline of Mineral Engineering.
MSE	Department of Materials Science & Engineering Graduates who studied the discipline of Materials Engineering are also designated as MSE.
TrackOne	General first-year undergraduate studies in Engineering. Upon successful completion of TrackOne, students choose from one of the Engineering undergraduate programs, excluding Engineering Science.
UTIAS	University of Toronto Institute for Aerospace Studies Graduates who studied the discipline of Aerospace Engineering within this Institute are designated as AeroE.

Additional Terms

AAAS	American Association for the Advancement of Science
AAU	Thomson Reuters Association of American Universities
AERO	Ambulance Emergency Response Optimization
APS1022	Financial Engineering II
APS1023	New Product Innovation
APS1024	Infrastructure Resilience Planning
APS1025	Infrastructure Protection
APS1026H	Positive Psychology for Engineers
APS1027H	Engineering Presentations
APS162	Calculus with Engineering Applications I
APS163	Calculus with Engineering Applications II
ARWU	Shanghai Jia Tong Academic Ranking of World Universities
ASEE	American Society for Engineering Education
BME	Biomedical Engineering minor
CCR	Co-Curricular Record
CEIE	Centre for Engineering Innovation & Entrepreneurship
CGEN	Centre for Global Engineering
CIHR	Canadian Institute of Health Research
CIV235	Civil Engineering Graphics
CIV300	Terrestrial Energy Systems
CRC	Canada Research Chair
DSF	Dean's Strategic Fund
ECE216	Signals and Systems
ECE221	Electricity and Magnetism
ECN	Engineering Communications Network
EDU:C	Extra-Departmental Unit
EFTE	Eligible Full-Time Equivalent
EIIP	Engineering Instructional Innovation Program
ELITE	Entrepreneurship, Leadership, Innovation & Technology in Engineering
eSIP	Engineering Summer Internship Program
FTE	Full-Time Equivalent
GCC	Grand Challenges Canada
GEI	Graduate Enterprise Internships
GLEE	Girls' Leadership in Engineering Experience
H-index	A measurement of both the productivity and impact of published work based on citations
Headcount	Number of degree-seeking students
IFP	International Foundation Program
ILead	Institute for Leadership Education in Engineering

INFORMS	Institute of Operations Research and Management Sciences
INTEGRATE	Innovative Technologies for Groundwater Remediation
IRC	Industrial Research Chair
ISE	Institute for Sustainable Energy
MCPs	Multidisciplinary Capstone Projects
MEngCEM	MEng in Cities Engineering & Management
MEng, SCFI	MEng program for the Stronach Centre for Innovation
MNR	Ministry of Natural Resources
MOOC	Massive Open Online Course
NASMs	Net Assignable Square Metres
NCE	Networks of Centres of Excellence
NSERC	Natural Sciences and Engineering Research Council of Canada
NSERC CREATE	NSERC Collaborative Research and Training Experience
NTU	National Taiwan University
OCCAM	Ontario Centre for Characterization of Advanced Materials
OGS	Ontario Graduate Scholarship
OISE	Ontario Institute for Studies in Education
PEY	Professional Experience Year
PKU	Peking University
PUB	Published Articles
REBA	Institute for Research on Exposomics Based Assessment
RLO	Reusable Learning Objects
SAVI	Smart Applications on Virtual Infrastructure
SSHRC	Social Sciences and Humanities Research Council
STEM	Science, Technology, Engineering and Mathematics
SwB	Science without Borders
TEAL	Technology Enhanced Active Learning
THE	Times Higher Education
TIAM	Toronto Institute for Advanced Manufacturing
TOP	Articles in Top Journals
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
USP	University of Sao Paulo
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

Appendix A: Outreach Programs

Between July 2013 and June 2014, we offered the following pre-university outreach programs, reaching nearly 5,740 students from across Ontario, Canada and the world.

Program	Audience	Session	Approx. Number of Participants
DEEP Summer Academy	Grades 9 through 12	July 2013	1,000
DEEP Leadership Camp	Grades 11 to 12	July 2013	25
Girls' Jr. DEEP	Grades 3 to 8	July 2013	70
Jr. DEEP	Grades 3 to 8	July 2013	600
ENGage	Grades 3 to 8	July 2013	100
Go ENG Girl	Grades 7 to 10	October 2013	100
Girls' Jr. DEEP Saturday Fall	Grades 3 to 8	October 2013	70
Jr. DEEP Saturday Fall	Grades 3 to 9	November 2013	100
Girls' Jr. DEEP Saturday Winter	Grades 3 to 8	January 2014	70
Jr. DEEP Saturday Winter	Grades 3 to 9	February 2014	100
Jr. DEEP at March Break	Grades 3 to 8	March 2014	70
March Break Math Academy	Grades 3 to 8	March 2014	50
DEEP Saturday Workshops	Grades 9 to 12	Nov 2013 to Feb 2014	300
Science Rendezvous	General public	May 2014	100
In-School and On-Campus Workshops	Grades 3 to 8	May & June 2014	2,835
Skule Kids	Grades 1 to 8	May 2014	100
Big Ideas!	Ages 11 to 13	August 2013	50
Total Estimated Reach			**5,740**

Note: Does not include DEEP Summer Academy offered in July 2014.

Appendix B: Student Clubs and Teams

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

Arts

- Appassionata Music Group
- Skule Arts Festival
- Skule Improv Society
- Skule Nite
- Skule Orchestra
- Skule Stage Band
- Tales of Harmonia
- The Brass Ring
- U of T Music Clubs Initiative

Athletics

- Engineering Table Tennis
- Iron Dragons
- U of T Ironsports Club
- U of T Quidditch Team
- U of T Ski and Snowboard Club
- U of T Yoga and Fitness Club

Community

- Engineers for Christ/Power to Change
- Engineers Without Borders — U of T Chapter
- Eyes of Hope
- Galbraith Society
- LeadingLEED
- LGBTQ & Allies in Science and Engineering
- MIE Mentorship Program
- NSight Mentorship Program
- Promise to Future Generations
- Refresh Bolivia
- Skule's Got Talent
- Students Fighting Cancer (SFC)
- Social Spark
- U of T Mandarin Chinese Christian Fellowship
- Women in Science and Engineering (WISE)

Cultural

- Arab Students' Association
- Egyptian Students' Association at U of T
- Engineering Chinese Club
- Indian Engineering Students' Association
- Indian Students' Society
- Korean Engineering Students' Association
- Middle Eastern Students' Association
- Muslim Student Association
- National Society of Black Engineers
- Nawranj Iranian Association
- U of T Chinese Engineering Students' Association

Design & Competition

- Blue Sky Solar Racing
- Hovercraft Design Team
- Human Powered Vehicle Design Team
- Mechatronics Design Association
- Multidisciplinary Analytical Kinesthetic Education (M.A.K.E)
- Robotics for Space Exploration (RSX)
- Spark Design Club
- Tetra
- U of T Aeronautics Team
- U of T Baja Team
- U of T Concrete Canoe
- U of T Concrete Toboggan Team
- U of T Destination Imagination
- U of T Formula SAE
- U of T iGEM Club
- U of T Mining Games
- U of T Robotics Association
- U of T Solar House Design Team
- U of T Space Design Contest
- U of T Supermileage

Hobby & Special Interest

- Astronomy & Space Exploration Society
- Engineering Lego Group
- Rational Capital Investment Fund
- Skule MTG (Magic: The Gathering) Club
- U of T Emergency First Responders (UTEFR)
- U of T Engineering Toastmasters (UTET)

Professional Development & Industry

- American Society of Mechanical Engineers at U of T
- BioEngineering Student Association (BESt)
- Canadian Electrical Contractors Association (CECA)
- Canadian Society for Chemical Engineering
- Canadian Society for Civil Engineering
- Canadian Society for Mechanical Engineering U of T Student Chapter
- Chapter for Healthcare Improvement at U of T
- Club for Undergraduate Biomedical Engineering (CUBE)
- Hacker Academy
- Institute for Electrical and Electronics Engineers (IEEE), U of T Student Branch
- Institute of Industrial Engineers, U of T Chapter
- MSE Industry Club
- Nspire Innovation Network
- Ontario Water Works Association — Student Chapter
- Ontario Society of Professional Engineers U of T Section
- Skule Labs
- Sustainable Engineers Association
- SuitsU
- U of T Business Association
- U of T Consulting Association
- U of T Developers
- U of T Engineering Finance Association
- You're Next Career Network

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 length of time between a student's initial enrolment in a graduate program and meeting all the requirements for graduation. The data only includes 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, 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
PhD	5.3	4.3	4.5	5.2	5.3	6.0	7.0	4.7	5.3	5.3
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
MEng (FT)	1.7	1.3	1.3		1.3	1.2	1.3	1.3	1.0	1.0
MEng (PT)	2.0		1.7	1.7	1.0	1.8			1.7	1.3

Figure C.2 Institute of Biomaterials & Biomedical Engineering Time to Completion for Graduate Students, 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
PhD	2.7	4.7	5.2	3.3	4.3	4.3	6.0	5.7	5.0	5.0
MASc	2.0	2.0	2.3	2.0	2.2	2.0	2.0	2.0	2.0	2.0
MHSc (FT)	1.8	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, 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
PhD	5.0	5.3	5.7	4.7	5.0	5.3	6.0	5.3	5.2	5.5
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng (FT)	1.7	1.2	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MEng (PT)	2.3	2.7	3.3	2.0	3.7	2.2	1.8	1.3	2.0	2.0

Figure C.4 Department of Civil Engineering
Time to Completion for Graduate Students, 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
PhD	4.7	5.0	4.8	4.7	5.0	5.0	5.3	5.3	5.3	5.0
MASc	2.0	2.0	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng (FT)	1.3	1.5	1.3	1.0	1.0	1.0	1.3	1.0	1.0	1.0
MEng (PT)	1.7	2.0	1.8	1.7	1.7	2.0	2.3	1.8	2.0	2.0

Figure C.5 The Edward S. Rogers Sr. Department of Electrical & Computer Engineering
Time to Completion for Graduate Students, 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
PhD	5.3	4.7	5.3	4.7	4.7	4.7	5.0	5.2	5.5	5.3
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng (FT)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MEng (PT)	2.3	2.7	2.0	2.0	2.0	3.0	2.7	2.0	2.2	2.0

Figure C.6 Department of Mechanical & Industrial Engineering
Time to Completion for Graduate Students, 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
PhD	4.7	4.3	4.5	4.7	4.7	4.0	4.7	5.0	5.7	5.0
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng (FT)	1.0	1.3	1.0	1.3	1.0	1.3	1.0	1.3	1.0	1.0
MEng (PT)	2.0	2.0	2.0	2.3	2.3	2.3	2.0	2.0	2.0	2.0
MEng - Design (PT)	2.0	2.2	2.7	2.2	3.3	2.7	2.3	2.7	2.5	2.7

Figure C.7 Department of Materials Science & Engineering
Time to Completion for Graduate Students, 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
PhD	4.8	4.0	5.8	5.3	4.0	5.3	6.0	6.3	5.7	4.7
MASc	2.3	2.3	2.0	2.0	1.7	2.0	2.0	2.0	2.0	2.3
MEng (FT)	1.0	1.0			1.5	1.7		0.8	1.0	1.0
MEng (PT)	2.0	2.5	2.7		1.3	2.0	2.3	2.3	2.0	2.7

Note: Based on OCGS data from ROSI; counts # of terms where student is active (REG only; excl leaves, lapses & convocation term); fast-track PhD incl. MASc time.

Appendix D: Research Chairs

From July 2013 to June 2014, our Faculty held 62 research chair titles. The list below reflects four types of Chairs:

Canada Research Chair (CRC)

Established by the Government of Canada to attract and retain some of the world's most outstanding researchers. The program invests a total of $300 million per year across Canada in two types of CRCs: 1) Tier 1 — a renewable title that is held for seven years; and 2) Tier 2 — a junior chair that is held for five years and is eligible for renewal once. The University receives $200,000 annually per Tier 1 Chair and $100,000 annually per Tier 2 Chair.

Endowed Research Chair

Created with the generous support of donations and indicates a broad and continuing commitment to the position and discipline of research. Each faculty member who holds a Chair position is considered to be of great distinction and typically at the rank of professor with tenure. Each Chair 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.

Figure D.1 Research Chairs, 2013–2014

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	Dimitrios Hatzinakos	Endowed		ECE
Bell University Laboratories Chair in Computer Engineering	Baochun Li	Endowed		ECE
Bell University Laboratories Chair in Software Engineering	Hans-Arno Jacobsen	Endowed		ECE
Canada Research Chair in Autonomous Space Robotics	Timothy Barfoot	NSERC	Tier 2	UTIAS
Canada Research Chair in Biological Computation	Brendan Frey	NSERC	Tier 1	ECE
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 Communication Algorithms	Frank Kschischang	NSERC	Tier 1	ECE
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	CIHR	Tier 2	IBBME, ChemE
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 Mechanobiology	Craig Simmons	CIHR	Tier 2	MIE, IBBME
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

Title	Chairholder	Sponsor	Tier	Dep't
Canada Research Chair in Nano- and Micro-Structured Electromagnetic Materials and Applications	George Eleftheriades	NSERC	Tier 1	ECE
Canada Research Chair in Nanotechnology	Ted Sargent	NSERC	Tier 1	ECE
Canada Research Chair in Organic Optoelectronics	Zheng-Hong Lu	NSERC	Tier 1	MSE
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 Tissue Engineering	Molly Shoichet	NSERC	Tier 1	ChemE, IBBME
Canada Research Chair in Wireless Networks	Ashish Khisti	NSERC	Tier 2	ECE
Celestica Chair in Materials for Microelectronics	Doug Perovic	Endowed		MSE
Chair in Computer Networks and Enterprise Innovation	Elvino Sousa	Endowed		ECE
Chair in Information Engineering (retired)	Joseph Paradi	Endowed		ChemE
Clarice Chalmers Chair of Engineering Design	Greg A. Jamieson	Endowed		MIE
Dusan and Anne Miklas Chair in Engineering Design	Paul Chow	Endowed		ECE
Edward S. Rogers Sr. Chair in Engineering	Glenn Gulak	Endowed		ECE
Eugene V. Polistuk Chair in Electromagnetic Design	Costas Sarris	Endowed		ECE
Frank Dottori Chair in Pulp and Paper Engineering	Honghi Tran	Endowed		ChemE
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/Altera Industrial Research Chair in Programmable Silicon	Vaughn Betz	NSERC/ Altera		ECE
NSERC Associate Industrial Research Chair in Drinking Water	Ron Hofmann	NSERC		CivE
NSERC/Cement Association of Canada Industrial Research Chair in Concrete Durability and Sustainability	Doug Hooton	NSERC		CivE
NSERC Chair in Multidisciplinary Engineering Design	Kamran Behdinan	NSERC		MIE
NSERC Industrial Research Chair in Drinking Water Research	Robert Andrews	NSERC		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
Toronto Rehabilitation Engineering Institute's Chair in Spinal Cord Injury	Milos Popovic	Endowed		IBBME
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
Velma M. Rogers Graham Chair in Engineering	George Eleftheriades	Endowed		ECE
Wallace G. Chalmers Chair of Engineering Design	Axel Guenther	Endowed		MIE
W. M. Keck Chair in Engineering Rock Mechanics	John Harrison	Endowed		CivE

Appendix E: Research Funding by Academic Area

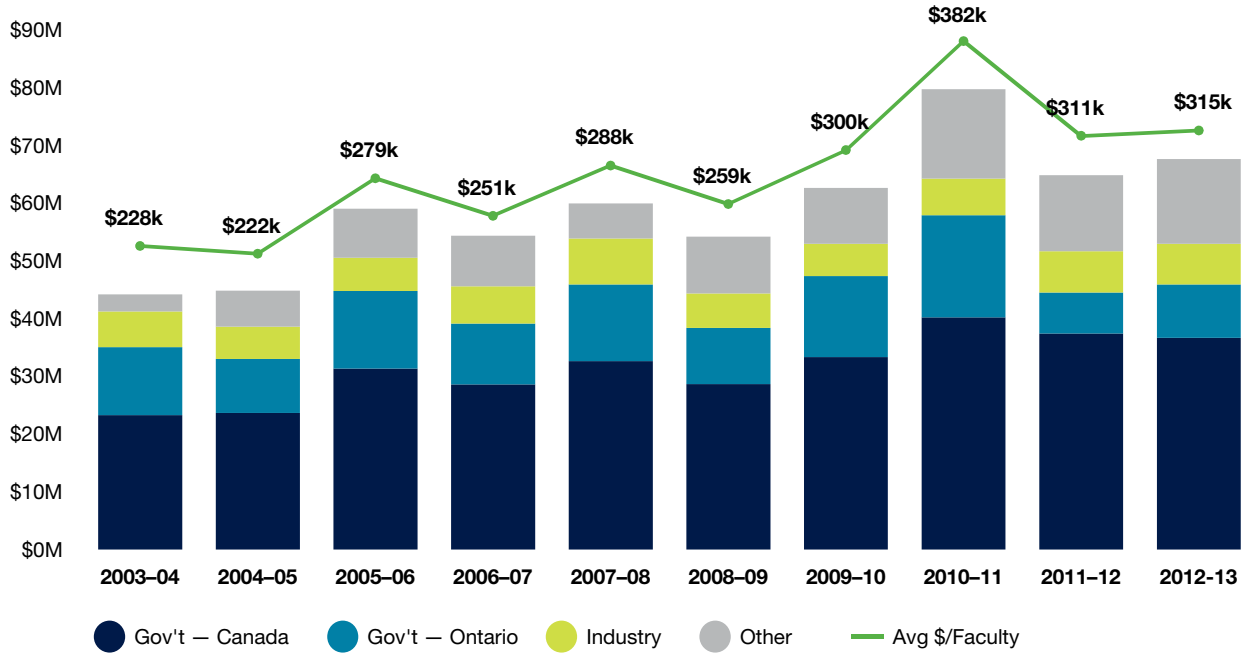
Figure E.1 shows our Faculty's total research funding, including operating and infrastructure.

