2 Graduate Studies

Our reputation for excellence in engineering research and education enables us to recruit talented graduate students from across Canada and around the world. Through a rich suite of academic, co-curricular and experiential learning opportunities, we empower them to become leaders in their fields.

Our graduate students continue to earn prestigious honours such as the Vanier Canada Graduate Scholarships. Across our professional and research-based programs, total enrolment is now 2,415, a new high for our graduate programs and an increase of almost two-thirds since 2008. Much of this growth has been driven by higher enrolment in our MEng and PhD programs, particularly among international students.

Recruiting domestic candidates for PhD and MASc programs continues to be a priority for our Faculty. We are founding members of the Canadian Graduate Engineering Consortium, which coordinates efforts from our Faculty leadership, our departments and our peer institutions to raise awareness of the impact that Canadian students can make through engineering graduate studies. Our Graduate Research Days event, held each February, continues to attract many outstanding applicants, and we conduct similar recruitment events across the country.

We have enhanced our curricular and co-curricular offerings to ensure our graduates are well-prepared for careers in academia, industry and other sectors. In 2017–2018, we launched the Opportunities for PhDs: Transitions, Industry Options, Networking and Skills (OPTIONS) program, which builds on the success of our Prospective Professors in Training (PPIT) program. We also initiated a new career fair for graduate students that attracted leading companies in a variety of sectors. Our Cross-Faculty Collaborative Master's Specialization in Psychology and Engineering (PsychEng) and our MEng emphasis in Forensic Engineering enrolled their first students in September 2017. Our new MEng emphasis in Analytics launched in January 2018.

Through campus-linked accelerators such as the Hatchery Launch Lab, we provide opportunities for our graduate students to translate their innovative discoveries into market-ready solutions. Mentorship, seed funding and infrastructure provided by U of T Engineering has helped launch companies such as Trexo Robotics, SensOR Medical Laboratories Ltd. and Aurorem.

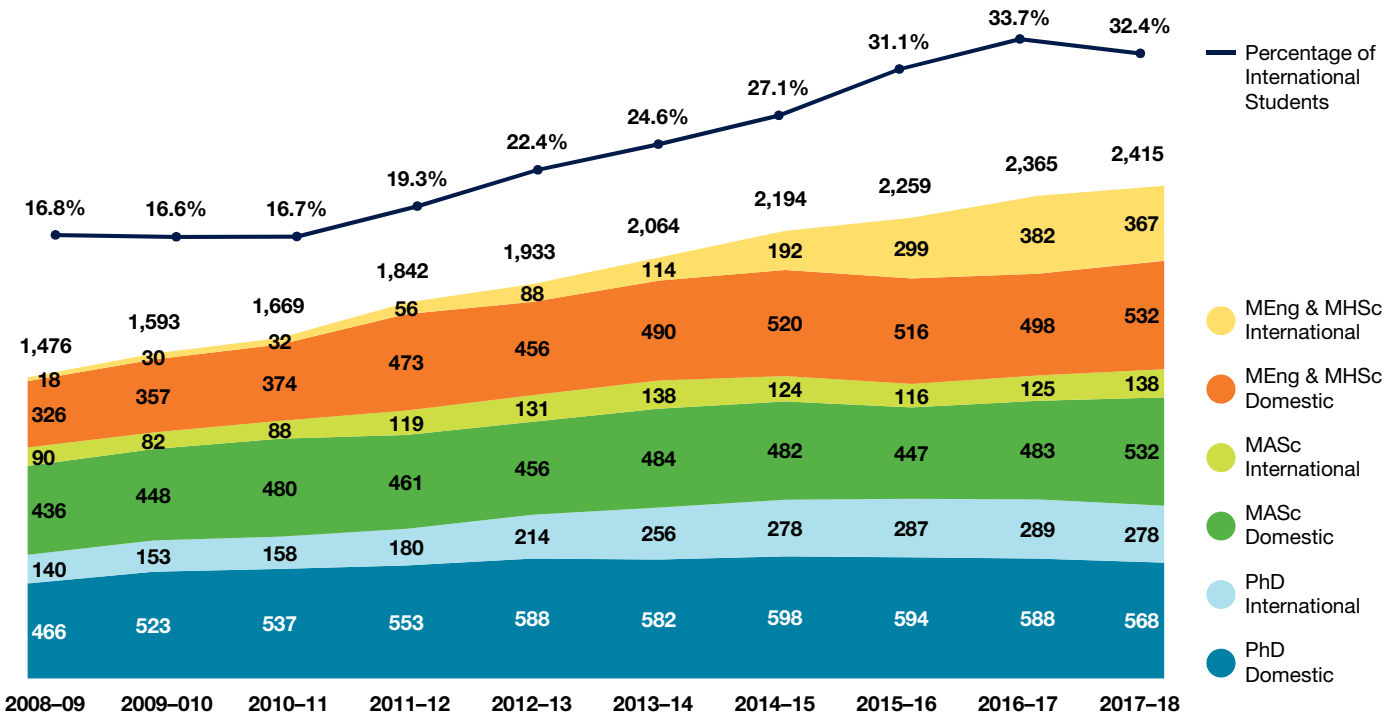
Enrolment

Our renowned, leading-edge research drives our recruitment of the world's top candidates for MEng, MASc, MHSc and PhD studies. Through curricular and co-curricular programs, we enable them to develop into the next generation of engineering professionals and researchers.

Our current graduate total enrolment is 2,415. This is an increase of almost two-thirds since 2008, and brings us closer to our Academic Plan goal of reaching a 60:40 ratio of undergraduate to graduate students. It includes 899 professional master's students and 1,516 MASc and PhD students, our highest on record. Total enrolment in our research-based programs has increased by 33.9% over the past decade, including a 39.6% increase in PhD enrolment, while numbers in our professional programs have more than doubled over the same period. The proportion of graduate students in our overall student body is 33.9%. Professional master's students now constitute 53% of all U of T Engineering master's students on a full-time equivalent basis. Our goal is to increase research-based and professional graduate student enrolment by 15% by 2022.

Diversity within our graduate student body remains strong. The proportion of women in our graduate programs reached a new high of 27.5%. We expect this proportion to grow as the number of women graduating from undergraduate programs increases. International students made up 32.4% of our graduate students in 2017–2018, compared to 33.7% the previous year. We continue to recruit talented graduate students both domestically and internationally through a number of initiatives, which are outlined in more detail in the following section: *Admissions and Recruitment*.