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

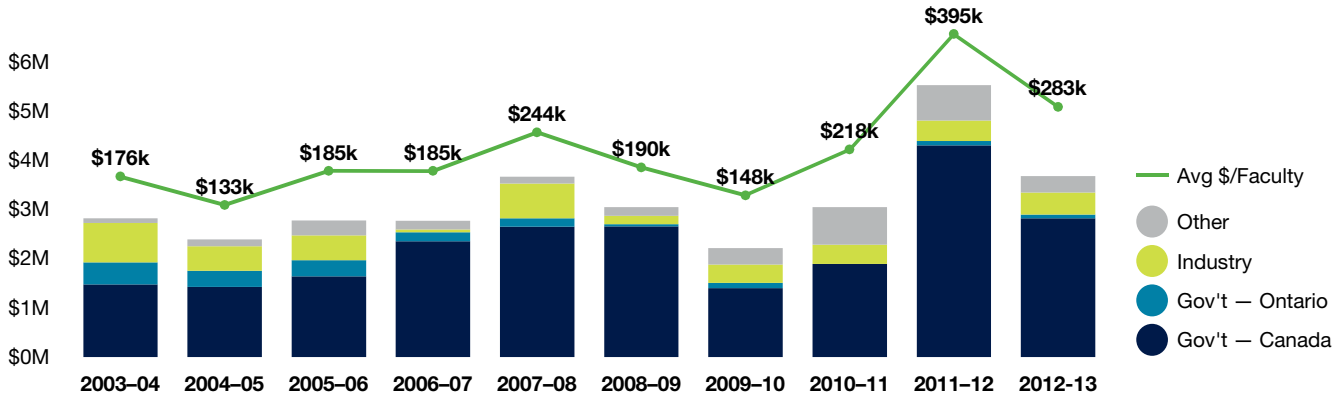
Data is based on grant years (April to March). For example, 2012–13 represents the granting cycle starting in April 2012 and ending in March 2013.

Figure E.1 University of Toronto Faculty of Applied Science & Engineering Total Research Funding by Source and Average Funding per Faculty Member, 2003–2004 to 2012–2013



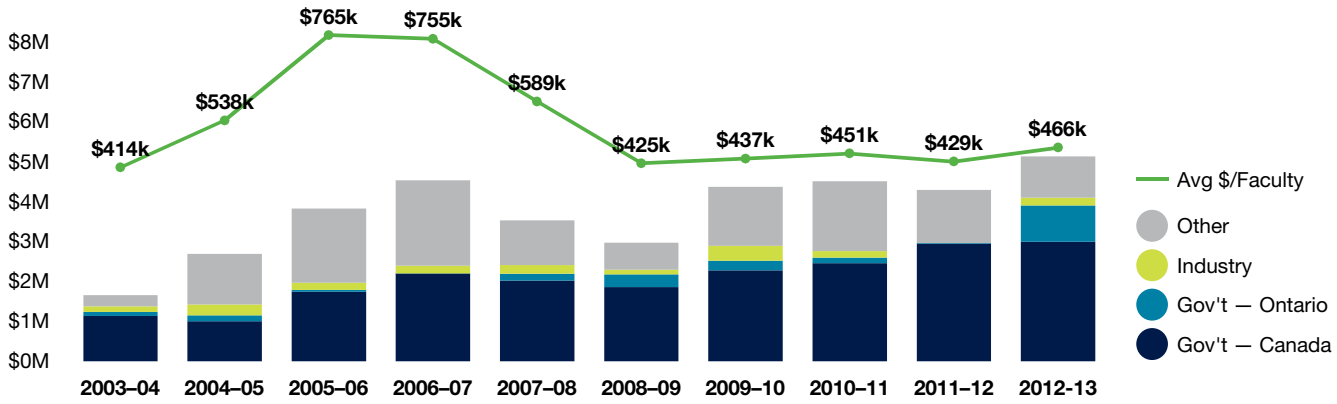
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2003–04	$23,337,168	$11,751,992	$6,202,324	$2,946,339	**$44,237,823**	**$228,030**
2004–05	$23,689,267	$9,371,903	$5,605,287	$6,201,491	**$44,867,948**	**$222,119**
2005–06	$31,396,902	$13,410,788	$5,791,694	$8,504,513	**$59,103,897**	**$278,792**
2006–07	$28,644,885	$10,509,937	$6,499,117	$8,726,012	**$54,379,951**	**$250,599**
2007–08	$32,656,054	$13,319,325	$7,945,281	$6,060,260	**$59,980,920**	**$288,370**
2008–09	$28,695,635	$9,745,147	$5,951,749	$9,828,127	**$54,220,658**	**$259,429**
2009–10	$33,356,895	$14,037,225	$5,605,799	$9,688,396	**$62,688,315**	**$299,944**
2010–11	$40,263,948	$17,704,185	$6,356,194	$15,469,759	**$79,794,086**	**$381,790**
2011–12	$37,445,302	$7,125,566	$7,137,670	$13,198,779	**$64,907,317**	**$310,561**
2012-13	$36,712,835	$9,243,896	$7,040,754	$14,669,800	**$67,667,285**	**$314,732**

Figure E.2 University of Toronto Institute for Aerospace Studies Research Operating Funding by Source and Average Funding per Faculty Member, 2003–2004 to 2012–2013



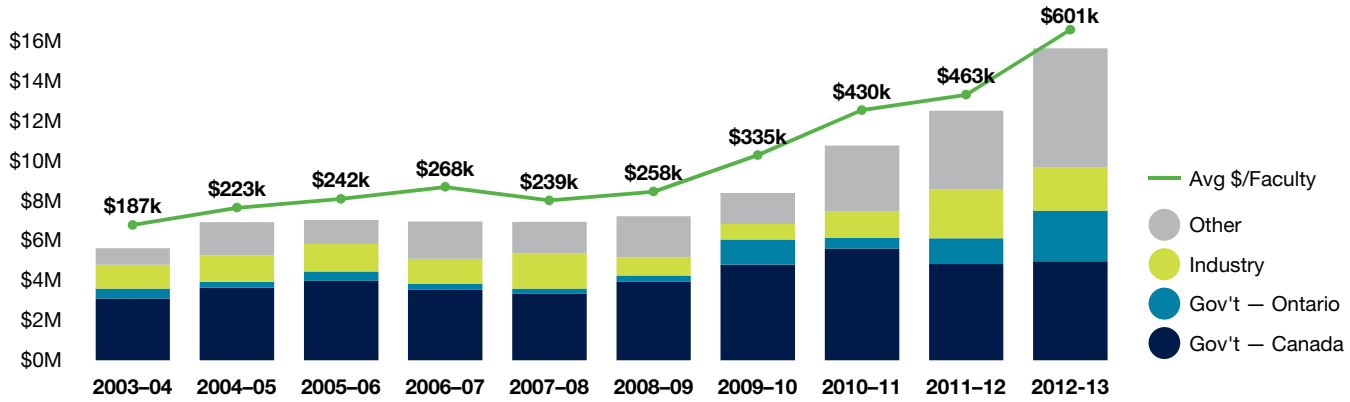
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2003–04	$1,475,691	$446,828	$801,745	$98,404	**$2,822,668**	**$176,417**
2004–05	$1,427,214	$327,394	$498,461	$136,796	**$2,389,865**	**$132,770**
2005–06	$1,642,531	$329,500	$499,365	$304,569	**$2,775,965**	**$185,064**
2006–07	$2,350,513	$185,000	$60,000	$176,533	**$2,772,046**	**$184,803**
2007–08	$2,647,542	$175,000	$703,727	$136,667	**$3,662,936**	**$244,196**
2008–09	$2,653,772	$45,000	$172,002	$174,966	**$3,045,740**	**$190,359**
2009–10	$1,398,735	$107,333	$374,731	$331,952	**$2,212,751**	**$147,517**
2010–11	$1,891,742		$390,200	$766,936	**$3,048,878**	**$217,777**
2011–12	$4,300,432	$89,356	$420,400	$712,990	**$5,523,178**	**$394,513**
2012-13	$2,822,087	$72,605	$447,651	$337,560	**$3,679,903**	**$283,069**

Figure E.3 Institute of Biomaterials & Biomedical Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2003–2004 to 2012–2013



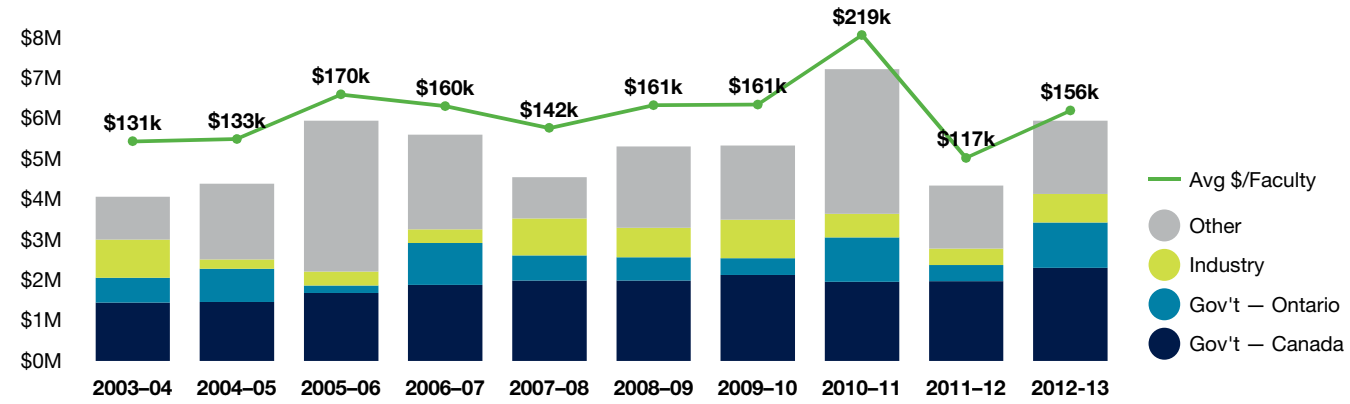
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2003–04	$1,135,098	$100,000	$142,307	$276,704	**$1,654,109**	**$413,527**
2004–05	$999,864	$150,001	$275,888	$1,266,515	**$2,692,268**	**$538,454**
2005–06	$1,740,728	$48,666	$176,220	$1,857,110	**$3,822,724**	**$764,545**
2006–07	$2,202,646	$1,333	$186,904	$2,137,473	**$4,528,356**	**$754,726**
2007–08	$2,024,200	$165,515	$222,300	$1,119,211	**$3,531,226**	**$588,538**
2008–09	$1,859,671	$317,147	$117,411	$678,498	**$2,972,727**	**$424,675**
2009–10	$2,277,302	$242,228	$375,037	$1,476,046	**$4,370,613**	**$437,061**
2010–11	$2,454,234	$142,383	$160,634	$1,749,144	**$4,506,395**	**$450,640**
2011–12	$2,947,869	$13,500		$1,331,167	**$4,292,536**	**$429,254**
2012-13	$2,995,604	$908,607	$193,090	$1,034,097	**$5,131,398**	**$466,491**

Figure E.4 Department of Chemical Engineering & Applied Chemistry Research Operating Funding by Source and Average Funding per Faculty Member, 2003–2004 to 2012–2013



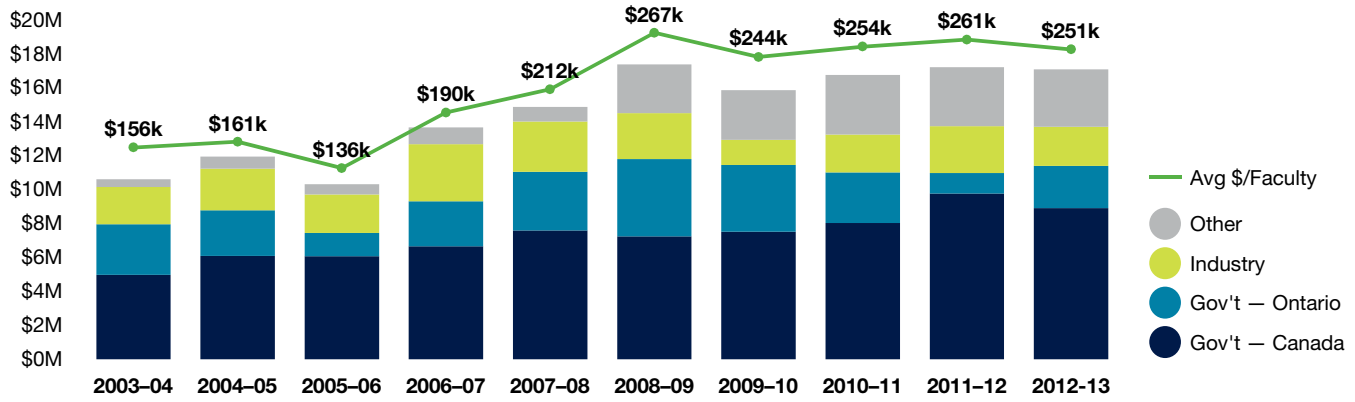
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2003–04	$3,092,486	$504,091	$1,197,649	$812,408	**$5,606,634**	**$186,888**
2004–05	$3,635,147	$293,952	$1,320,139	$1,675,132	**$6,924,370**	**$223,367**
2005–06	$3,982,279	$465,999	$1,379,766	$1,195,334	**$7,023,378**	**$242,185**
2006–07	$3,527,890	$290,203	$1,261,279	$1,875,921	**$6,955,293**	**$267,511**
2007–08	$3,335,629	$261,610	$1,768,550	$1,561,293	**$6,927,082**	**$238,865**
2008–09	$3,949,214	$299,378	$907,256	$2,056,033	**$7,211,881**	**$257,567**
2009–10	$4,782,578	$1,257,813	$781,842	$1,556,321	**$8,378,554**	**$335,142**
2010–11	$5,602,177	$516,952	$1,352,026	$3,285,476	**$10,756,631**	**$430,265**
2011–12	$4,824,755	$1,283,137	$2,439,008	$3,950,770	**$12,497,670**	**$462,877**
2012-13	$4,962,872	$2,525,848	$2,166,340	$5,968,640	**$15,623,700**	**$600,912**

Figure E.5 Department of Civil Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2003–2004 to 2012–2013



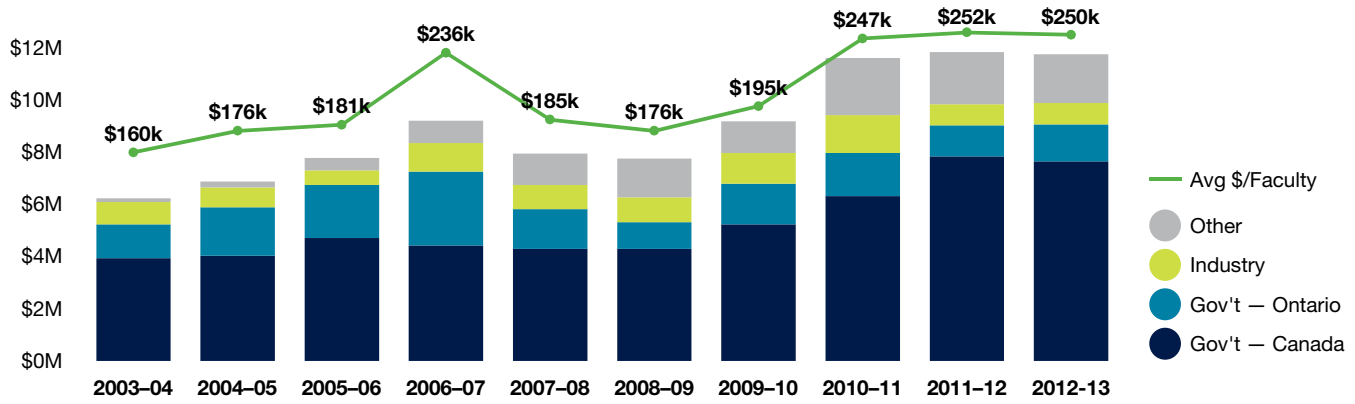
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2003–04	$1,448,071	$610,140	$945,948	$1,059,504	**$4,063,663**	**$131,086**
2004–05	$1,456,773	$826,688	$225,653	$1,878,573	**$4,387,687**	**$132,960**
2005–06	$1,685,873	$182,459	$347,635	$3,725,020	**$5,940,987**	**$169,742**
2006–07	$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	$2,129,407	$412,542	$956,466	$1,829,277	**$5,327,692**	**$161,445**
2010–11	$1,960,750	$1,097,072	$585,244	$3,574,555	**$7,217,621**	**$218,716**
2011–12	$1,972,638	$402,645	$403,513	$1,562,949	**$4,341,745**	**$117,344**
2012-13	$2,301,395	$1,121,004	$706,088	$1,812,797	**$5,941,284**	**$156,350**

Figure E.6 The Edward S. Rogers Sr. Department of Electrical & Computer Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2003–2004 to 2012–2013



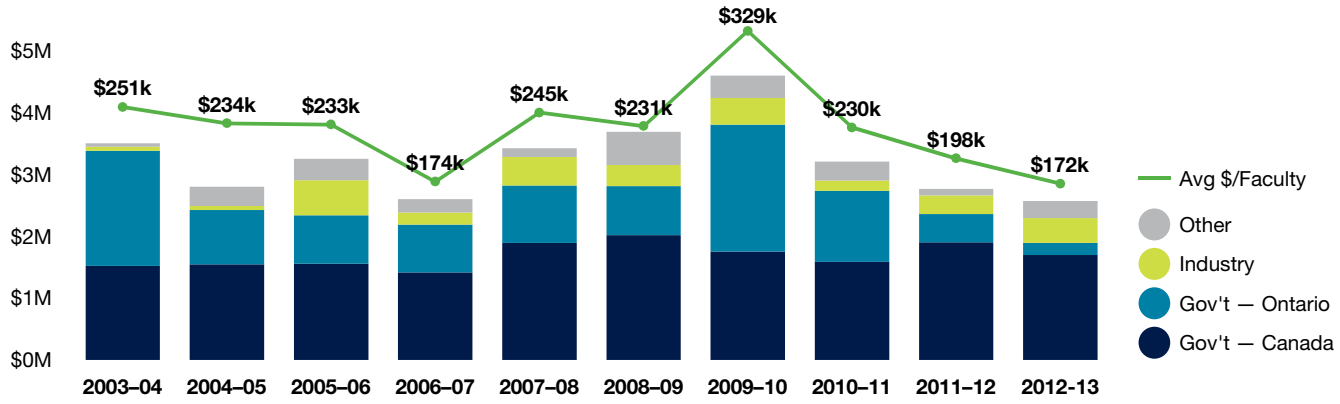
	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2003–04	$4,966,596	$2,982,592	$2,191,341	$457,693	**$10,598,222**	**$155,856**
2004–05	$6,099,154	$2,680,773	$2,455,661	$706,262	**$11,941,850**	**$161,376**
2005–06	$6,067,223	$1,378,334	$2,266,096	$603,341	**$10,314,994**	**$135,724**
2006–07	$6,649,878	$2,660,526	$3,363,559	$987,306	**$13,661,269**	**$189,740**
2007–08	$7,581,560	$3,470,568	$2,950,516	$871,531	**$14,874,175**	**$212,488**
2008–09	$7,235,736	$4,551,690	$2,709,325	$2,876,148	**$17,372,899**	**$267,275**
2009–10	$7,525,357	$3,923,865	$1,481,958	$2,917,487	**$15,848,667**	**$243,826**
2010–11	$8,030,542	$2,978,787	$2,228,062	$3,518,860	**$16,756,251**	**$253,883**
2011–12	$9,760,928	$1,205,388	$2,765,890	$3,469,600	**$17,201,806**	**$260,633**
2012-13	$8,914,560	$2,482,000	$2,304,819	$3,377,035	**$17,078,414**	**$251,153**

Figure E.7 Department of Mechanical & Industrial Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2003–2004 to 2012–2013



	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2003–04	$3,938,897	$1,290,633	$860,084	$139,626	**$6,229,240**	**$159,724**
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	$4,418,052	$2,833,485	$1,095,225	$855,095	**$9,201,857**	**$235,945**
2007–08	$4,290,233	$1,519,533	$924,880	$1,210,214	**$7,944,860**	**$184,764**
2008–09	$4,289,293	$1,027,566	$946,457	$1,488,487	**$7,751,803**	**$176,177**
2009–10	$5,226,172	$1,558,727	$1,173,710	$1,212,768	**$9,171,377**	**$195,136**
2010–11	$6,312,367	$1,653,762	$1,444,528	$2,194,187	**$11,604,844**	**$246,912**
2011–12	$7,830,744	$1,188,878	$805,995	$1,996,803	**$11,822,420**	**$251,541**
2012-13	$7,644,010	$1,412,360	$817,191	$1,864,971	**$11,738,532**	**$249,756**

Figure E.8 **Department of Materials Science & Engineering Research Operating Funding by Source and Average Funding per Faculty Member, 2003–2004 to 2012–2013**



	Gov't – Canada	Gov't – Ontario	Corporate	Other	Total	Avg $/Faculty
2003–04	$1,523,775	$1,866,447	$63,250	$57,000	**$3,510,472**	**$250,748**
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	$2,056,294	$432,055	$364,545	**$4,607,581**	**$329,113**
2010–11	$1,589,098	$1,150,973	$165,500	$309,101	**$3,214,672**	**$229,619**
2011–12	$1,907,580	$453,820	$302,864	$104,500	**$2,768,764**	**$197,769**
2012-13	$1,698,541	$196,359	$405,575	$274,700	**$2,575,175**	**$171,678**

Appendix F: Spin-off Companies

Est.	Company Name	Engineering Affiliation	Department
2013	QD Solar Inc.	Sjoerd Hoogland and Ted Sargent	ECE
2013	XTouch Inc.	Parham Aarabi	ECE
2013	Pragmatek Transport Innovations, Inc.	Baher Abdulhai	CivE
2013	SpineSonics Medical Inc.	Richard Cobbold	IBBME
2013	XCellPure Inc.	Milica Radisic	IBBME
2012	CoursePeer	Hadi Aladdin	ECE
2012	MyTrak Health Systems	Sean Doherty	CivE
2012	Whirlscape Inc.	Will Walmsley	MIE
2012	XTT	Parham Aarabi	ECE
2011	Kinetica Dynamics Inc.	Constantin Christopoulos	CivE
2011	Ojiton Inc.	Tom Chau	IBBME
2011	Filaser Inc.	Peter Herman	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
1984	ABIT Systems Inc.	Burhan Turksen	MIE
1984	Ergotechnics	P. Foley	MIE
1984	MERP Enhanced Composites Inc.	Michael Piggott	ChemE
1983	Human Factors North	N. Moray	MIE
1982	DMER	D. MacKay	ChemE
1982	Engineering Services Inc. (ESI)	Andrew Goldenberg	MIE
1982	Owl Instruments	J.W. Smith	IBBME
1980	Almax Ltd.	G. Sinclair	ECE
1980	Dynaco Inc.	Peter Hughes	UTIAS
1980	SatCon Power Systems Canada Ltd.	Shashi Dewan	ECE
1978	Aurora Scientific Inc.	David James	MIE
1978	Hummel Energy Systems Ltd.	R.L. Hummel	ChemE
1976	Hooper & Angus Consulting Engineers	Frank Hooper	MIE
1976	Kings Engineering Associates Ltd.	Iian Currie	MIE

Appendix G: Descriptions of Major Awards

The Awards and Honours chapter summarizes the international, national and provincial awards received by our faculty. Below are descriptions of those awards and honours.

International

AAAS Fellowship
Recognition for meritorious efforts to advance science or its applications from the American Association for the Advancement of Science

Guggenheim Fellowship
Intended for men and women who have demonstrated exceptional capacity for productive scholarship

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

NAE Foreign Associate
Election to the National Academy of Engineering is among the highest professional distinctions accorded to an engineer

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

CAE Fellowship
Fellows elected by the Canadian Academy of Engineering for distinguished achievements and career-long service to the engineering profession

EIC Fellowship and Awards
Recognition for exceptional contributions to engineering in Canada and for service to the profession and to society by the Engineering Institute of Canada

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. Recipients have the opportunity to devote two years to full-time research

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

Steacie Fellowship
Awarded to enhance the career development of outstanding and highly promising scientists and engineers by NSERC

Steacie Prize
Awarded to a young scientist or engineer in Canada and is administered by the E.W.R. Steacie Memorial Trustees Fund

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

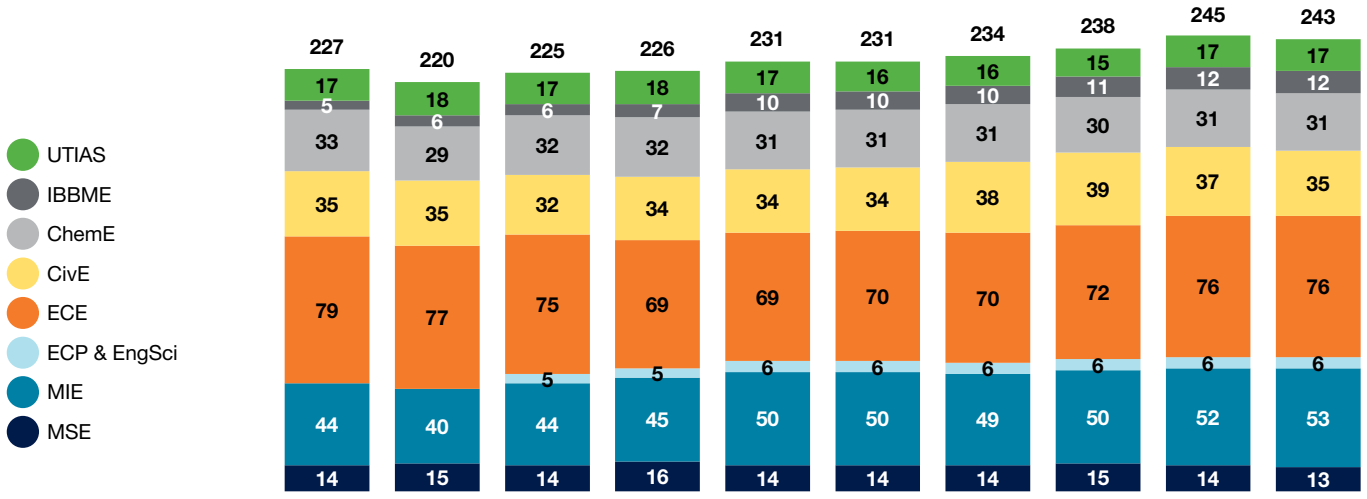
Provincial

Ontario Professional Engineers Awards
Recognition of professional engineers in Ontario who have made outstanding contributions to their profession and their community

Appendix H: Academic Staff by Academic Area

The figures in Appendix H show the composition of our academic staff from 2004–05 to 2013–14. Figures H.1a and H.1b provide a Faculty overview and H.2 to H.8 depict our composition.

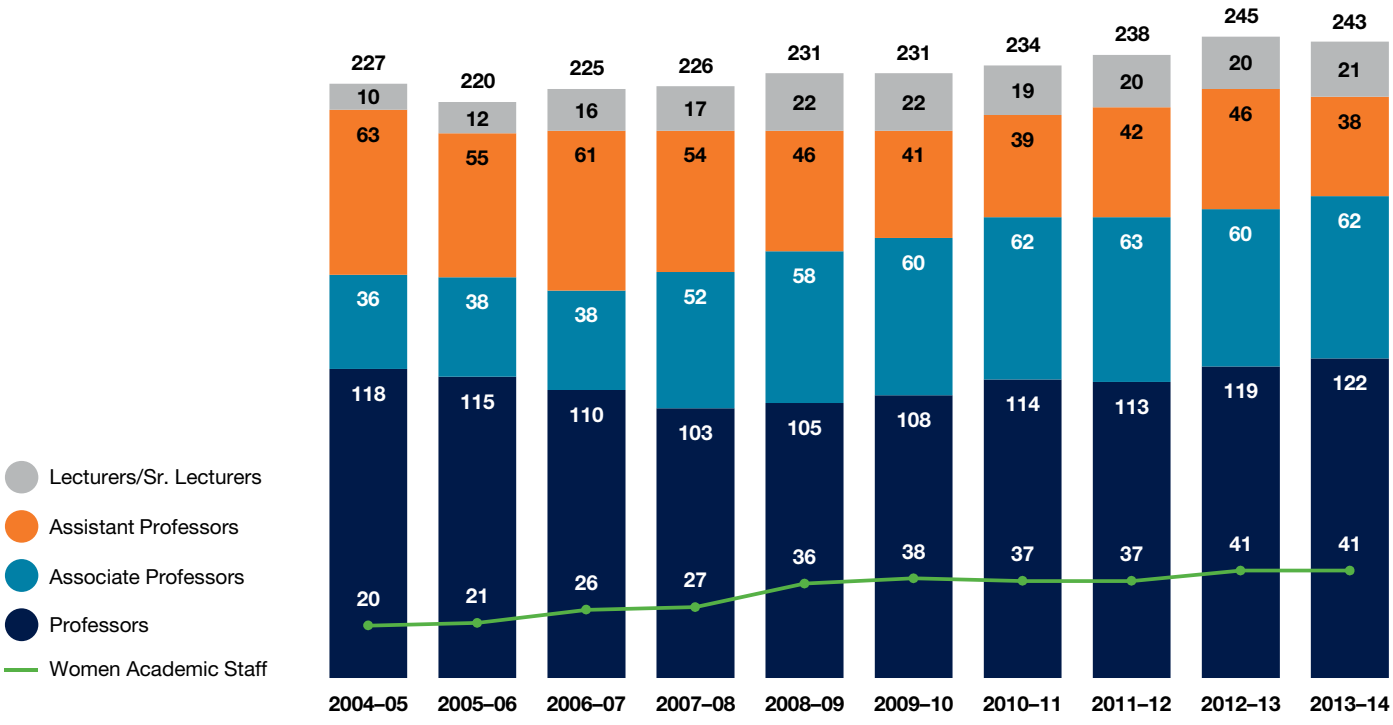
Figure H.1a **Total Academic Staff by Academic Area, 2004–2005 to 2013–2014**



		2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
UTIAS	Assistant Profs	4	4	4	4	4	4	4	5	6	5
	Associate Profs	1	1	1	3	5	4	3	3	4	4
	Professors	10	10	10	9	6	6	7	5	5	6
	Lecturers	2	3	2	2	2	2	2	2	2	2
IBBME	Assistant Profs	4	3	3	3	6	5	3	5	6	5
	Associate Profs	1	3	3	3	3	1	3	3	2	2
	Professors	0	0	0	1	1	4	4	3	4	4
	Lecturers	0	0	0	0	0	0	0	0	0	1
ChemE	Assistant Profs	1	2	4	5	5	6	7	5	6	4
	Associate Profs	6	2	3	3	3	2	2	3	3	5
	Professors	22	22	22	20	17	17	18	18	18	18
	Lecturers	4	3	3	4	6	6	4	4	4	4
CivE	Assistant Profs	8	7	11	8	6	6	9	9	8	7
	Associate Profs	9	9	6	10	12	12	11	10	11	11
	Professors	18	19	15	15	15	15	17	19	17	16
	Lecturers	0	0	0	1	1	1	1	1	1	1
ECE	Assistant Profs	35	28	25	18	9	8	7	9	11	9
	Associate Profs	9	14	15	22	26	26	25	25	22	20
	Professors	32	30	30	25	30	32	34	34	39	43
	Lecturers	3	5	5	4	4	4	4	4	4	4
ECP & EngSci	Lecturers			5	5	6	6	6	6	6	6
MIE	Assistant Profs	10	10	13	14	13	11	8	7	7	6
	Associate Profs	7	5	6	7	8	12	15	16	14	16
	Professors	26	24	24	23	26	24	24	24	28	28
	Lecturers	1	1	1	1	3	3	2	3	3	3
MSE	Assistant Profs	1	1	1	2	2	1	1	2	2	2
	Associate Profs	3	4	4	4	2	3	3	3	4	4
	Professors	10	10	9	10	10	10	10	10	8	7
	Lecturers	0	0	0	0	0	0	0	0	0	0
Total		**227**	**220**	**225**	**226**	**231**	**231**	**234**	**238**	**245**	**243**