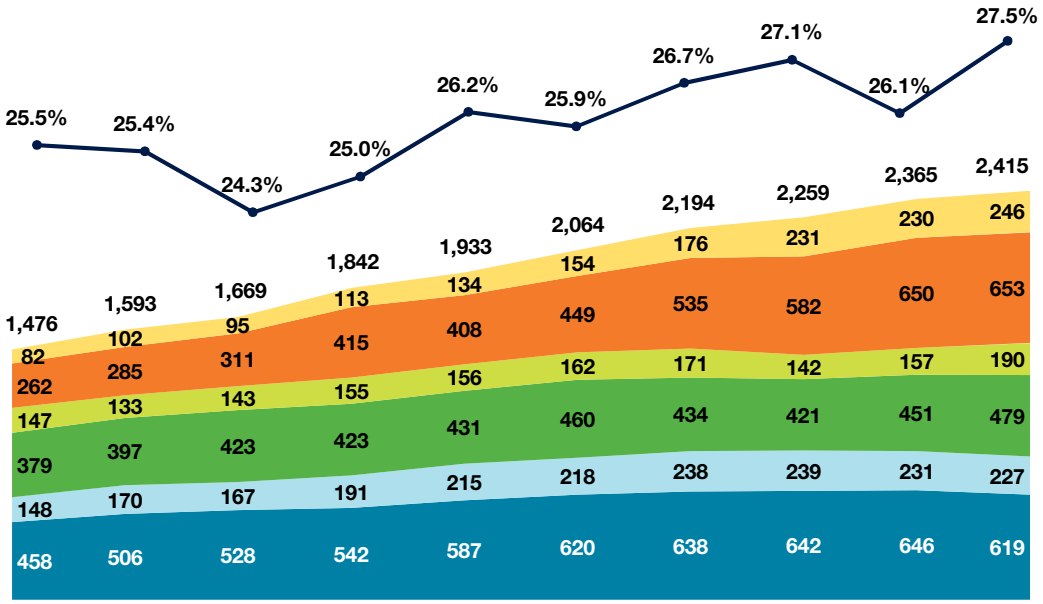
Figure 2.1a **International and Domestic Graduate Students by Degree Type, with Percentage of International Students, 2008–2009 to 2017–2018**



Data in this chapter are presented by academic year (September to August) unless otherwise noted. Highlights are from June 2017 to July 2018.

Note 2.1a: Student counts are shown as of November 1, 2017.

Figure 2.1b **Graduate Students by Degree Type and Gender with Percentage of Women Students, 2008–2009 to 2017–2018**



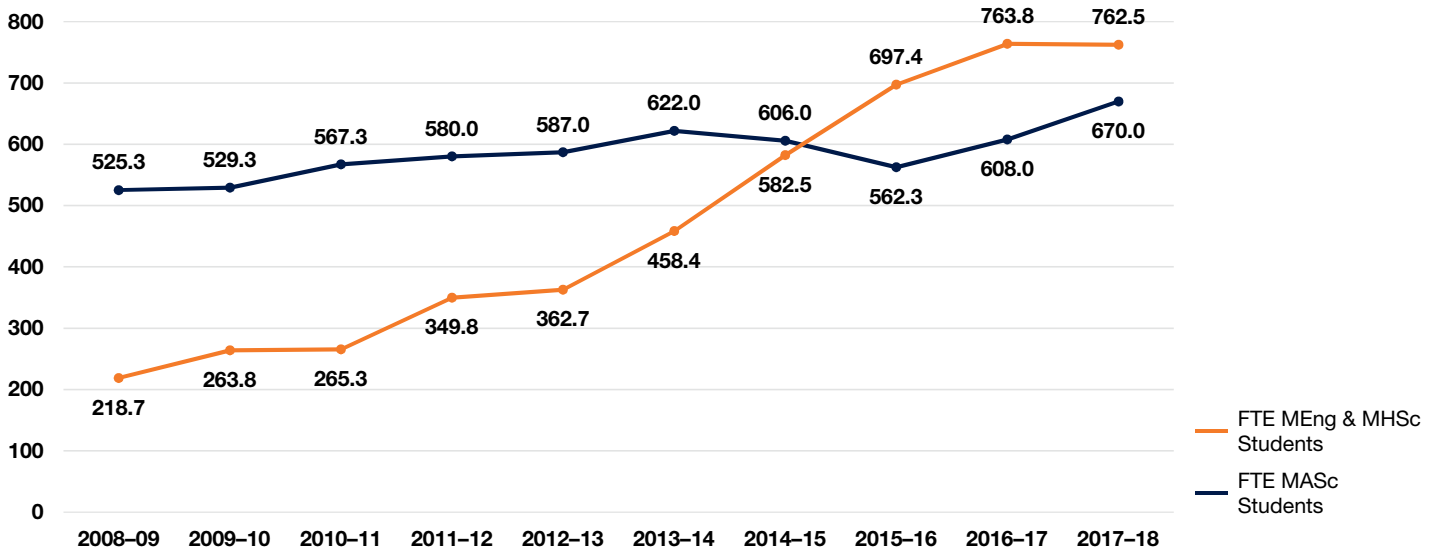
	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
MEng & MHSc Women	82	102	95	113	134	154	176	231	230	246
MEng & MHSc Men	262	285	311	415	408	449	535	582	650	653
MEng & MHSc Gender Not Reported				1	2	1	1	2		
MASc Women	147	133	143	155	156	162	171	142	157	190
MASc Men	379	397	423	423	431	460	434	421	451	479
MASc Gender Not Reported			2	2			1			1
PhD Women	148	170	167	191	215	218	238	239	231	227
PhD Men	458	506	528	542	587	620	638	642	646	619

Note 2.1b: Student counts are shown as of November 1, 2017. Data on gender comes from the School of Graduate Studies' student enrolment cube, where gender is an optional category. Students who opted not to report their gender appear in the data table, but not the graph presented above.

Figure 2.1c **Graduate Student Enrolment by Full-Time Equivalent (FTE) and Headcount (HC) by Academic Area, 2008–2009 to 2017–2018**

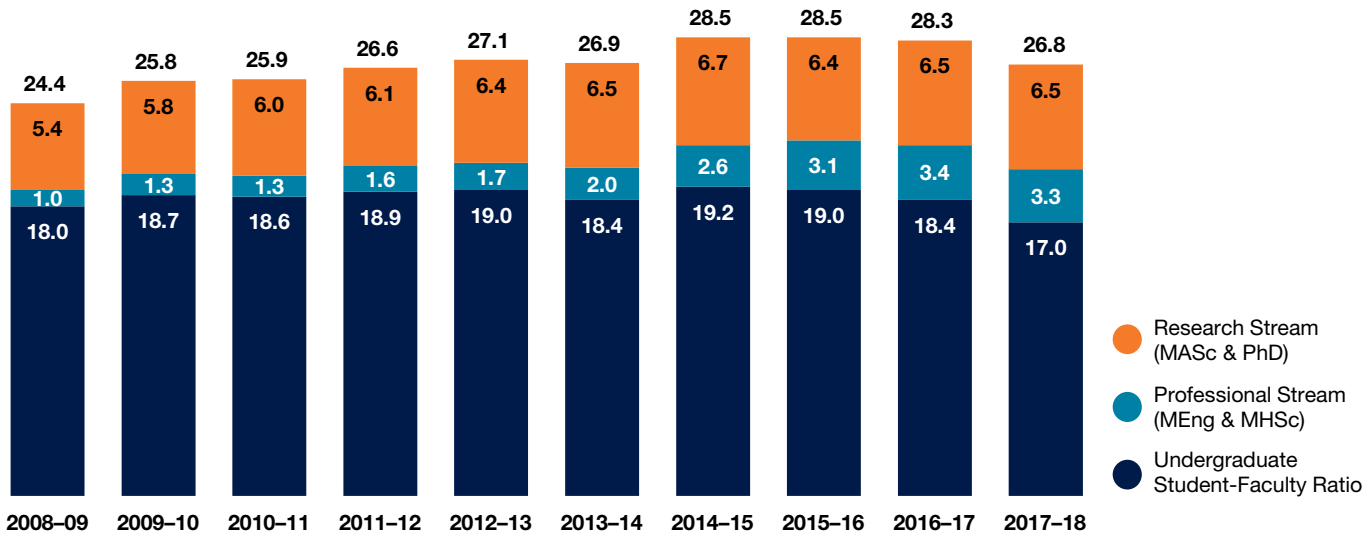
		UTIAS	IBBME	ChemE	CivMin	ECE	MIE	MSE	Total
2008–2009	**FTE**	122.9	140.0	167.8	184.0	415.4	237.1	82.8	**1,350.0**
	HC	125	140	179	219	442	284	87	**1,476**
2009–2010	**FTE**	130.6	153.0	209.1	200.2	421.5	284.3	70.4	**1,469.1**
	HC	132	153	221	238	453	320	76	**1,593**
2010–2011	**FTE**	140.9	168.0	195.4	212.6	403.0	339.2	68.5	**1,527.6**
	HC	143	168	208	256	431	391	72	**1,669**
2011–2012	**FTE**	143.2	199.0	202.3	229.8	437.7	382.6	68.2	**1,662.8**
	HC	146	199	217	276	479	454	71	**1,842**
2012–2013	**FTE**	146.7	208.3	193.2	243.3	504.8	387.2	68.2	**1,751.7**
	HC	153	209	203	279	565	453	71	**1,933**
2013–2014	**FTE**	162.1	219.0	209.9	290.5	509.8	436.2	90.9	**1,918.4**
	HC	167	219	219	322	556	488	93	**2,064**
2014–2015	**FTE**	182.4	228.0	238.0	293.1	531.5	511.2	80.3	**2,064.5**
	HC	188	228	245	312	577	563	81	**2,194**
2015–2016	**FTE**	143.2	241.0	253.0	299.4	591.5	532.9	79.0	**2,140.0**
	HC	146	241	260	326	637	570	79	**2,259**
2016–2017	**FTE**	178.2	269.0	245.0	306.3	577.0	580.3	92.3	**2,248.1**
	HC	181	269	252	335	619	616	93	**2,365**
2017–2018	**FTE**	170.1	296.0	246.7	313.0	551.5	602.8	94.9	**2,275.0**
	HC	175	303	253	348	597	642	97	**2,415**