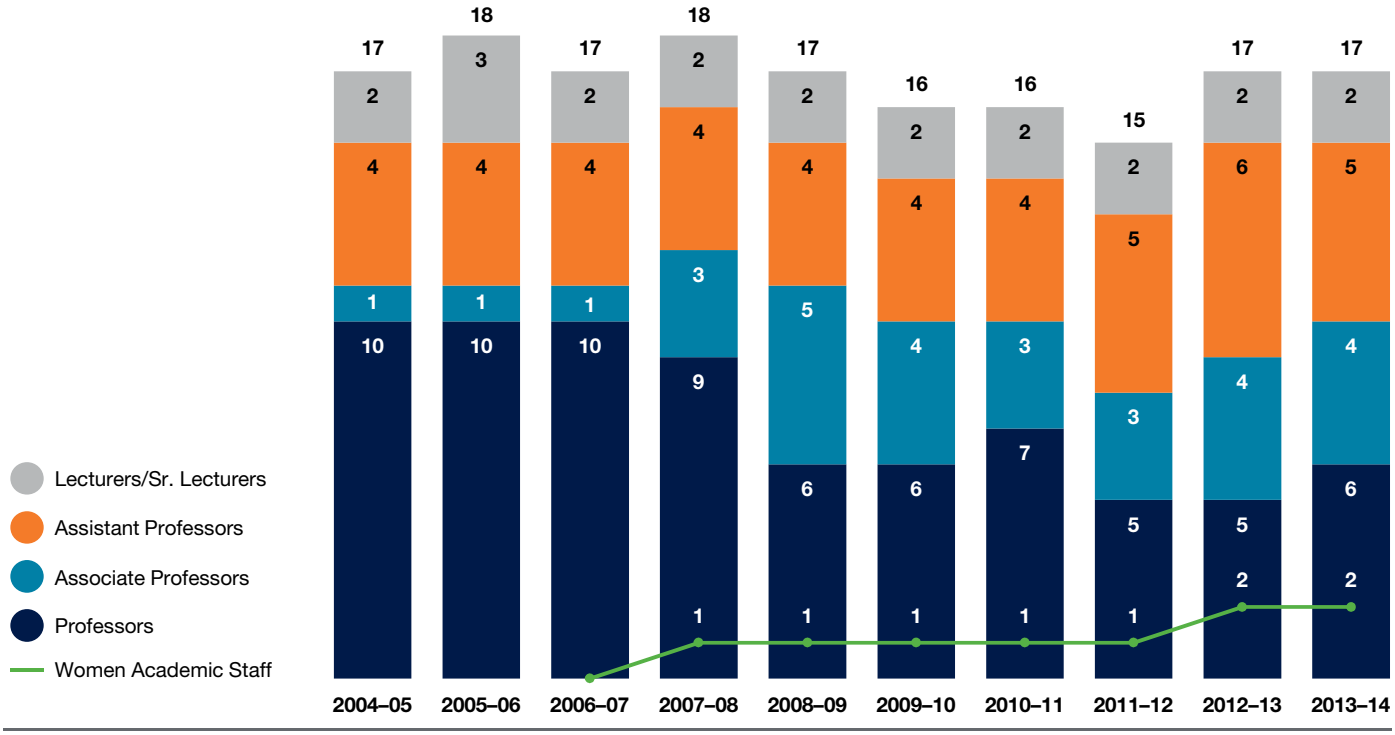
Note: Number of lecturers from Engineering Communications Program (ECP) and EngSci is unavailable prior to 2006–07.

Figure H.1b **University of Toronto Faculty of Applied Science & Engineering Total Academic Staff by Position with Percentage of Women, 2004–2005 to 2013–2014**



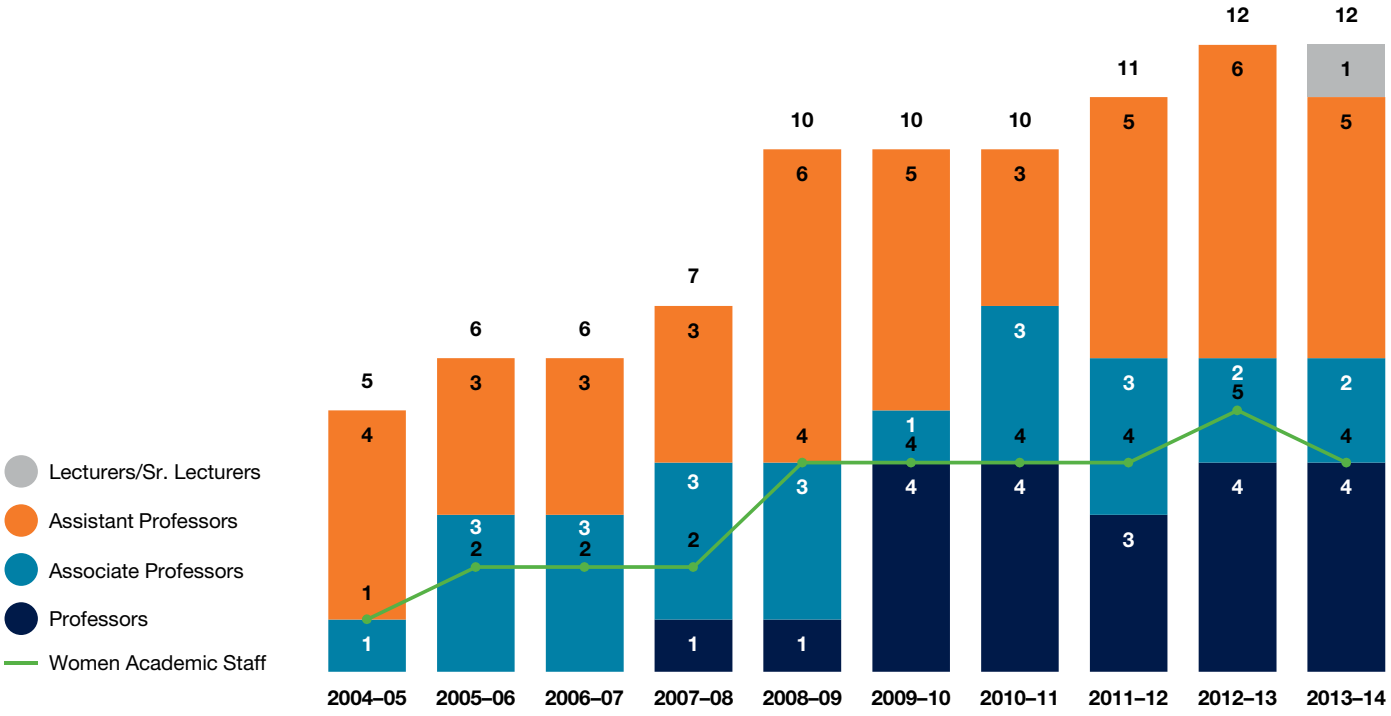
	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Assistant Professors	63	55	61	54	46	41	39	42	46	38
Women Assistant Professors	8	9	13	12	17	17	15	14	16	10
% Women Assistant Professors	**12.7%**	**16.4%**	**21.3%**	**22.2%**	**37.0%**	**41.5%**	**38.5%**	**33.3%**	**34.8%**	**26.3%**
Associate Professors	36	38	38	52	58	60	62	63	60	62
Women Associate Professors	8	6	5	6	8	10	13	13	13	17
% Women Associate Professors	**22.2%**	**15.8%**	**13.2%**	**11.5%**	**13.8%**	**16.7%**	**21.0%**	**20.6%**	**21.7%**	**27.4%**
Professors	118	115	110	103	105	108	114	113	119	122
Women Professors	1	4	5	6	5	5	5	6	8	9
% Women Professors	**0.8%**	**3.5%**	**4.5%**	**5.8%**	**4.8%**	**4.6%**	**4.4%**	**5.3%**	**6.7%**	**7.4%**
Lecturers/ Sr. Lecturers	10	12	16	17	22	22	19	20	20	21
Women Lecturers/ Sr. Lecturers	3	2	3	3	6	6	4	4	4	5
% Women Lecturers/ Sr. Lecturers	**30.0%**	**16.7%**	**18.8%**	**17.6%**	**27.3%**	**27.3%**	**21.1%**	**20.0%**	**20.0%**	**23.8%**
Total Tenured and Tenure Stream	217	208	209	209	209	209	215	218	225	222
Women Tenured and Tenure Stream	17	19	23	24	30	32	33	33	37	36
% Women Tenured and Tenure Stream	**7.8%**	**9.1%**	**11.0%**	**11.5%**	**14.4%**	**15.3%**	**15.3%**	**15.1%**	**16.4%**	**16.2%**
Total Academic Staff	227	220	225	226	231	231	234	238	245	243
Women Academic Staff	20	21	26	27	36	38	37	37	41	41
% Women Academic Staff	**8.8%**	**9.5%**	**11.6%**	**11.9%**	**15.6%**	**16.5%**	**15.8%**	**15.5%**	**16.7%**	**16.9%**

Figure H.2 **University of Toronto Institute for Aerospace Studies: Academic Staff by Position with Percentage of Women, 2004–2005 to 2013–2014**



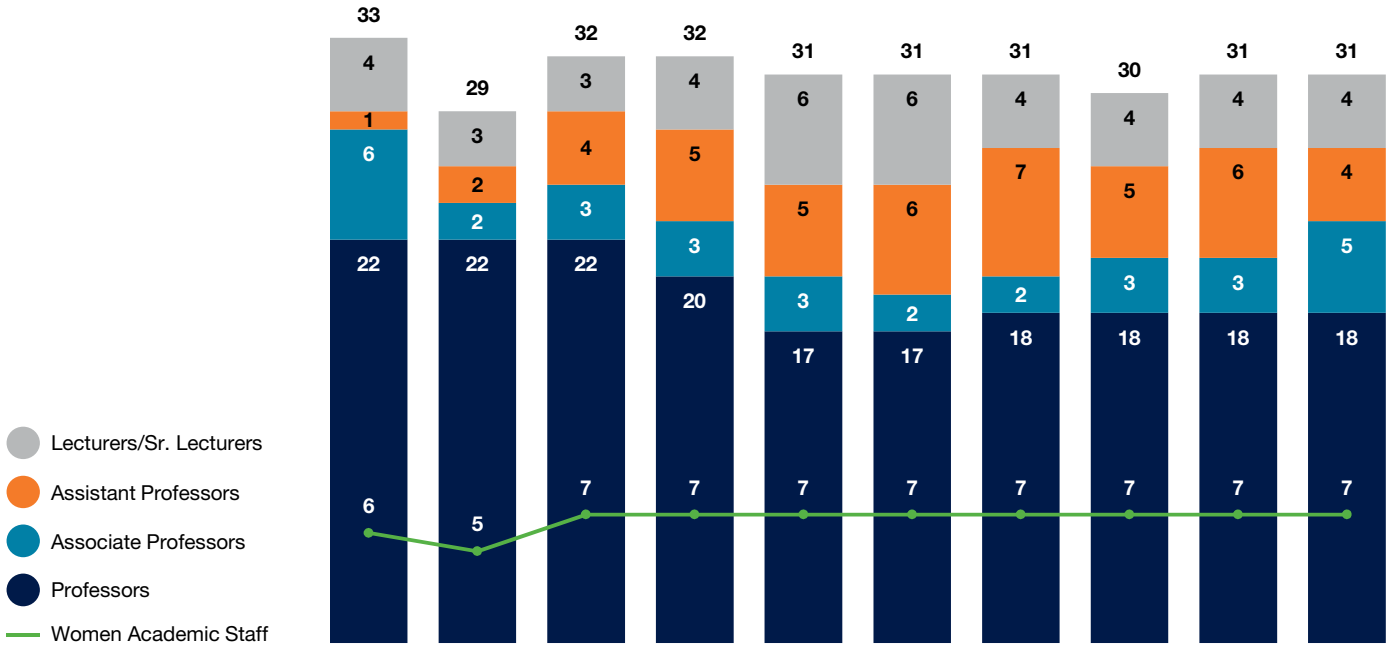
	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Assistant Professors	4	4	4	4	4	4	4	5	6	5
Women Assistant Professors	0	0	0	1	1	1	1	1	2	2
% Women Assistant Professors	**0.0%**	**0.0%**	**0.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**20.0%**	**33.3%**	**40.0%**
Associate Professors	1	1	1	3	5	4	3	3	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	10	9	6	6	7	5	5	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	2	3	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	15	16	15	14	14	13	15	15
Women Tenured and Tenure Stream	0	0	0	1	1	1	1	1	2	2
% Women Tenured and Tenure Stream	**0.0%**	**0.0%**	**0.0%**	**6.3%**	**6.7%**	**7.1%**	**7.1%**	**7.7%**	**13.3%**	**13.3%**
Total Academic Staff	17	18	17	18	17	16	16	15	17	17
Women Academic Staff	0	0	0	1	1	1	1	1	2	2
% Women Academic Staff	**0.0%**	**0.0%**	**0.0%**	**5.6%**	**5.9%**	**6.3%**	**6.3%**	**6.7%**	**11.8%**	**11.8%**

Figure H.3 **Institute of Biomaterials & Biomedical Engineering: Academic Staff by Position with Percentage of Women, 2004–2005 to 2013–2014**



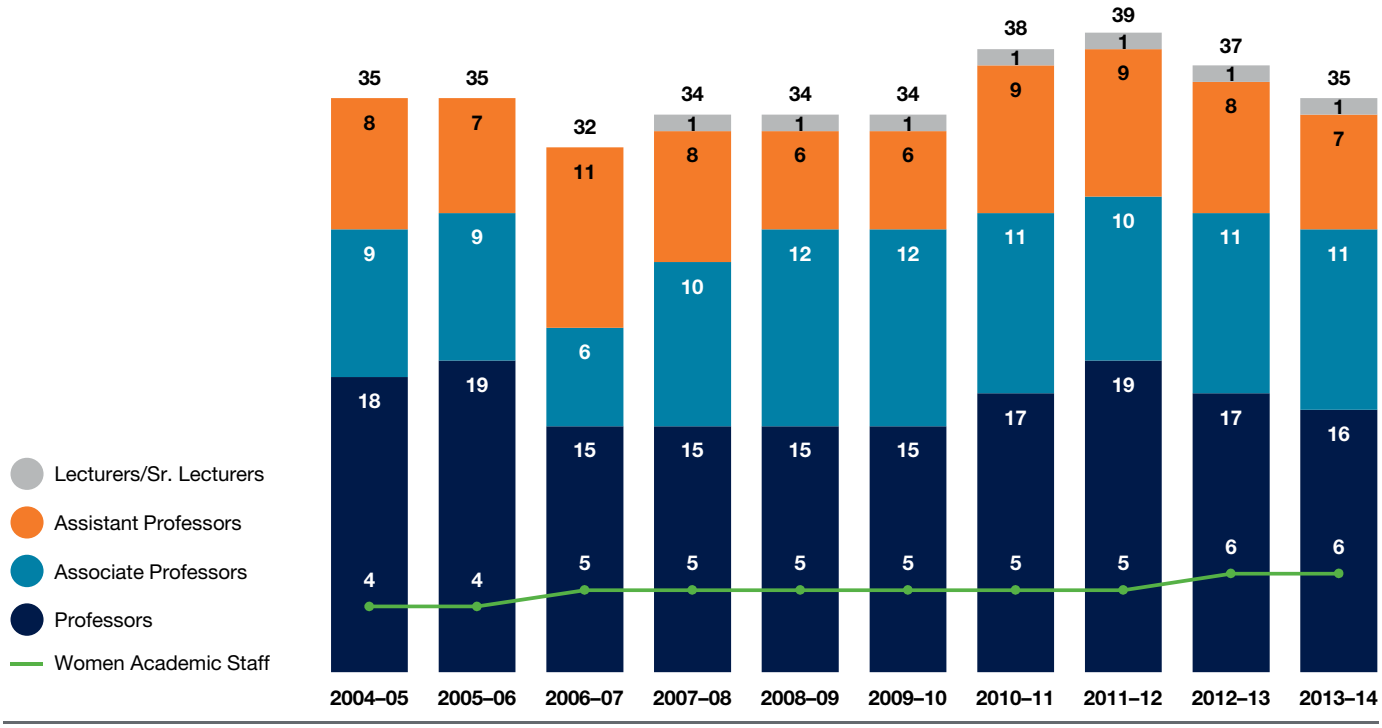
	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Assistant Professors	4	3	3	3	6	5	3	5	6	5
Women Assistant Professors	1	2	2	2	4	4	2	2	3	1
% Women Assistant Professors	**25.0%**	**66.7%**	**66.7%**	**66.7%**	**66.7%**	**80.0%**	**66.7%**	**40.0%**	**50.0%**	**20.0%**
Associate Professors	1	3	3	3	3	1	3	3	2	2
Women Associate Professors	0	0	0	0	0	0	2	2	2	2
% Women Associate Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**66.7%**	**66.7%**	**100.0%**	**100.0%**
Professors	0	0	0	1	1	4	4	3	4	4
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	1
Women Lecturers/ Sr. Lecturers	0	0	0	0	0	0	0	0	0	1
% Women Lecturers/ Sr. Lecturers	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**
Total Tenured and Tenure Stream	5	6	6	7	10	10	10	11	12	11
Women Tenured and Tenure Stream	1	2	2	2	4	4	4	4	5	3
% Women Tenured and Tenure Stream	**20.0%**	**33.3%**	**33.3%**	**28.6%**	**40.0%**	**40.0%**	**40.0%**	**36.4%**	**41.7%**	**27.3%**
Total Academic Staff	5	6	6	7	10	10	10	11	12	12
Women Academic Staff	1	2	2	2	4	4	4	4	5	4
% Women Academic Staff	**20.0%**	**33.3%**	**33.3%**	**28.6%**	**40.0%**	**40.0%**	**40.0%**	**36.4%**	**41.7%**	**33.3%**