Figure 2.1d **Comparison of MASc and MEng/MHSc Full-Time Equivalent Enrolment Trends, 2008–2009 to 2017–2018**



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

Figure 2.2a **Undergraduate and Graduate Full-Time Equivalent Students per Faculty Member, 2008–2009 to 2017–2018**



Over the past 10 years, we have consistently balanced our number of faculty members with the changing sizes of our graduate and undergraduate cohorts. Today, we have an average of 6.5 graduate students per faculty member, compared with 5.4 in 2008–2009, reflecting larger lab groups and increased research impact. At the same time, our undergraduate student-to-faculty ratio is at its lowest level in 10 years, providing for smaller class sizes and enhanced interaction between professors and students.

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

Figure 2.2b **Ratio of Undergraduate to Graduate Full-Time Equivalent Students, 2008–2009 to 2017–2018**

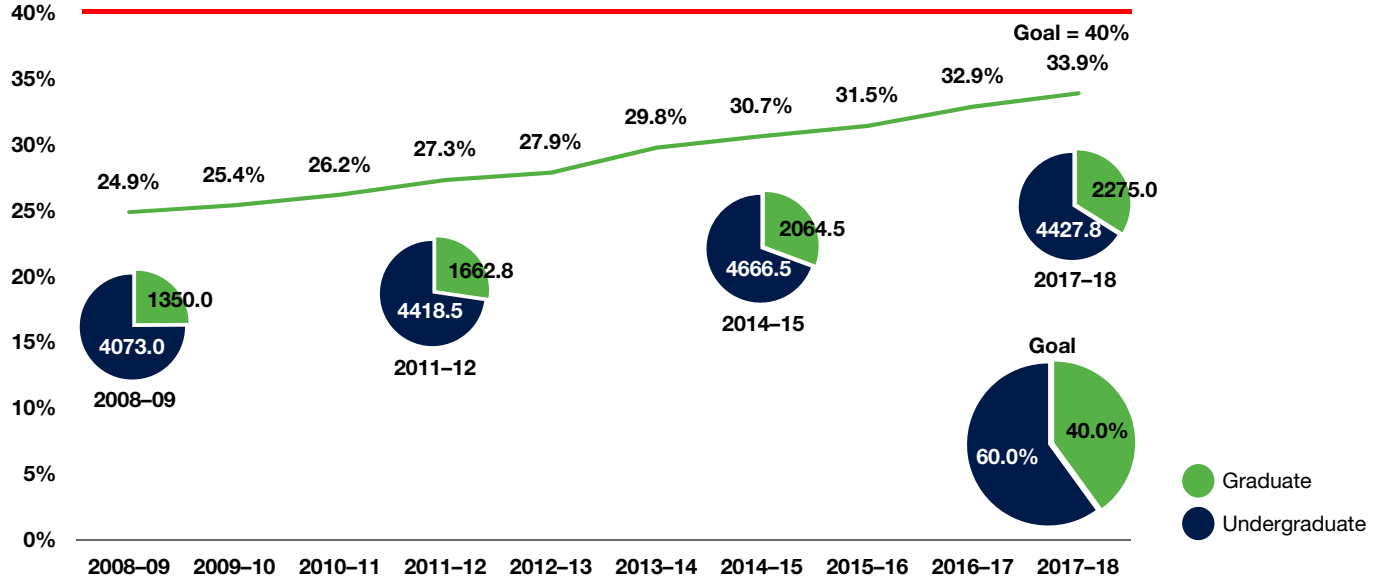
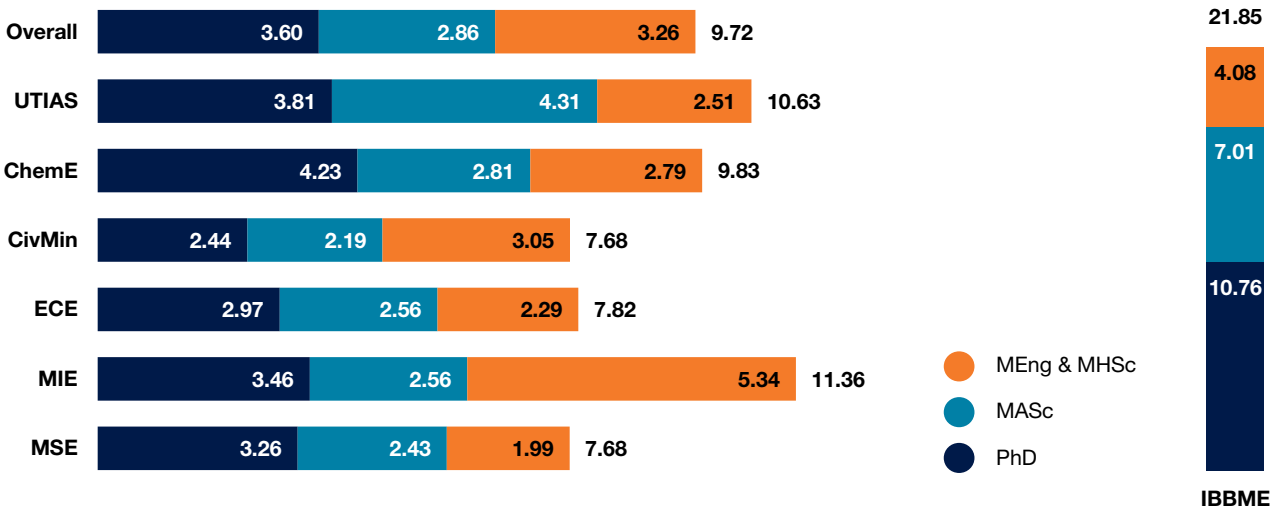


Figure 2.2c **FTE Graduate Student-to-Faculty Ratios by Academic Area and Degree Type, 2017–2018**



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

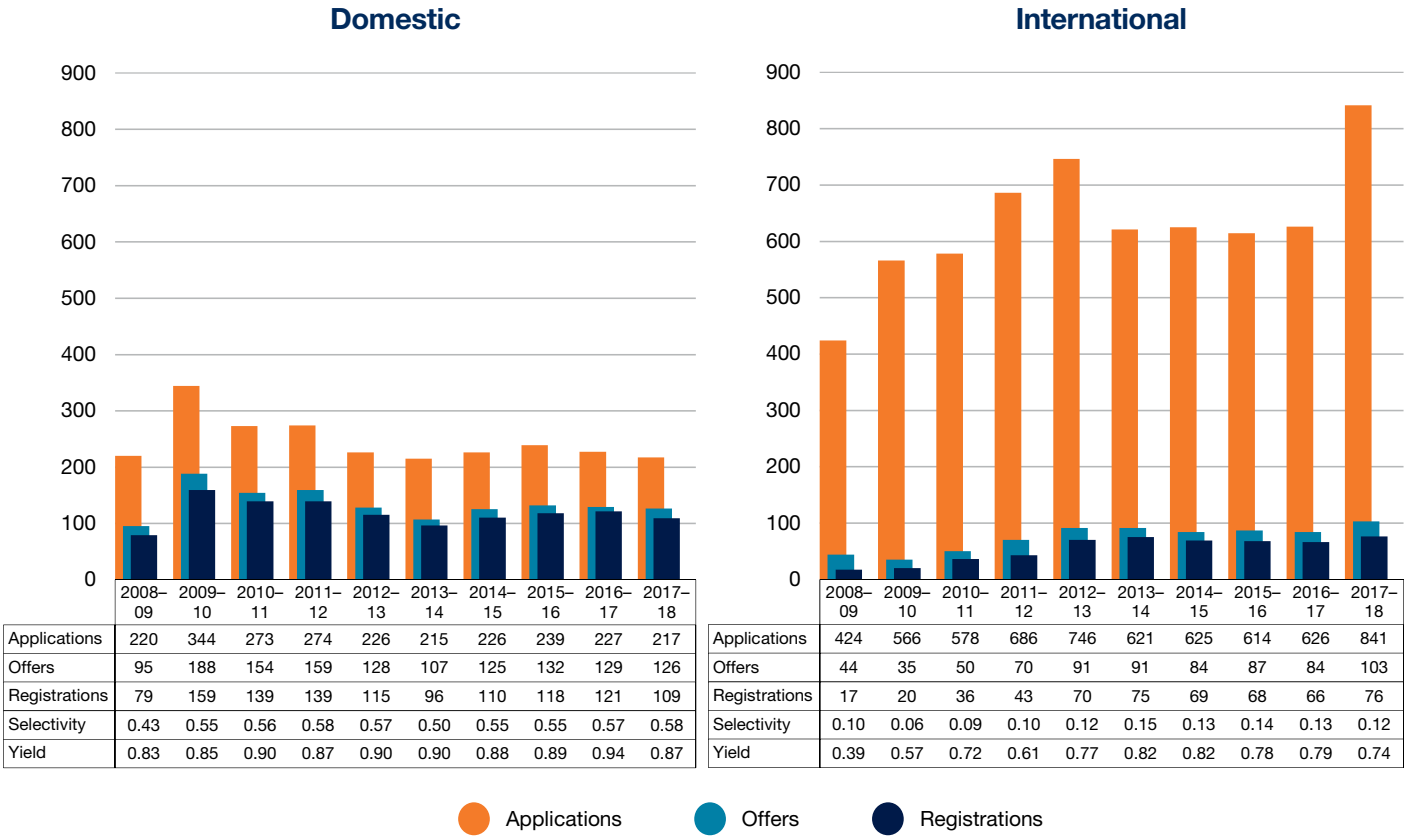
Admissions and Recruitment

Our international reputation for research excellence enables us to recruit talented graduate students both within Canada and from abroad. International applications for our MASc programs increased by 24.8% and those for PhD programs by 34.3%, a significant increase over the previous year. This reflects strong interest in our programs from abroad, as well as changes in the global marketplace for graduate-level engineering studies.

Domestic registrations for our research-stream programs held steady. We continue to strategically recruit talented domestic students into our graduate programs. Through an ongoing digital marketing campaign, we advertise to top students at engineering schools across the country, driving them to our graduate studies website for further information. We are also a founding member of the Canadian Graduate Engineering Consortium, and through this body we hosted the U of T Graduate Engineering Fair on October 2, 2017 with 324 students in attendance. We conducted similar events held in Vancouver, Edmonton, Calgary, Hamilton, Waterloo, Kingston and Montreal throughout fall 2017.

We held our fourth annual Graduate Research Days event on February 22 and 23, 2018, inviting talented students to learn more about our innovative research projects and meet prospective supervisors. We hosted 165 prospective graduate students from nine Canadian provinces as well as the U.S., Iran, India and the U.K.

Figure 2.3 Domestic and International PhD Students: Applications, Offers, Registrations, Selectivity and Yield, 2008–2009 to 2017–2018



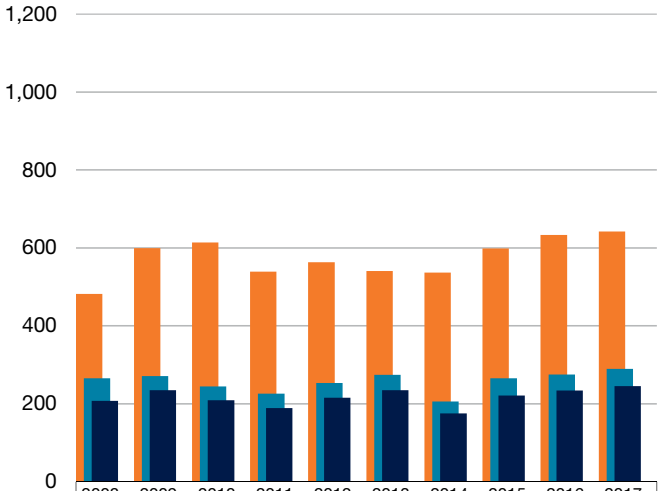
Domestic	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
Applications	220	344	273	274	226	215	226	239	227	217
Offers	95	188	154	159	128	107	125	132	129	126
Registrations	79	159	139	139	115	96	110	118	121	109
Selectivity	0.43	0.55	0.56	0.58	0.57	0.50	0.55	0.55	0.57	0.58
Yield	0.83	0.85	0.90	0.87	0.90	0.90	0.88	0.89	0.94	0.87

International	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
Applications	424	566	578	686	746	621	625	614	626	841
Offers	44	35	50	70	91	91	84	87	84	103
Registrations	17	20	36	43	70	75	69	68	66	76
Selectivity	0.10	0.06	0.09	0.10	0.12	0.15	0.13	0.14	0.13	0.12
Yield	0.39	0.57	0.72	0.61	0.77	0.82	0.82	0.78	0.79	0.74

Note 2.3: Student counts are shown as of November 1, 2017. Selectivity = offers ÷ applications and represents the proportion of applicants who were offered admission. Yield = registration ÷ offers. Domestic students are defined as citizens (living in Canada or abroad) or permanent residents of Canada. Students who have fast-tracked from MASc programs into PhD programs are counted in this figure as applications, offers and admissions.