Figure H.4 Department of Chemical Engineering & Applied Chemistry: Academic Staff by Position with Percentage of Women, 2004–2005 to 2013–2014



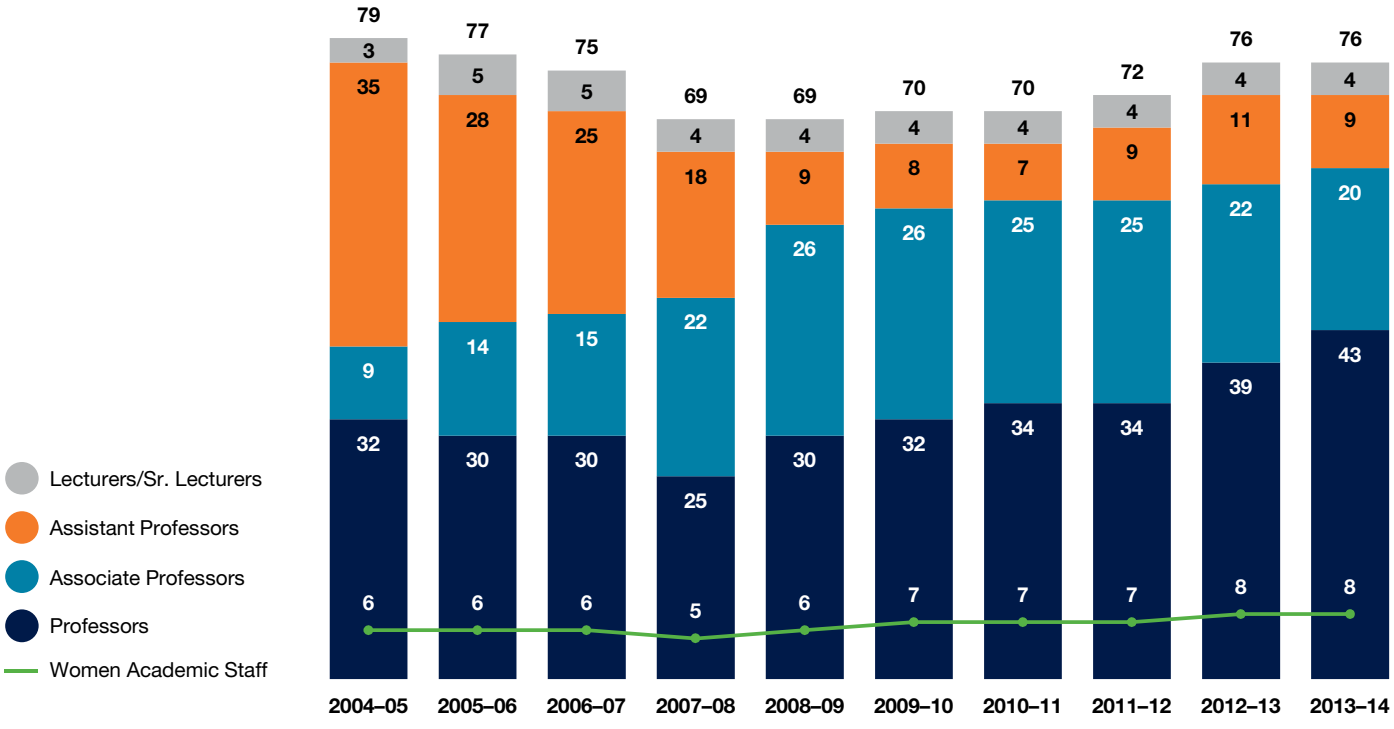
	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Assistant Professors	1	2	4	5	5	6	7	5	6	4
Women Assistant Professors	0	0	2	2	2	2	3	2	2	2
% Women Assistant Professors	**0.0%**	**0.0%**	**50.0%**	**40.0%**	**40.0%**	**33.3%**	**42.9%**	**40.0%**	**33.3%**	**50.0%**
Associate Professors	6	2	3	3	3	2	2	3	3	5
Women Associate Professors	3	1	1	0	0	0	0	1	1	1
% Women Associate Professors	**50.0%**	**50.0%**	**33.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**33.3%**	**33.3%**	**20.0%**
Professors	22	22	22	20	17	17	18	18	18	18
Women Professors	1	3	3	4	3	3	3	3	3	3
% Women Professors	**4.5%**	**13.6%**	**13.6%**	**20.0%**	**17.6%**	**17.6%**	**16.7%**	**16.7%**	**16.7%**	**16.7%**
Lecturers/ Sr. Lecturers	4	3	3	4	6	6	4	4	4	4
Women Lecturers/ Sr. Lecturers	2	1	1	1	2	2	1	1	1	1
% Women Lecturers/ Sr. Lecturers	**50.0%**	**33.3%**	**33.3%**	**25.0%**	**33.3%**	**33.3%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**
Total Tenured and Tenure Stream	29	26	29	28	25	25	27	26	27	27
Women Tenured and Tenure Stream	4	4	6	6	5	5	6	6	6	6
% Women Tenured and Tenure Stream	**13.8%**	**15.4%**	**20.7%**	**21.4%**	**20.0%**	**20.0%**	**22.2%**	**23.1%**	**22.2%**	**22.2%**
Total Academic Staff	33	29	32	32	31	31	31	30	31	31
Women Academic Staff	6	5	7	7	7	7	7	7	7	7
% Women Academic Staff	**18.2%**	**17.2%**	**21.9%**	**21.9%**	**22.6%**	**22.6%**	**22.6%**	**23.3%**	**22.6%**	**22.6%**

Figure H.5 **Department of Civil Engineering: Academic Staff by Position with Percentage of Women, 2004–2005 to 2013–2014**



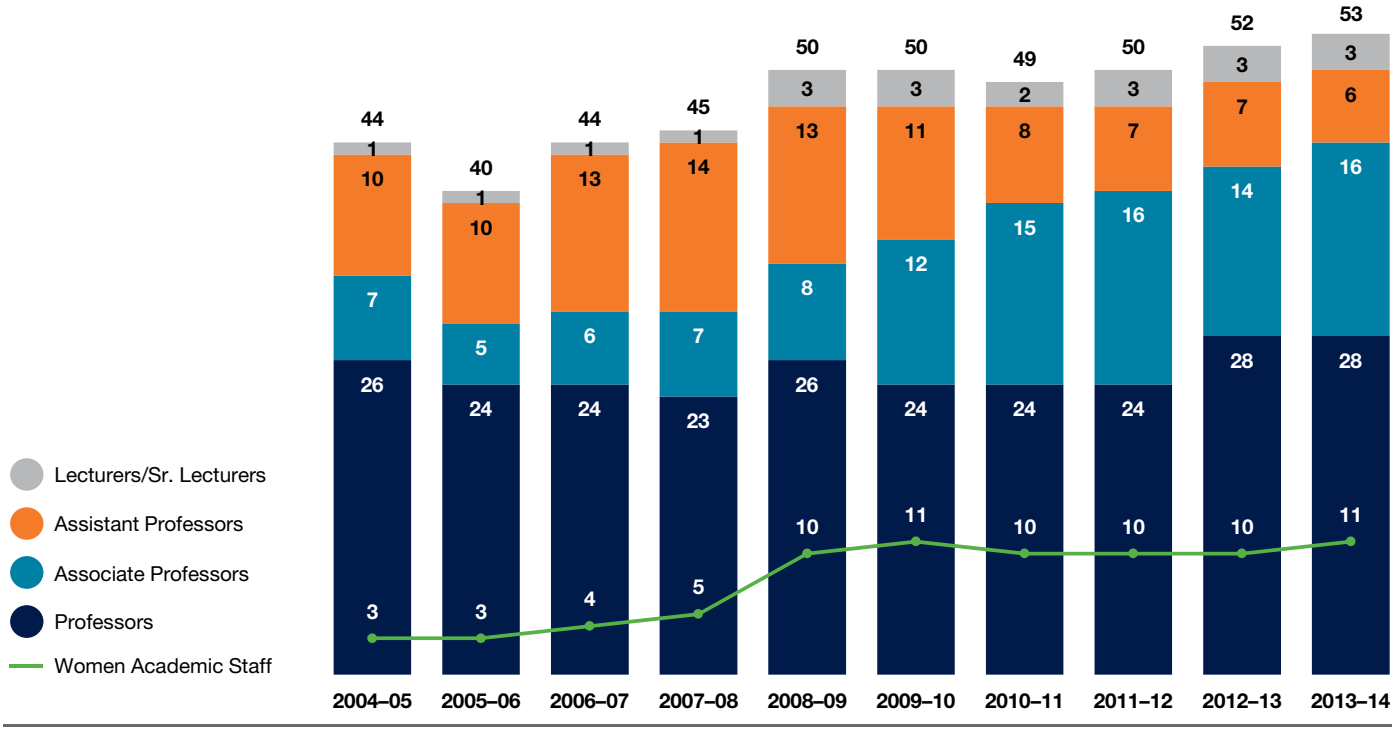
	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Assistant Professors	8	7	11	8	6	6	9	9	8	7
Women Assistant Professors	3	3	4	3	2	2	2	2	3	2
% Women Assistant Professors	**37.5%**	**42.9%**	**36.4%**	**37.5%**	**33.3%**	**33.3%**	**22.2%**	**22.2%**	**37.5%**	**28.6%**
Associate Professors	9	9	6	10	12	12	11	10	11	11
Women Associate Professors	1	1	1	2	3	3	3	2	2	3
% Women Associate Professors	**11.1%**	**11.1%**	**16.7%**	**20.0%**	**25.0%**	**25.0%**	**27.3%**	**20.0%**	**18.2%**	**27.3%**
Professors	18	19	15	15	15	15	17	19	17	16
Women Professors	0	0	0	0	0	0	0	1	1	1
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**5.3%**	**5.9%**	**6.3%**
Lecturers/ Sr. Lecturers	0	0	0	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	35	32	33	33	33	37	38	36	34
Women Tenured and Tenure Stream	4	4	5	5	5	5	5	5	6	6
% Women Tenured and Tenure Stream	**11.4%**	**11.4%**	**15.6%**	**15.2%**	**15.2%**	**15.2%**	**13.5%**	**13.2%**	**16.7%**	**17.6%**
Total Academic Staff	35	35	32	34	34	34	38	39	37	35
Women Academic Staff	4	4	5	5	5	5	5	5	6	6
% Women Academic Staff	**11.4%**	**11.4%**	**15.6%**	**14.7%**	**14.7%**	**14.7%**	**13.2%**	**12.8%**	**16.2%**	**17.1%**

Figure H.6 **The Edward S. Rogers Sr. Department of Electrical & Computer Engineering: Academic Staff by Position with Percentage of Women, 2004–2005 to 2013–2014**



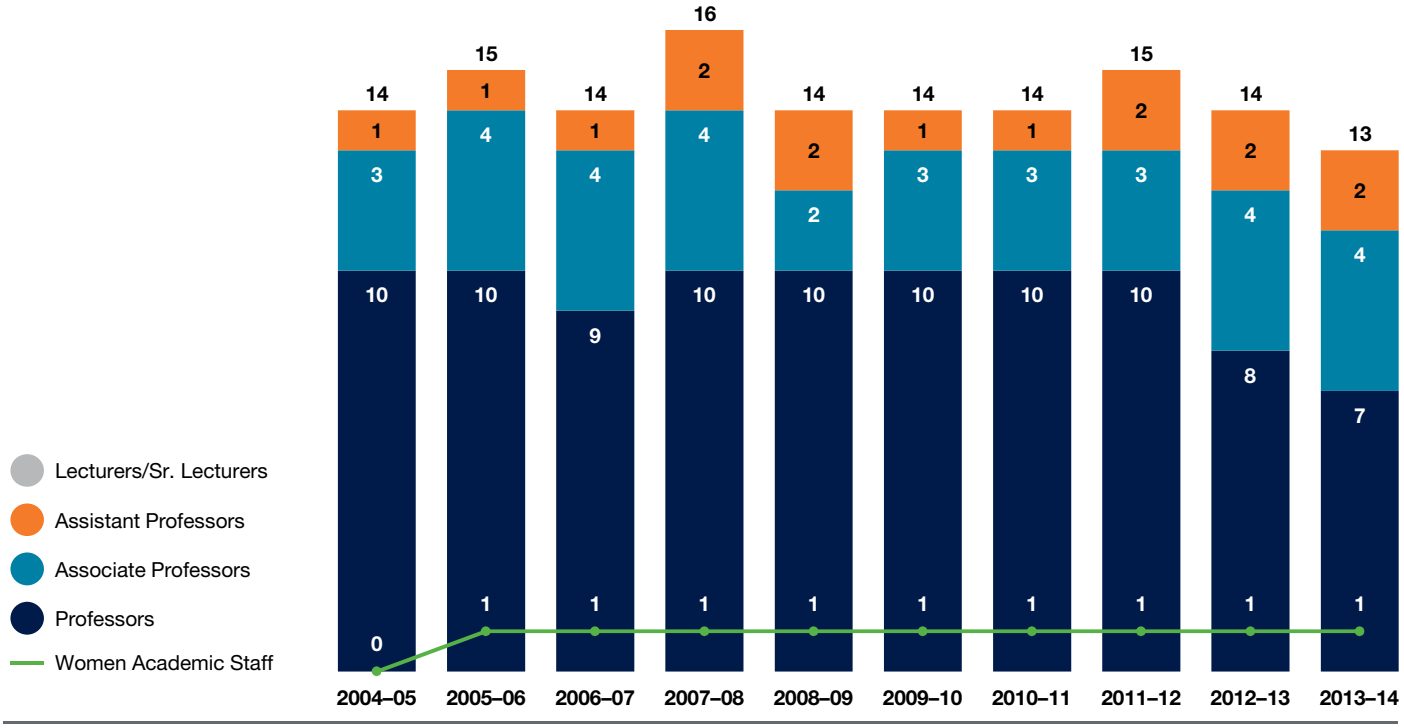
	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Assistant Professors	35	28	25	18	9	8	7	9	11	9
Women Assistant Professors	4	4	5	3	2	2	2	2	2	1
% Women Assistant Professors	**11.4%**	**14.3%**	**20.0%**	**16.7%**	**22.2%**	**25.0%**	**28.6%**	**22.2%**	**18.2%**	**11.1%**
Associate Professors	9	14	15	22	26	26	25	25	22	20
Women Associate Professors	1	1	0	1	3	4	4	4	4	4
% Women Associate Professors	**11.1%**	**7.1%**	**0.0%**	**4.5%**	**11.5%**	**15.4%**	**16.0%**	**16.0%**	**18.2%**	**20.0%**
Professors	32	30	30	25	30	32	34	34	39	43
Women Professors	0	0	0	0	0	0	0	0	1	2
% Women Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.6%**	**4.7%**
Lecturers/ Sr. Lecturers	3	5	5	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	**33.3%**	**20.0%**	**20.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**
Total Tenured and Tenure Stream	76	72	70	65	65	66	66	68	72	72
Women Tenured and Tenure Stream	5	5	5	4	5	6	6	6	7	7
% Women Tenured and Tenure Stream	**6.6%**	**6.9%**	**7.1%**	**6.2%**	**7.7%**	**9.1%**	**9.1%**	**8.8%**	**9.7%**	**9.7%**
Total Academic Staff	79	77	75	69	69	70	70	72	76	76
Women Academic Staff	6	6	6	5	6	7	7	7	8	8
% Women Academic Staff	**7.6%**	**7.8%**	**8.0%**	**7.2%**	**8.7%**	**10.0%**	**10.0%**	**9.7%**	**10.5%**	**10.5%**