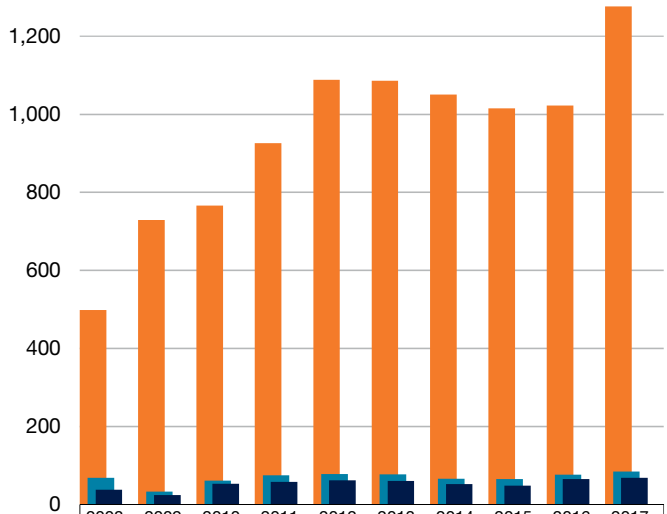
Figure 2.4 Domestic and International MASc Students: Applications, Offers, Registrations, Selectivity and Yield, 2008–2009 to 2017–2018

Domestic



	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
Applications	482	599	614	539	563	540	536	598	633	642
Offers	265	271	244	226	253	274	206	265	275	289
Registrations	207	235	209	189	215	235	175	221	234	245
Selectivity	0.55	0.45	0.40	0.42	0.45	0.51	0.38	0.44	0.43	0.45
Yield	0.78	0.87	0.86	0.84	0.85	0.86	0.85	0.83	0.85	0.85

International



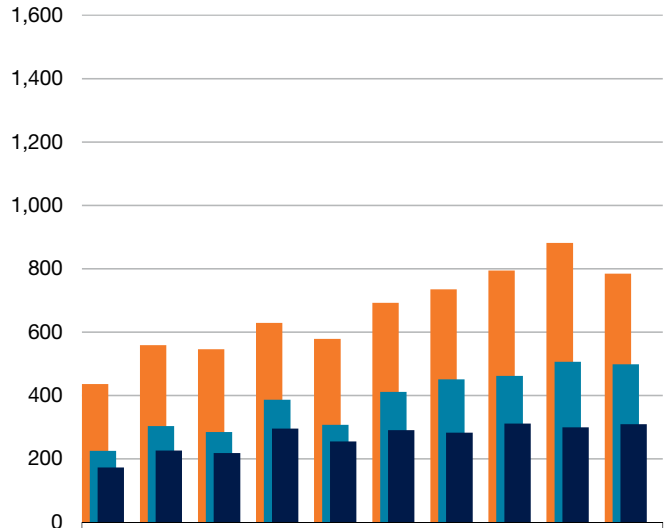
	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
Applications	498	729	766	926	1,088	1,086	1,050	1,015	1,022	1,276
Offers	68	33	61	75	78	77	66	65	76	84
Registrations	38	24	53	58	62	60	52	48	65	68
Selectivity	0.14	0.05	0.08	0.08	0.07	0.07	0.06	0.06	0.07	0.07
Yield	0.56	0.73	0.87	0.77	0.79	0.78	0.79	0.74	0.86	0.81

Applications Offers Registrations

Note 2.4: Student counts are shown as of November 1, 2017. Selectivity = offers ÷ applications and represents the proportion of applicants who were offered admission. Yield = registration ÷ offers. Domestic students are defined as citizens (living in Canada or abroad) or permanent residents of Canada.

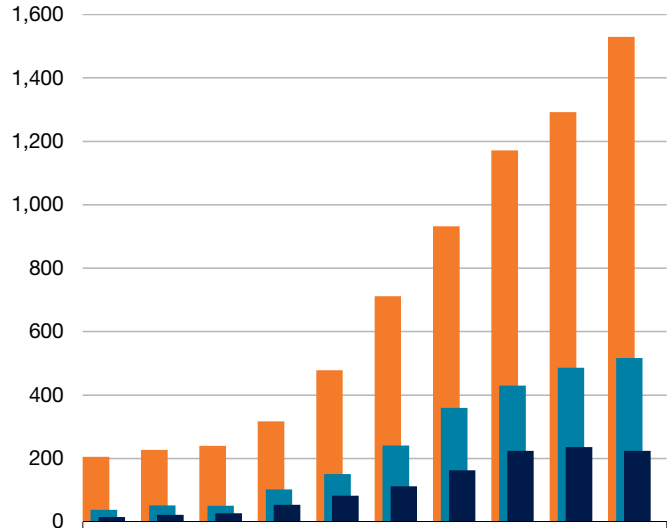
Figure 2.5 Domestic and International MEng and MHSc Students: Applications, Offers, Registrations, Selectivity and Yield, 2008–2009 to 2017–2018

Domestic



	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
Applications	435	558	545	628	578	692	734	794	881	784
Offers	224	303	284	386	307	411	450	461	506	498
Registrations	172	225	217	295	254	290	282	311	299	309
Selectivity	0.51	0.54	0.52	0.61	0.53	0.59	0.61	0.58	0.57	0.64
Yield	0.77	0.74	0.76	0.76	0.83	0.71	0.63	0.67	0.59	0.62

International



	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
Applications	205	226	239	316	478	711	932	1,171	1,292	1,529
Offers	38	51	50	102	150	240	359	429	486	516
Registrations	15	22	27	53	82	112	162	223	235	223
Selectivity	0.19	0.23	0.21	0.32	0.31	0.34	0.39	0.37	0.38	0.34
Yield	0.39	0.43	0.54	0.52	0.55	0.47	0.45	0.52	0.48	0.43

We attracted 2,313 applications to our professional-stream programs in 2017–2018, a 6.4% increase over the previous year, driven by 18.3% more applications from outside of Canada. Over the last decade, we nearly tripled annual registrations for our MEng and MHSc programs, reflecting the growing demand for programs that offer practicing engineers advanced technical and professional competencies.