Figure H.7 **Department of Mechanical & Industrial Engineering: Academic Staff by Position with Percentage of Women, 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
Assistant Professors	10	10	13	14	13	11	8	7	7	6
Women Assistant Professors	0	0	0	1	5	6	5	5	4	2
% Women Assistant Professors	**0.0%**	**0.0%**	**0.0%**	**7.1%**	**38.5%**	**54.5%**	**62.5%**	**71.4%**	**57.1%**	**33.3%**
Associate Professors	7	5	6	7	8	12	15	16	14	16
Women Associate Professors	3	2	2	2	2	2	3	3	3	6
% Women Associate Professors	**42.9%**	**40.0%**	**33.3%**	**28.6%**	**25.0%**	**16.7%**	**20.0%**	**18.8%**	**21.4%**	**37.5%**
Professors	26	24	24	23	26	24	24	24	28	28
Women Professors	0	1	2	2	2	2	2	2	3	3
% Women Professors	**0.0%**	**4.2%**	**8.3%**	**8.7%**	**7.7%**	**8.3%**	**8.3%**	**8.3%**	**10.7%**	**10.7%**
Lecturers/ Sr. Lecturers	1	1	1	1	3	3	2	3	3	3
Women Lecturers/ Sr. Lecturers	0	0	0	0	1	1	0	0	0	0
% Women Lecturers/ Sr. Lecturers	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**33.3%**	**33.3%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Total Tenured and Tenure Stream	43	39	43	44	47	47	47	47	49	50
Women Tenured and Tenure Stream	3	3	4	5	9	10	10	10	10	11
% Women Tenured and Tenure Stream	**7.0%**	**7.7%**	**9.3%**	**11.4%**	**19.1%**	**21.3%**	**21.3%**	**21.3%**	**20.4%**	**22.0%**
Total Academic Staff	44	40	44	45	50	50	49	50	52	53
Women Academic Staff	3	3	4	5	10	11	10	10	10	11
% Women Academic Staff	**6.8%**	**7.5%**	**9.1%**	**11.1%**	**20.0%**	**22.0%**	**20.4%**	**20.0%**	**19.2%**	**20.8%**

Figure H.8 **Department of Materials Science & Engineering: Academic Staff by Position with Percentage of Women, 2004–2005 to 2013–2014**

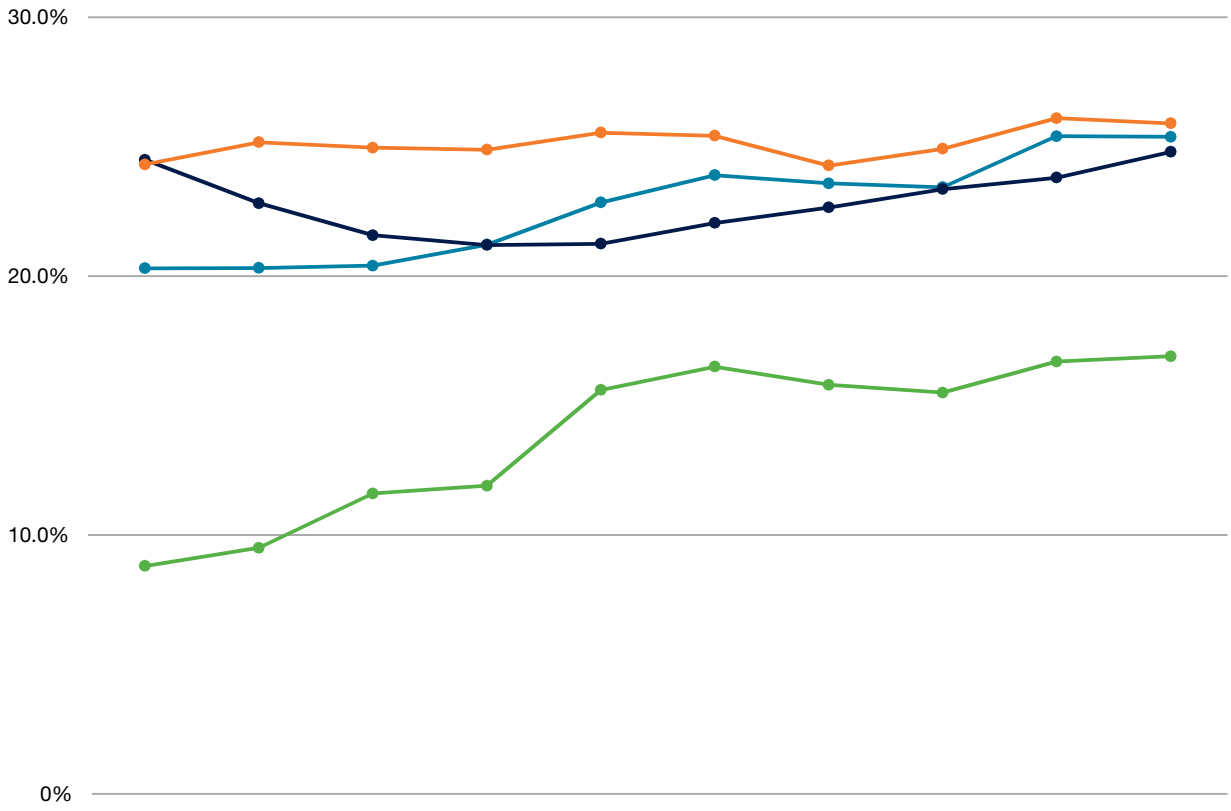


	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14
Assistant Professors	1	1	1	2	2	1	1	2	2	2
Women Assistant Professors	0	0	0	0	0	0	0	0	0	0
% Women Assistant Professors	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Associate Professors	3	4	4	4	2	3	3	3	4	4
Women Associate Professors	0	1	1	1	1	1	1	1	1	1
% Women Associate Professors	**0.0%**	**25.0%**	**25.0%**	**25.0%**	**50.0%**	**33.3%**	**33.3%**	**33.3%**	**25.0%**	**25.0%**
Professors	10	10	9	10	10	10	10	10	8	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	14	15	14	16	14	14	14	15	14	13
Women Tenured and Tenure Stream	0	1	1	1	1	1	1	1	1	1
% Women Tenured and Tenure Stream	**0.0%**	**6.7%**	**7.1%**	**6.3%**	**7.1%**	**7.1%**	**7.1%**	**6.7%**	**7.1%**	**7.7%**
Total Academic Staff	14	15	14	16	14	14	14	15	14	13
Women Academic Staff	0	1	1	1	1	1	1	1	1	1
% Women Academic Staff	**0.0%**	**6.7%**	**7.1%**	**6.3%**	**7.1%**	**7.1%**	**7.1%**	**6.7%**	**7.1%**	**7.7%**

Appendix I: Women at U of T Engineering

Increasing diversity, and in particular gender diversity, among students and faculty members continues to be a priority across our Faculty. Appendix I presents a series of figures that illustrate the number of women undergraduates, graduate students and faculty within U of T Engineering.

Figure I.1 **Percentage of Women Students and Faculty in Engineering, 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
First Year Undergrad	20.3%	20.3%	20.4%	21.2%	22.8%	23.9%	23.6%	23.4%	25.4%	25.4%
All Undergrad	24.5%	22.8%	21.6%	21.2%	21.3%	22.1%	22.7%	23.4%	23.8%	24.8%
Graduate Students	24.3%	25.2%	25.0%	24.9%	25.5%	25.4%	24.3%	24.9%	26.1%	25.9%
Faculty	8.8%	9.5%	11.6%	11.9%	15.6%	16.5%	15.8%	15.5%	16.7%	16.9%

Figure I.2 **Total Number of Faculty with Percentage of Women, 2004–2005 to 2013–2014**

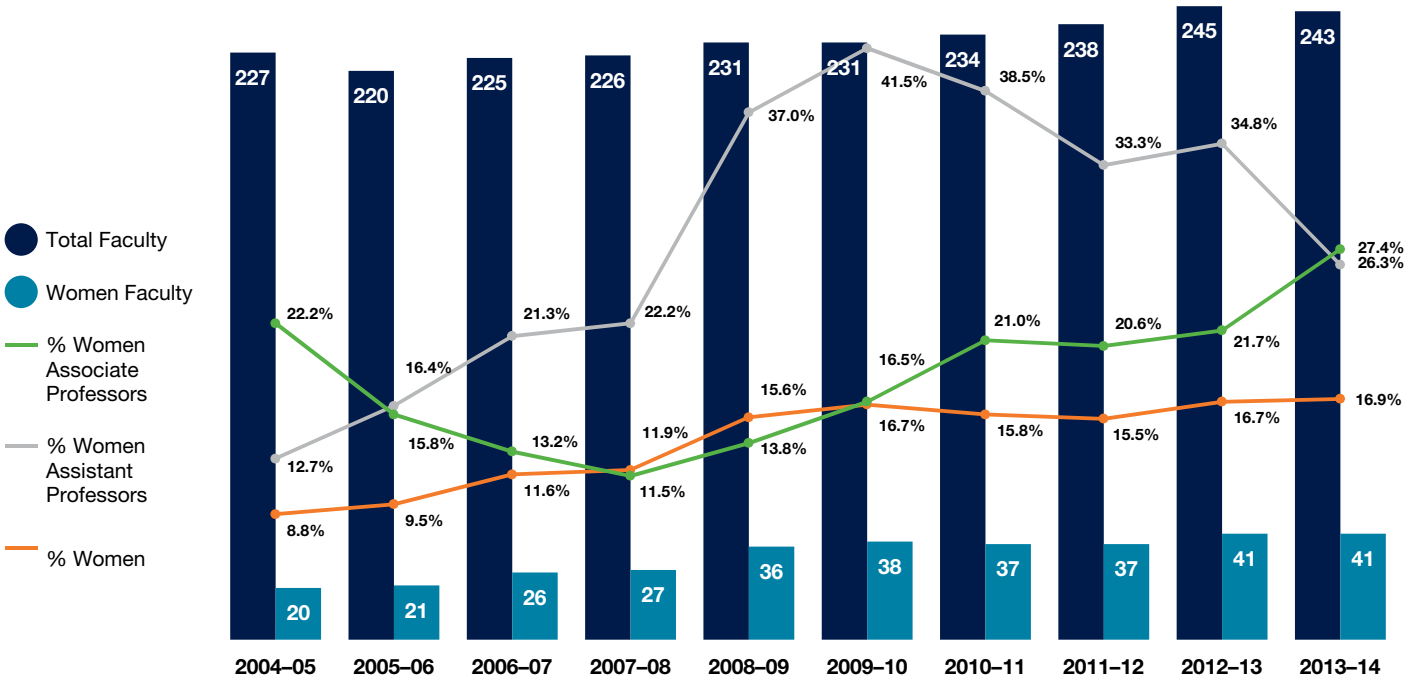
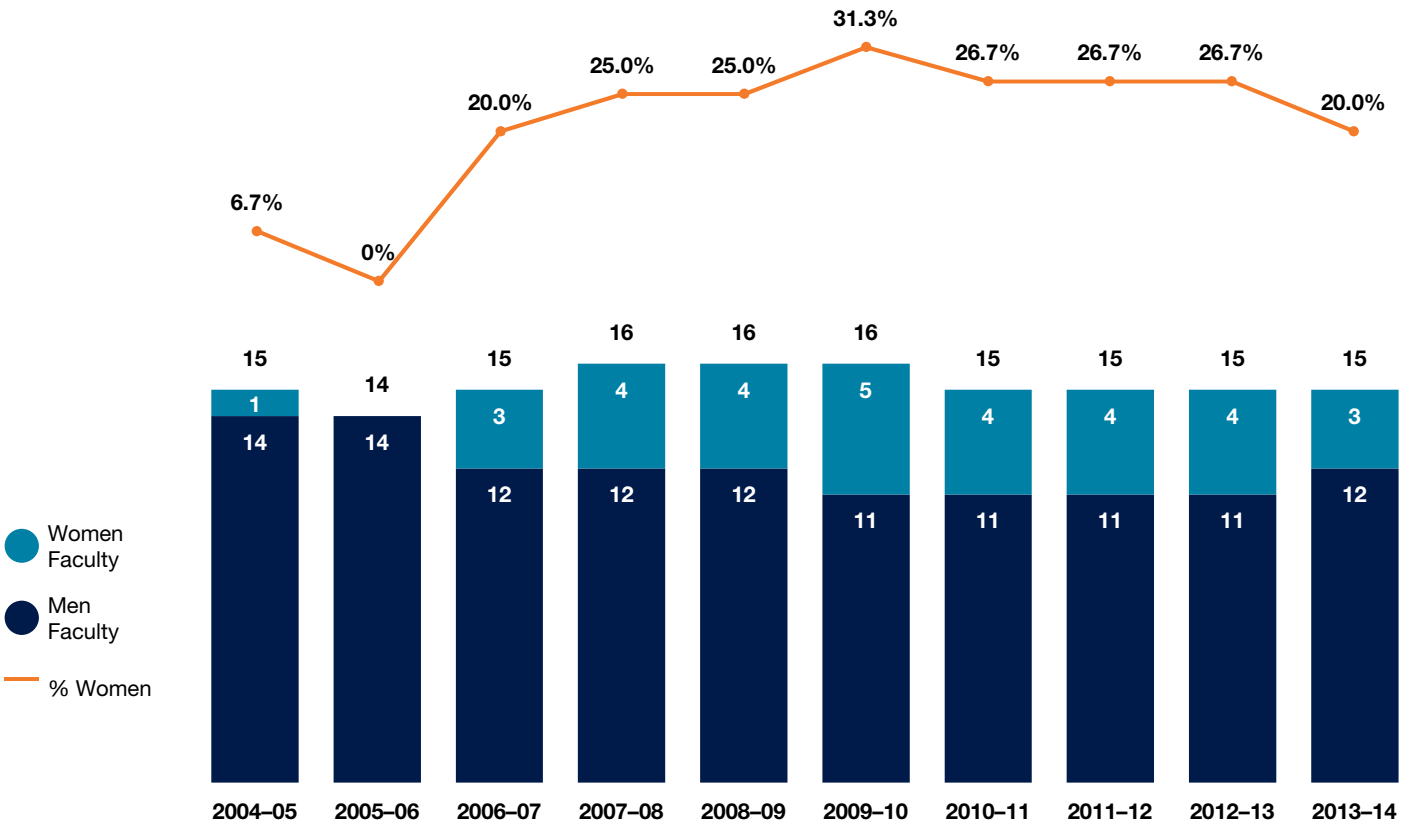
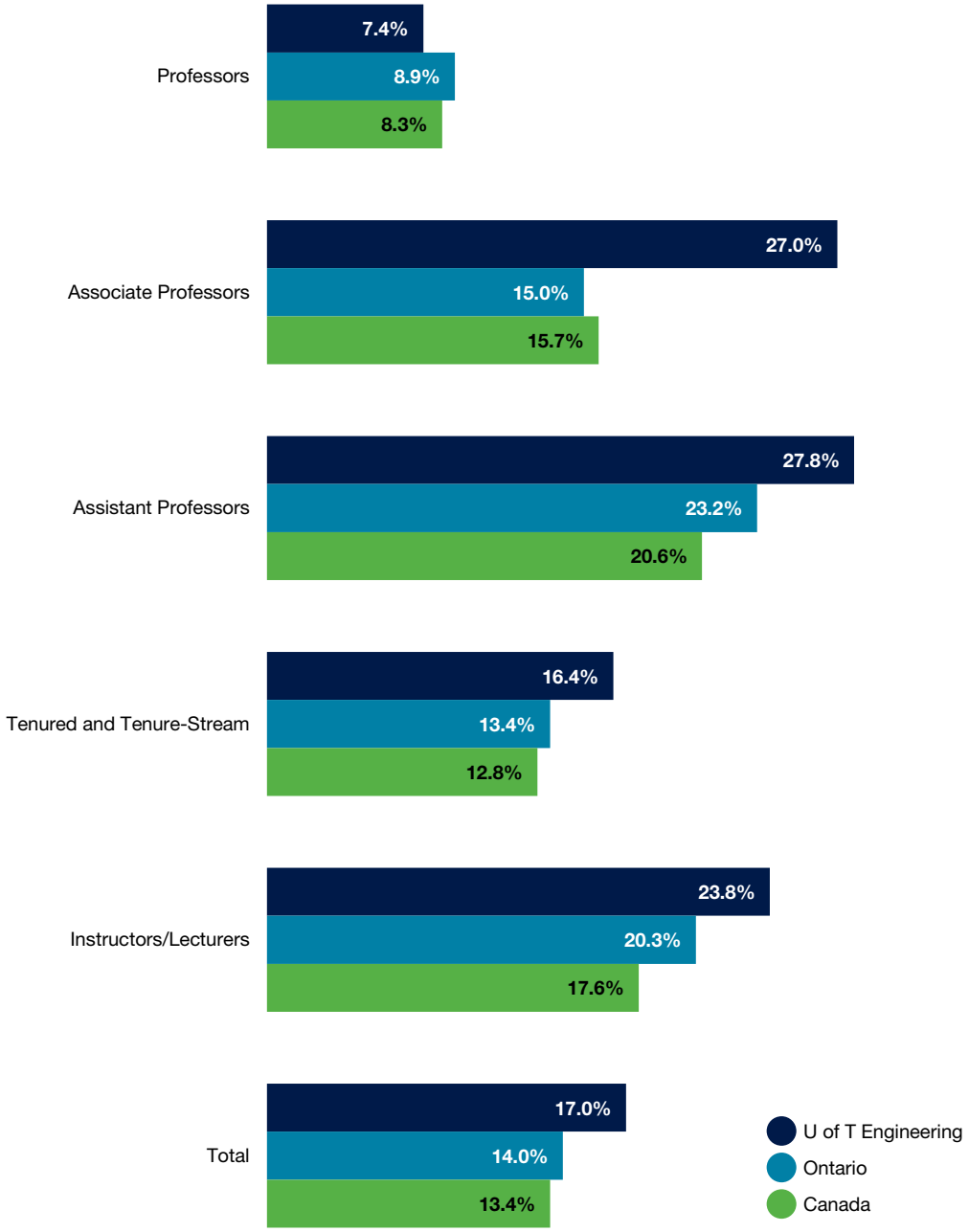


Figure I.3 **Academic Administrative Faculty Roles and Percentage of Women, 2004–2005 to 2013–2014**



Note I.3: 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.

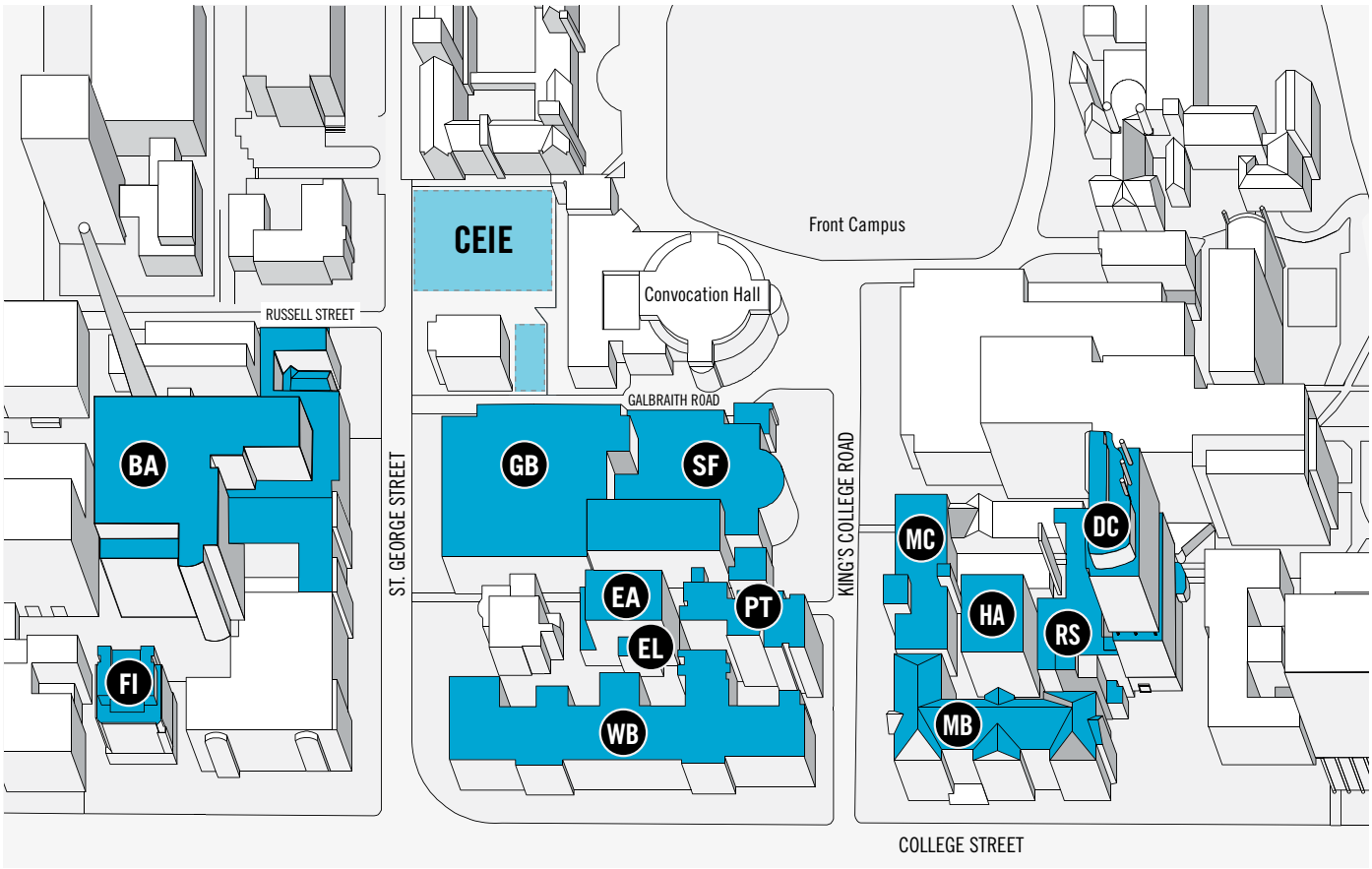
Figure I.4 **Percentage of Women Faculty at U of T Engineering Compared with Women Faculty in Ontario and Canadian Engineering Faculties, 2013**



Note I.4: Based on November 15, 2013 data analyzed by Engineers Canada.

Appendix J: 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 and our offices located at 256 McCaul Street and 704 Spadina Avenue (not pictured), these 17 sites house our students, faculty, staff, research and teaching spaces. For details on the buildings we occupy, please see chapter 10, *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 (future home)

Note Appendix J: U of T Engineering offices formerly located at 245 College Street have been relocated to 704 Spadina Avenue.

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, 2013–2014 Information provided by Assistant Dean, Administration, Faculty of Applied Science & Engineering. A current organizational chart is also available online at www.engineering.utoronto.ca/About/deans_office/Academic_Administrative_Leadership.htm.
	Comparison of U of T Engineering with Ontario and Canada, 2013–2014 Enrolment, degrees granted and faculty data are based on the 2013 calendar year and come from the National Council of Deans of Engineering and Applied Science (NCDEAS) 2013 Resources Report, prepared by Engineers Canada and circulated to Canadian engineering deans in July 2014. Undergraduate enrolment figures exclude non-degree students and those doing a Professional Experience Year (PEY). Full-time equivalent (FTE) enrolment statistics represent averages that take into account all three terms of the year (winter, summer and fall). Undergraduate FTE shows the three-term total divided by two; Graduate FTE shows the three-term total divided by three. Research funding data comes from the Natural Sciences and Engineering Research Council (NSERC) search engine (www.nserc-crsng.gc.ca/ase-oro/index_eng.asp) and includes grants only for the 2012–13 NSERC fiscal year (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 2013–14 grant year (April to March).
	Comparison of U of T Engineering with St. George Campus and University of Toronto, 2013–2014 All student enrolment statistics are based on headcount for Fall 2013 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 2013 to June 2014 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 2012–13 grant year and exclude partner hospitals; includes all program types; data current as of May 2014. Engineering academic staff statistics provided by Assistant Dean, Administration, Faculty of Applied Science & Engineering (based on HRIS and published lists of faculty members). Engineering administrative and technical staff statistic from 2013 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 2013. 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, May 2014. U of T and St. George space statistics from U of T Facts and Figures 2013, which is available online at: www.utoronto.ca/about-uoft/measuring-our-performance/facts-figures/facts-figures-2013
	Chapter 1: Undergraduate Studies
1.1	**Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2004 to 2013** 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: Faculty = Faculty of Applied Science & Engineering, New Students Only (based on candidacy session). Cube Parameters: All Fall Terms for 2004–13, Year 1 (SESLEV), First Time Registered (LEVSTAT), Measure = Headcount.
1.2	**Ontario Secondary School Averages of Incoming First-Year Undergraduates and Retention Rate Between First and Second Year, 2004 to 2013** Averages of incoming first-year 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, October 2013 and January 2014.

1.3 **Incoming First-Year Undergraduates with Percentage of Women and International Students, 2004 to 2013**

Headcount from U of T Undergraduate Enrolment Cube. Excludes students with special status. Cube Parameters: All Fall Terms for 2004–13; First Time Registered (LEVSTAT); 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 2013**

Headcount from University of Toronto Enrolment Master Files, the source of U of T Reporting Cube. Includes new and returning students. Excludes students with special status. Cube Parameters: Year 1 (SESLEV); Fall Terms for 2005–13; Degree Type = Undergraduate; excludes students with special status.

1.5 **International and Domestic Undergraduate Enrolment, 2004–2005 to 2013–2014**

Headcount from U of T Undergraduate Enrolment Reporting Cube. Excludes students with special status. Cube Parameters: Fall Terms for 2004–13; Degree Type = Undergraduate; Excludes students with special status.

1.6 **Undergraduates by Program, Year of Study and Professional Experience Year (PEY), 2013–2014**

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 2013; Departments based on [Programs] field; Degree Type = Undergraduate.

1.7 **Undergraduates by Program, 2004–2005 to 2013–2014**

Headcount for the fall of each year 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 2004–13; 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, 2004–2005 to 2013–2014**

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

1.8b **Total Value of Undergraduate Need-Based Awards and Percentage Distributed by Year of Study, 2004–2005 to 2013–2014**

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

1.9a **Undergraduate Degrees Awarded by Program, 2004–2005 to 2013–2014**

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, 2012**

U of T and Canadian statistics are based on the 2012 calendar year and come from Engineers Canada Report of Enrolment & Degrees Granted (*Canadian Engineers for Tomorrow, 2008–12*), revised December 2013, and available online at: www.engineerscanada.ca/sites/default/files/ enrolment_report_2012_eng.pdf. American statistics used to calculate North American percentages are based on the 2011–12 academic year and come from the 2013 American Society of Engineering Educators (ASEE) Report, available online at: www.asee.org/papers-and-publications/publications/college-profiles

1.10 **Undergraduate Student-Faculty Ratios by Academic Area, 2013–2014**
Number of undergraduates from U of T Undergraduate Enrolment Reporting Cube. Excludes students on PEY internship and students with special status. Cube Parameters: Fall 2013, Degree Type = Undergraduate; AssocOrg = blank (to exclude PEYs); Measure = Headcount. Faculty Total does not include teaching done for Engineering by extra-divisional units (especially Arts & Science departments). Results are not adjusted for departmental contributions to shared first-year curriculum, Engineering Science or Engineering minors. FTE faculty counts are derived from 2014–15 (FY15) budget calculations, based on data from 2013–14. Calculation includes tenured / tenure-stream and lecturers / teaching stream faculty.

1.11a **PEY Internship Placements for Engineering Undergraduates with Percentage Participation from Previous Third-Year Class, 2004–2005 to 2013–2014**
Statistics provided by Assistant Director, Engineering Career Centre, Faculty of Applied Science & Engineering.

1.11b **PEY Internship Placements, 2008–2009 to 2013–2014**
Statistics provided by Assistant Director, Engineering Career Centre, Faculty of Applied Science & Engineering.

1.11c **PEY Employers, 2008–2009 to 2013–2014**
Statistics provided by Assistant Director, Engineering Career Centre, Faculty of Applied Science & Engineering.

1.12a **Undergraduate Participation in Summer Research Opportunities, 2009-2010 to 2013-2014**
Information regarding Canadian placements provided by each department and division within the Faculty of Applied Science & Engineering. International placement statistics provided by the University of Toronto's Centre for International Experience.

1.12b **Undergraduate Participation in Summer Research Opportunities, 2014**
Information regarding Canadian placements provided by each department and division within the Faculty of Applied Science & Engineering. International placement statistics provided by the University of Toronto's Centre for International Experience.

Text **Pre-University Engineering Outreach**
Information and statistics provided by Associate Director, Engineering Student Outreach Office, Faculty of Applied Science & Engineering.

Chapter 2: **Graduate Studies**

2.1a **Applications, Offers, Registrations, Selectivity and Yield of Graduate Students, 2004–2005 to 2013–2014**
All data from ROSI download: 4BEG (Admissions Statistics)

2.1b **Applications, Offers, Registrations, Selectivity and Yield of Graduate Students by Degree Type, 2004–2005 to 2013–2014**
All data from ROSI download: 4BEG (Admissions Statistics)

2.2a **International and Domestic Graduate Students by Degree Type, with Percentage of International Students, 2004–2005 to 2013–2014**
Student counts for fall terms from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: All Fall Terms for 2004–13, Measure = Headcount.

2.2b **Graduate Students by Degree Type and Gender, with Percentage of Women, 2004–2005 to 2013–2014**
Student counts for fall terms from U of T Graduate Enrolment Reporting Cube. Excludes special status students. Cube Parameters: All Fall Terms for 2004–13; Measure = Headcount.

2.2c **Graduate Student Enrolment by Full-Time Equivalent (FTE) and Headcount (HC) by Academic Area, 2004–2005 to 2013–2014**

All enrolment counts are from U of T Graduate Enrolment Reporting Cube. Cube Parameters: Measure = Headcount or Total FTE (UAR). Headcounts are reported for all fall terms for 2004–13. FTEs are counted by academic year as reported in the cube (May to April).

2.2d **Graduate Students: International and Domestic Full-Time Equivalent (FTE) and Domestic Eligible Full-Time Equivalent (EFTE), 2004–2005 to 2013–2014**

EFTE and headcount for fall terms from U of T Graduate Enrolment Reporting Cube. Cube Parameters: All Fall terms for 2004–13, Measure = Headcount or Eligible FTE.

2.3a **Graduate and Undergraduate Full-Time Equivalent Student-Faculty Ratios, 2004–2005 to 2013–2014**

Number of undergraduates from U of T Undergraduate Enrolment Reporting Cube. Excludes students on PEY internship and students with special status. Cube Parameters: Fall terms 2004–13; Degree Type = Undergraduate; Measure = Headcount. AssocOrg = blank (to exclude PEY). Number of FTE graduate students from U of T Graduate Enrolment Reporting Cube. Cube Parameters: Fall terms 2004–13; Measure = Total FTE (UAR); excludes students with special status. Number of faculty included in the calculation provided by Assistant Dean, Administration, Faculty of Applied Science & Engineering (based on HRIS and published lists of faculty).

2.3b **Full-Time Equivalent (FTE) Graduate Student-Faculty Ratios by Academic Area and Degree Type, 2013–2014**

Number of FTE graduate students from U of T Graduate Enrolment Reporting Cube. Cube Parameters: Fall 2013; Measure = Total FTE (UAR). 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. Number of faculty included in the calculation provided by Assistant Dean, Administration, Faculty of Applied Science & Engineering (based on HRIS and published lists of faculty).

2.4a **External Graduate Student Scholarships by Source, 2003–2004 to 2012–2013**

All data from U of T Graduate Student Income Reporting Cube, current as of May 2014 (includes complete 2012–13 academic year). Faculty = Faculty of Applied Science & Engineering. Award Income only.