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

Funding

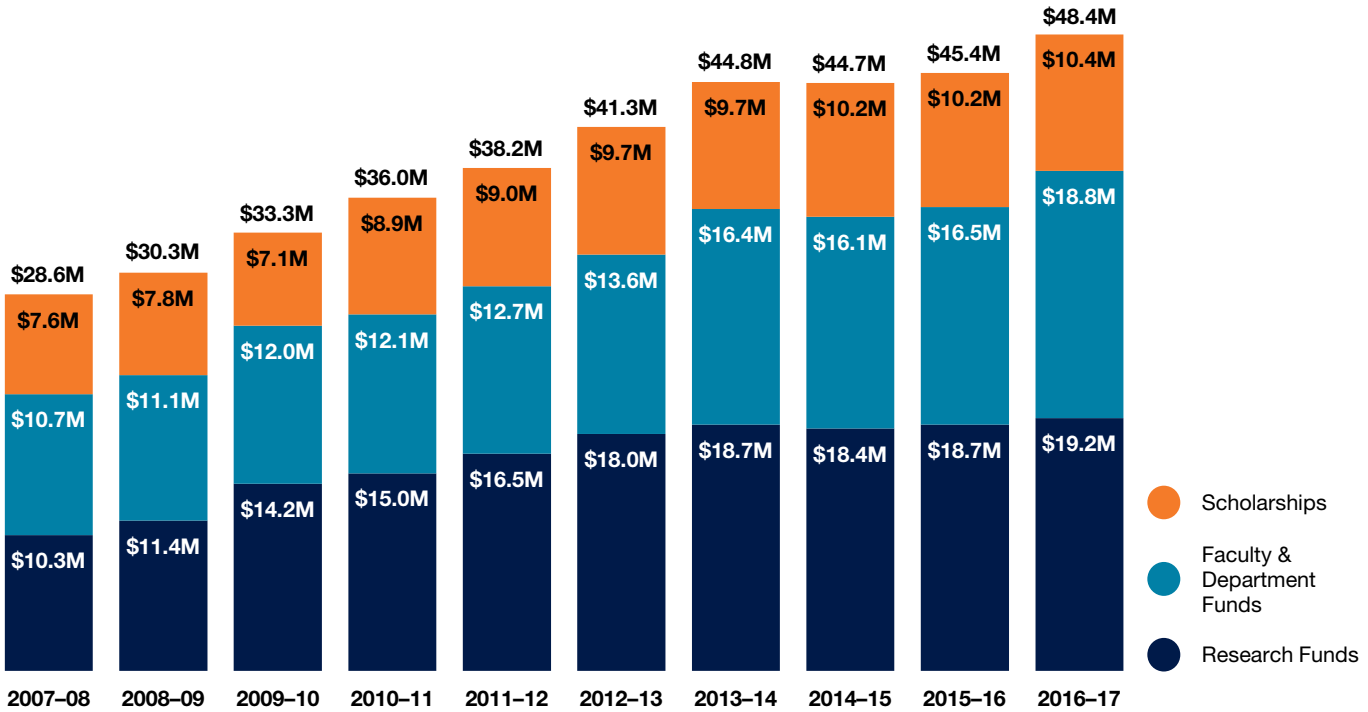
In 2016–2017, the most recent year for which data is available, total graduate funding reached an historic high of $48.4 million, a 6.8% increase over the previous year. Part of this is due to an increase in the minimum funding package guaranteed to graduate students. As of September 2017, all programs offer an amount sufficient to cover tuition and fees and provide, in addition, an annual stipend of at least $17,000 per year for PhD students and $15,500 per year for MASc students, which will increase to $16,000 starting in September 2018. Most students earn more than this minimum as a result of scholarships and teaching assistantships, so the average engineering graduate student stipend for those in the funded cohort is approximately $25,000 per year.

Starting in the fall of 2018, international PhD students at U of T Engineering will pay the same tuition fees as domestic students. The new fee structure will benefit current and prospective international PhD students. It will include students in all years of a PhD program, and exclude students in research master's programs.

The total amount of graduate student scholarships increased from $10.2 million in 2015–2016 to $10.4 million in 2016–2017 (Fig. 2.6a) and included a wide range of sources, both external to U of T Engineering (e.g. Ontario Graduate Scholarships, NSERC) and internal (including donor-supported scholarships). Over the past 10 years, we have significantly increased the number of internal awards, such that they now represent 49.7% of total graduate student funding, compared to 36.3% in 2007–2008. This reflects the dedication of our vibrant community of donors and our ability to attract support for engineering research.

Future opportunities include increased governmental funding for industrial internships and research exchanges abroad. We continue to promote these options to our graduate students and encourage them to apply for external scholarships, and work with the provincial and federal governments to increase the amount of funding available in direct support.

Figure 2.6a **Graduate Student Funding by Category, 2007–2008 to 2016–2017**



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

Figure 2.6b **Graduate Student Funding by Category and Academic Area, 2016–2017**

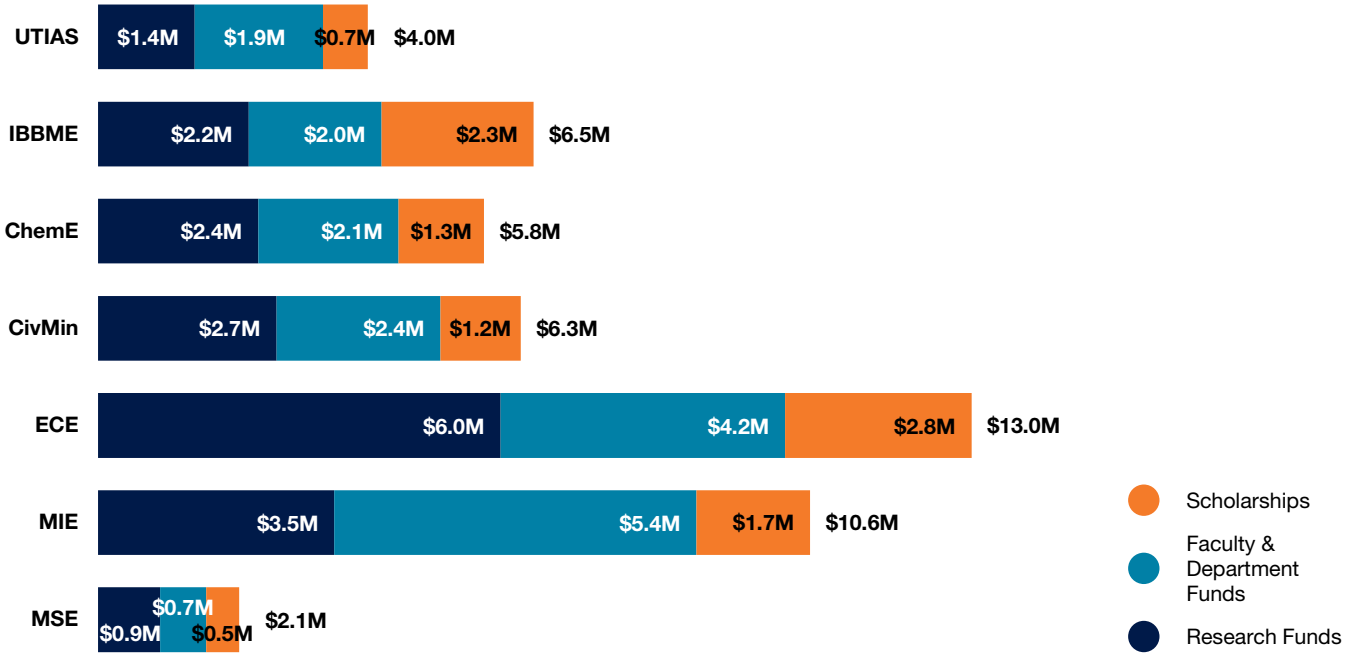
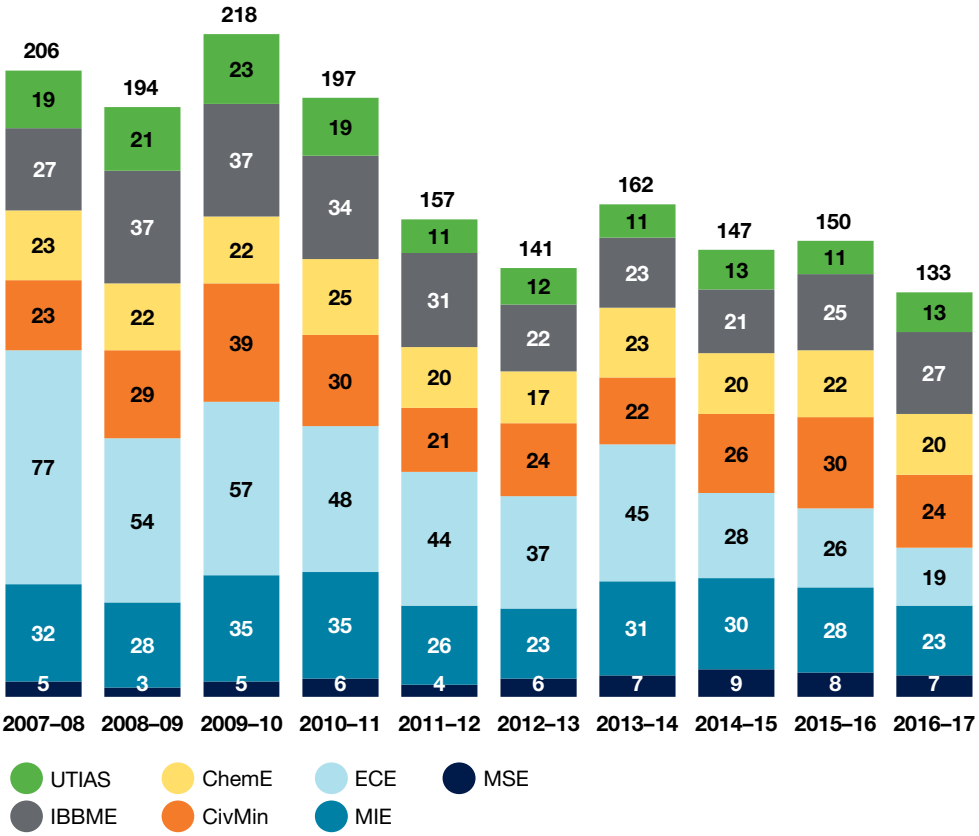


Figure 2.7a **Total Graduate Student Scholarships by Source, 2007–2008 to 2016–2017**

	NSERC	OGS	External-Other	Internal	Total
2007–08	$3,827,494	$930,000	$68,167	$2,752,772	$7,578,433
2008–09	$3,737,157	$868,332	$111,770	$3,075,758	$7,793,017
2009–10	$4,393,513	$853,334	$203,167	$1,613,187	$7,063,201
2010–11	$4,396,617	$1,036,675	$179,580	$3,280,401	$8,893,273
2011–12	$3,765,883	$1,593,328	$256,860	$3,381,086	$8,997,157
2012–13	$3,374,183	$1,583,333	$285,501	$4,445,430	$9,688,448
2013–14	$3,759,671	$1,236,666	$582,170	$4,088,309	$9,666,816
2014–15	$3,488,447	$1,336,670	$877,587	$4,487,866	$10,190,570
2015–16	$3,315,223	$1,223,331	$926,787	$4,748,300	$10,213,641
2016–17	$3,315,223	$1,223,331	$926,787	$5,157,619	$10,381,390

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

Figure 2.7b **Number of NSERC Graduate Student Award Recipients by Academic Area, 2007–2008 to 2016–2017**



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

Graduate Studies Completion

We continue to encourage students to maximize their research impact by fast-tracking from MASc programs into PhD programs, and to apply for PhD programs directly from their undergraduate degrees. In 2017–2018, 44 students fast-tracked, our highest total to date, and 13 students started direct-entry PhD programs, our second highest total to date.

Figure 2.8a **Number of Students Fast-Tracked from MASc to PhD by Academic Area, 2008–2009 to 2017–2018**

	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
UTIAS	8	6	5	2	5	6	10	1	3	10
IBBME	5	12	8	5	8	8	12	14	8	10
ChemE	7	11	4	8	7	14	8	5	7	5
CivMin	5	3	2	5	2	3	1	5	5	7
ECE	0	1	6	4	2	4	5	4	3	6
MIE	7	7	6	6	6	5	2	8	13	6
MSE	3	1	3	7	1	3	4	2	2	0
Total	**35**	**41**	**34**	**37**	**31**	**43**	**42**	**39**	**41**	**44**

Figure 2.8b **Number of Direct-Entry PhD Students by Academic Area, 2008–2009 to 2017–2018**

	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
IBBME	1	6	6	5	5	7	3	5	7	11
ChemE				1				5	1	
CivMin									1	
ECE							2	2	2	2
MIE				1	1				4	
Total	**1**	**6**	**6**	**7**	**6**	**7**	**5**	**12**	**15**	**13**

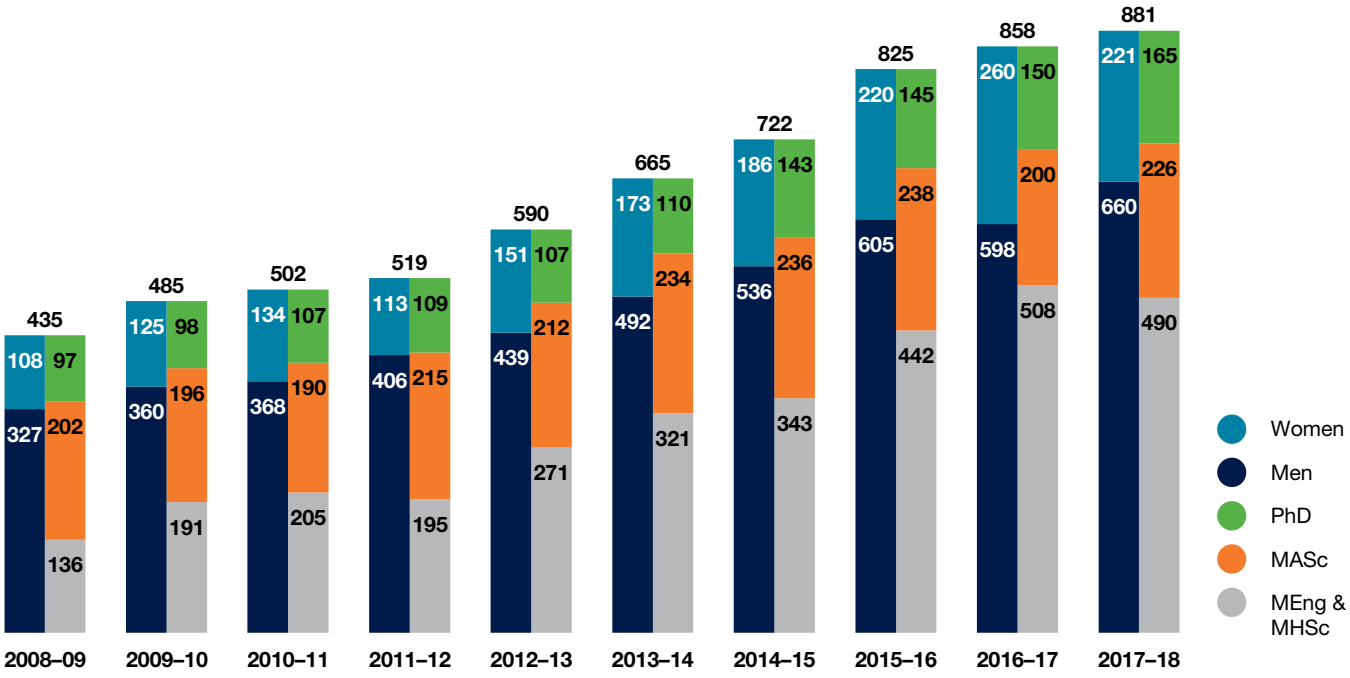
Note 2.8a and b: For counting purposes, the academic year is from May to April.