2.4b **Number of NSERC Graduate Student Award Recipients by Academic Area, 2003–2004 to 2012–2013**

All data from U of T Graduate Student Income Reporting Cube, current as of May 2014 (includes complete 2012–13 academic year). Faculty = Faculty of Applied Science & Engineering. Award Income only. Source = Federal — Natural Sciences and Engineering Research Council. Measure = Student Count.

2.5a **Graduate Student Funding by Category, 2003–2004 to 2012–2013**

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

2.5b **Graduate Student Funding by Category and Academic Area, 2012–2013**

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

2.6 **Number of Students Fast-Tracked from MASc to PhD by Academic Area, 2006–2007 to 2012–2013**

All data from ROSI download: 4FF (Student Registrations). Fast-tracked students are identified by POSt codes that end in 'PHD U.'

2.7 **Time to Graduation for PhD, MASc, MEng and MHSc Graduate Students, 2004–2005 to 2013–2014**

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

2.8 **Graduate Degrees Awarded by Degree Type and Gender, 2004–2005 to 2013–2014**

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

Text **Graduate Studies Initiatives**

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

2.9 **ELITE Certificates Awarded, 2008–2009 to 2013–2014**

Information provided by Faculty Graduate Coordinator, Vice-Dean Graduate Studies Office, Faculty of Applied Science & Engineering.

2.10 **MEng, SCFI Program Enrolment, Fall 2008 to Winter 2014**

Information provided by Graduate Program Administrator, Department of Mechanical & Industrial Engineering.

Chapter 3: **Research**

Text **Selected Research Highlights for 2013–2014**

Information provided by Vice-Dean Research, Faculty of Applied Science & Engineering.

3.1a **Overall Research Funding Breakdown: Research Infrastructure and Research Operating Funding, 2003–2004 to 2012–2013**

Data from the U of T Research Cube. Current as of May 2014. 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 **Canadian Institutes of Health Research (CIHR) and Natural Sciences and Engineering Research Council (NSERC) Funding, 2003–2004 to 2012–2013**

Data from the U of T Research Cube. Current as of May 2014. Organized by grant year (e.g., 2012–2013 = April 2012 to March 2013 = Grant Year 2013). Faculty = Faculty of Applied Science & Engineering.

3.1c **Research Operating Funding by Year, Source and Funding per Faculty Member, 2003–2004 to 2012–2013**

Data from the U of T Research Cube. Current as of May 2014. Organized by grant year (e.g., 2012–13 = April 2012 to March 2013 = Grant Year 2013). Faculty = Applied Science & Engineering. Categories as defined in footnote to Figure 3.1a. Number of faculty included in the calculation provided by 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 **Natural Sciences and Engineering Research Council (NSERC) Funding, 2012–2013**

Data from the U of T Research Cube. Current as of May 2014. Organized by grant year (e.g., 2012–13 = April 2012 to March 2013 = Grant Year 2013). Faculty = Faculty of Applied Science & Engineering.

3.2b **NSERC Industrial Partnership Funding by Program, 2003–2004 to 2012–2013**

Data from the U of T Research Cube. Current as of May 2014. Organized by grant year (e.g., 2012–13 = April 2012 to March 2013 = Grant Year 2013). Faculty = Faculty of Applied Science & Engineering.

3.2c **Industrial Partnerships as a Proportion of Total NSERC Funding, 2003–2004 to 2012–2013**

Data from the U of T Research Cube. Current as of May 2014. Organized by grant year (e.g., 2012–13 = April 2012 to March 2013 = Grant Year 2013). Faculty = Faculty of Applied Science & Engineering.

3.2d **Industrial Partnerships, 2013-2014**
Data from the U of T Research Cube. Current as of May 2014. Organized by grant year (e.g., 2012–13 = April 2012 to March 2013 = Grant Year 2013). Faculty = Faculty of Applied Science & Engineering. Sponsor = Corporate. Additional

3.3a **Canadian Peer Universities vs. University of Toronto Share of NSERC Funding for Engineering, Cumulative Five-year Share, 2008–2009 to 2012–2013**
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 Excellence and does not include Indirect Costs of Research.

3.3b **U of T Annual Share of NSERC Funding in Engineering, 2003–2004 to 2012–2013**
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 Excellence and does not include Indirect Costs of Research.

3.4a **Engineering Invention Disclosures by Academic Area, 2009–2010 to 2013–2014**
Report of U of T Commercialization Indicators, Annual Supplement for FY2014, provided by the Office of the Vice President, Research. Data current as of May 1, 2014.

3.4b **U of T Invention Disclosures by Faculty, 2013–2014**
Report of U of T Commercialization Indicators, Annual Supplement for FY2014, provided by the Office of the Vice President, Research. Data current as of May 1, 2014.

3.4c **U of T Patent Applications by Faculty, 2013–2014**
Report of U of T Commercialization Indicators, Annual Supplement for FY2014, provided by the Office of the Vice President, Research. Data current as of May 1, 2014.

3.5 **Distribution of Research Operating Funding by Academic Area, 2003–2004 to 2012–2013**
Data from the U of T Research Cube. Current as of May 2014. Organized by grant year. Faculty = Faculty of Applied Science & Engineering.

Chapter 4: **Cross-Faculty Education and Research**

Text **Selected Cross-Faculty Initiatives**
Information taken from *The Engineering Newsletter,* Faculty of Applied Science & Engineering.

Text **Undergraduate Engineering Minors and Certificates**
Information provided by the Cross-Disciplinary Programs Office, Faculty of Applied Science & Engineering

4.1 **Undergraduate Enrolment in Engineering Minors, 2007–2008 to 2013–2014**
Information provided by the Cross-Disciplinary Programs Office, Faculty of Applied Science & Engineering

Chapter 5: **Awards and Honours**

Text **Selected Awards Received by Faculty Members and Alumni, 2013–2014**
Information provided by Director, Awards and Honours, Faculty of Applied Science & Engineering.

5.1 **Summary of Major International, National and Provincial Awards and Honours, 2004 to 2013**
Information provided by Director, Awards and Honours, Faculty of Applied Science & Engineering.

5.2a	**Number of Major Awards Received by U of T Engineering Compared to other Canadian Engineering Faculties, 2013**
5.2b	**Percentages of Engineering Faculty and Total Major Awards Received in Canadian Engineering Faculties** Information provided by Director, Awards and Honours, Faculty of Applied Science & Engineering.
5.3	**Number of Awards Received by U of T Engineering Faculty Compared to other Canadian Engineering Faculties, 2008 to 2013** Information provided by Director, Awards and Honours, Faculty of Applied Science & Engineering.
Text	**Selected Awards Received by Staff, 2013–2014** Information provided by Director, Awards and Honours, Faculty of Applied Science & Engineering.
Text	**University of Toronto Engineering Faculty Awards, 2010–2011 to 2013–2014** Information provided by Director, Awards and Honours, Faculty of Applied Science & Engineering.
Text	**Engineering Alumni Association Awards, 2012-2013 to 2013-2014** Information provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

Chapter 6: **World Recognition by Rankings**

6.1a	**Shanghai Jiao Tong Academic Ranking of World Universities (ARWU), Top 50 Universities for Engineering/Technology and Computer Sciences, 2013** Data from ARWU website: www.shanghairanking.com/FieldENG2013.html
6.1b	**Canadian Universities in Top 100** Data from ARWU website: www.shanghairanking.com/FieldENG2013.html
6.1c	**Scoring Analysis of Canadian Universities in Top 100** Data from ARWU website: www.shanghairanking.com/FieldENG2013.html
6.2a	**Times Higher Education–Thomson Reuters World University Rankings, Top 50 Universities for Engineering and Information Technology, 2013** Data from THE World University Ranking website: www.timeshighereducation.co.uk/world-university-rankings/2013-14/subject-ranking/subject/engineering-and-IT
6.2b	**Top 25 North American Universities for Engineering and Information Technology, 2013** Data from THE World University Ranking website: www.timeshighereducation.co.uk/world-university-rankings/2013-14/subject-ranking/subject/engineering-and-IT
6.3a	**QS World University Rankings, Top 50 Universities for Engineering and Information Technology, 2013** Data from QS World University Ranking website: www.topuniversities.com/university-rankings/world-university-rankings/2013
6.3b	**Canadian U15 in Top 100 for Engineering and Information Technology, 2013** Data from QS World University Ranking website: www.topuniversities.com/university-rankings/world-university-rankings/2013
6.3c	**Top 20 North American Universities for Engineering and Information Technology, 2013** Data from QS World University Ranking website: www.topuniversities.com/university-rankings/world-university-rankings/2013

6.3d **Canadian Universities in QS World Ranking by Discipline for Engineering and Information Technology, 2013**
Data from QS World University Ranking website: www.topuniversities.com/university-rankings/world-university-

6.4a **National Taiwan University (NTU) Performance Ranking of Engineering Papers for World Universities, 2013**
Data from National Taiwan University Performance Ranking of Scientific Papers for World Universities 2013 website: nturanking.lis.ntu.edu.tw/Default.aspx. Data compiled from Thomson Reuters' science citation indexes.

6.4b **Canadian Universities in NTU Performance Ranking of Engineering Papers by Subject, 2013**
Data from National Taiwan University Performance Ranking of Scientific Papers for World Universities 2013 website: nturanking.lis.ntu.edu.tw/Default.aspx. Data compiled from Thomson Reuters' science citation indexes.

6.5a **Number of Engineering Publications Indexed by Thomson Reuters Association of American Universities (AAU) Public and Canadian Institutions, 2008 to 2012**
Data from Thomson Reuters University Science Indicators 2012 Standard Edition, covering 2008–12. Includes public peer institutions in Canada (U15) and U.S. (AAU plus University of California at San Francisco).

6.5b **Summary of U15 Bibliometrics for Publications**
Data from Thomson Reuters University Science Indicators 2012 Standard Edition, covering 2008–12. Includes public peer institutions in Canada (U15) and U.S. (AAU plus University of California at San Francisco). Faculty counts for analysis of U15 publications per faculty member are from the Engineers Canada 2013 Resources Report.

6.6a **Number of Engineering Citations Indexed by Thomson Reuters Association of American Universities (AAU) Public and Canadian Peer Institutions, 2008 to 2012**
Data from Thomson Reuters University Science Indicators 2012 Standard Edition, covering 2008–12. Includes public peer institutions in Canada (U15) and U.S. (AAU plus University of California at San Francisco).

6.6b **Summary of U15 Bibliometrics for Citations**
Data from Thomson Reuters University Science Indicators 2012 Standard Edition, covering 2008–12. Includes public peer institutions in Canada (U15) and U.S. (AAU plus University of California at San Francisco). Faculty counts for analysis of U15 publications per faculty member are from the Engineers Canada 2013 Resources Report.

6.7a **Summary of University of Toronto Engineering Performance in World Rankings, 2011 to 2013**
Compiled from other figures in this chapter and corresponding figures in previous Annual Reports.

6.7b **Summary of University of Toronto Engineering Performance in World Rankings by Subject or Category, 2011 to 2013**
Compiled from other figures in this chapter and corresponding figures in previous Annual Reports.

Chapter 7: **Advancement**

7.1a **Advancement Results, 2013–2014**
Statistics provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

7.1b **Philanthropic Support, 2012-2013 to 2013-2014**
Statistics provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

7.1c **Gift Designations, 2012-2013 to 2013-2014**
Statistics provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

7.1d **Graditude Participation, 2009–2010 to 2013–2014**
Statistics provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

Text	**Initiatives and Projects for 2013–2014**
7.2	**Alumni Events by City, 2013-2014** Statistics provided by the Office of Advancement and Alumni Relations, Faculty of Applied Science & Engineering.

Chapter 8: **Communications**

Text	**Selected Communication Projects for 2013–2014** Information provided by Engineering Strategic Communications, Faculty of Applied Science & Engineering.
8.1a	**U of T Engineering Media Stories by Channel, 2013–2014** Statistics provided by University of Toronto Strategic Communications. Data represents information collected between May 2013 and April 2014.
8.1b	**Proportion of U of T Engineering Media Stories by Academic Area, 2013–2014** Statistics provided by University of Toronto Strategic Communications. Data represents information collected between May 2013 and April 2014.
8.1c	**Proportion of U of T Engineering Media Stories by Location, 2013–2014** Statistics provided by University of Toronto Strategic Communications. Data represents information collected between May 2013 and April 2014.
8.1d	**Media Coverage by Month, 2013–2014** Statistics provided by University of Toronto Strategic Communications. Data represents information collected between May 2013 and April 2014.
8.1e	**Top Engineering Stories on U of T News Website, 2013–2014** Statistics provided by University of Toronto Strategic Communications. Data represents information collected between May 2013 and April 2014.
Text	**Online Activity** Information provided by Engineering Strategic Communications, Faculty of Applied Science & Engineering.
8.2a	**Summary of Analytics for Faculty Website, 2012–2013 to 2013–2014** Website: engineering.utoronto.ca. Website statistics sourced from Google Analytics.
8.2b	**Visitors to Website for Prospective Undergraduate Students: Top 9 Countries, 2013–2014** Website: discover.engineering.utoronto.ca. Website statistics sourced from Google Analytics.

Chapter 9: **International Initiatives**

Text	**Selected Highlights of Global Impact for 2013–2014** Information taken from *The Engineering Newsletter,* Faculty of Applied Science & Engineering.
Text	**Selected International Partnerships for 2013–2014** Information taken from *The Engineering Newsletter*, Faculty of Applied Science & Engineering.

Chapter 10: **Financial and Physical Resources**

10.1 **Total Revenue, 2006–2007 to 2013–2014**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

10.2 **Total Central Costs, 2006–2007 to 2013–2014**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

10.3 **Budget Data, 2006–2007 to 2013–2014**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

10.4 **Revenue Sources, 2013–2014**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

10.5 **Revenue Distribution, 2013–2014**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

10.6 **Total Operating Budget: Breakdown by Expense, 2013–2014**
Information provided by Chief Financial Officer, Faculty of Applied Science & Engineering.

Text **Dean's Strategic Fund**
Information provided by Office of the Dean, Faculty of Applied Science & Engineering.

Text **Engineering Instructional Innovation Program**
Information provided by Office of the Dean, Faculty of Applied Science & Engineering.

10.7 **Summary of Buildings Occupied by Engineering, 2013–2014**
Data provided by Director, Facilities & Infrastructure Planning, Faculty of Applied Science & Engineering.

Text **Projects Completed in 2013–2014**
Information provided by Director, Facilities & Infrastructure Planning, Faculty of Applied Science & Engineering.

Text **Projects Underway**
Information provided by Director, Facilities & Infrastructure Planning, Faculty of Applied Science & Engineering.

Appendices

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

B **Student Clubs and Teams**
Information from the Engineering Society: www.skule.ca

C **Time to Completion for Graduate Students, 2004–2005 to 2013–2014**
All data from ROSI 4BEA downloads, 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.

D **Research Chairs**
Information from: Canada Research Chair website: www.chairs-chaires.gc.ca/home-accueil-eng.aspx; Industrial Research Chair website: www.nserc-crsng.gc.ca/Professors-Professeurs/CFS-PCP/IRC-PCI_eng.asp; the Office of Advancement, Faculty of Applied Science & Engineering; the Office of the Vice-Dean, Research, Faculty of Applied Science & Engineering; and, Assistant Dean, Administration, Faculty of Applied Science & Engineering.

E **Research Funding by Academic Area**

Data is from the U of T Research Cube, current as of May 2014, 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.,

F **Spin-off Companies**

Report of U of T Commercialization Indicators, Annual Supplement for FY2014, provided by the Office of the Vice President, Research. Data current as of May 1, 2014.

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 Assistant Dean, Administration, Faculty of Applied Science & Engineering. Women academic staff include all ranks of professor plus lecturers / senior lecturers.

I **Women at U of T Engineering**

- **I.1:** Graduate, undergraduate and first-year headcount from U of T Enrolment Reporting Cube. Enrolment excludes students with special status. Number of faculty provided by Assistant Dean, HR & Diversity, Faculty of Applied Science & Engineering.
- **I.2:** Information provided by Assistant Dean, HR & Diversity, Faculty of Applied Science & Engineering.
- **I.3:** Information provided by Assistant Dean, HR & Diversity, Faculty of Applied Science & Engineering.
- **I.4:** Information from 2013 Resources Survey prepared by Engineers Canada for the National Council of Deans of Engineering and Applied Science. Data represents November 15, 2013 counts.

J **The Engineering Precinct**

Information from Office of Space Management. Visit map.utoronto.ca for a full campus map.

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