Figure 2.9 Time to Completion for PhD, MASc, MEng and MHSc Students, 2008–2009 to 2017–2018

	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
PhD	4.7	4.7	5.3	5.0	5.3	5.2	5.3	5.3	5.3	5.0
MASc	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
MEng & MHSc (FT)	1.0	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.0	1.0
MEng (ExtFT)							1.3	1.7	1.7	1.7
MEng (PT)	2.3	2.3	2.3	2.0	2.0	2.0	2.0	2.0	2.3	2.0

In 2017–2018, women made up 25% of our graduating class. The number of women receiving degrees has more than doubled over the past decade. The number of PhDs awarded in 2017–2018 was 490, representing an 3.6-fold increase over the past 10 years.

Figure 2.10 Graduate Degrees Awarded by Degree Type and Gender, 2008–2009 to 2017–2018



Post-Graduation Employment

In early 2018, U of T's School of Graduate Studies released the data for the 10,000 PhDs project, a comprehensive database of the employment status of the 10,886 doctoral students who graduated from U of T between 2000 and 2015. The study successfully located 88% (9,583) of these graduates, including 85% (1,246 of 1,461) of the PhD students that graduated from our Faculty during that time. According to this data:

- Among U of T Engineering PhD graduates, a higher proportion were employed in the private sector (44.5%) than the overall U of T PhD graduate population (21.8%). Post-secondary education is also a major employer of U of T Engineering graduates, accounting for 44.6%, nearly identical to the proportion in the private sector.
- Over the last 15 years, there has been a shift in employment among PhD graduates, with fewer working in post-secondary education and more choosing to work in the private sector. The proportion in the private sector grew from 37.1% among the 2000–2003 cohort to 47.2% in the 2012–2015 cohort.

These findings reflect our commitment to prepare graduate students for a wide range of potential career paths. Some of our newest initiatives are outlined in the next section: *Enriching the Graduate Student Experience.*

Enriching the Graduate Student Experience

Whether our students aspire to a career in academia, industry or entrepreneurship, we provide a wide range of curricular and co-curricular opportunities that enable them to develop the competencies they need to be successful and to lead change.

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

The Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE) emphasis continues to be the most popular of these emphases. In 2017–2018, 118 students completed an ELITE emphasis. We expanded our ELITE curriculum to include six new courses in 2017–2018:

- APS1049 Management Consulting for Engineers (start date summer 2018)
- APS1050 Blockchain technologies and cryptocurrencies (start date fall 2018)
- APS1051 Portfolio management praxis under real market constraints (start date winter 2019)
- APS1502 Leading Engineering Design Projects, (start date fall 2017)
- APS1305/1308 PsychEng Seminars Series, (start date fall 2017)
- APS1061 Business Strategy and Intrapreneurship (start date summer 2018)

In 2017–2018, we further expanded our academic offerings with new programs, including:

- **Cross-Faculty Collaborative Master's Specialization in Psychology and Engineering (PsychEng):** This new program is delivered jointly by the Department of Mechanical & Industrial Engineering and the Department of Psychology in the Faculty of Arts & Science. Students study topics such as how product design can encourage pro-environmental behavior and how the communication of information about climate change can lead to action.
- **MEng Emphasis in Forensic Engineering:** This emphasis recognizes specialized work by graduate students in areas related to forensic engineering, including assessment of deterioration in infrastructure, product quality and product failure, and procedural practice improvement as a result of investigations.
- **MEng Emphasis in Analytics:** Launched in January 2018, this emphasis draws on the Faculty's existing expertise in areas such as operations research, computational genomics and intelligent mechatronic systems. It will provide students with techniques and strategies to translate large data sets into useful insights in sectors such as manufacturing, transportation, banking and health care.

Figure 2.11 **ELITE Emphases Awarded, 2008–2009 to 2017–2018**

	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18
AeroE		1	2		7	2	4	11	1	17
ChemE		2	12	11	17	8	20	20	18	13
CivMin	3	11	13	11	9	12	12	24	22	16
ECE		3	3	3	22	32	22	14	28	30
MIE		7	19	20	26	36	39	50	53	41
MSE			1	1	4	6	11	5	15	1
Total	**3**	**24**	**50**	**46**	**85**	**96**	**108**	**124**	**137**	**118**

Professional Development

To further enrich the graduate student experience, the Faculty offers a number of opportunities for graduate students to develop professional competencies and gain industry exposure:

- **Prospective Professors In Training (PPIT):** Launched in 2007–2008, PPIT has a rich history of preparing doctoral students for the rigors of an academic position. The program includes seminars on applying for academic positions and grants, managing a classroom, starting research programs, as well as topics in teaching and learning. For 2017–2018, 23 PhD candidates enrolled in PPIT.
- **Opportunities for PhDs: Transitions, Industry Options, Networking and Skills (OPTIONS):** Developed in 2017-2018 and supported by the School of Graduate Studies' Innovation in Graduate Professional Development Fund, OPTIONS builds on the format of the Faculty's PPIT program, exploring non-academic careers in industry research and development, government policy and entrepreneurship. Through a series of workshops, panel discussions and networking events, OPTIONS participants learn about labour market information, career planning, resumé building and fostering productive team dynamics. Fifty-six students enrolled in its inaugural year.
- **Graduate Engineering Council of Students (GECoS):** This new student body meets regularly with the Vice-Dean, Graduate Studies to advise on academic policy and programs. GECoS includes representation from each graduate unit, and played a major role in the execution of Graduate Research Days in February 2018. In May 2017, GECoS spearheaded a new Graduate Career Fair on the St. George Campus.
- **Graduate Career Fair:** Since 2017, we have hosted a Graduate Career Fair, bringing together a diverse number of employers looking to recruit U of T Engineering graduate students and alumni. In the event's second iteration in May 2018, GECoS partnered with the Engineering Career Centre to broaden the range of company partnerships. The career fair brought out 29 companies, including Intel Programmable Solutions Group, Toyota Canada and Baylis Medical Company. Attendees also had the opportunity to participate in a speed networking event, which aims to build career-advancing connections with industry. In 2018, 434 graduate students and engineering professionals with graduate degrees were in attendance.

Selected Graduate Student Highlights

Four U of T Engineering graduate students awarded Vanier Scholarships

In the summer of 2017, four students from U of T Engineering received a total of $600,000 from the 2017 Vanier Canada Graduate Scholarships competition. The awards recognize doctoral students at Canadian universities who demonstrate excellence in academics, research impact and leadership. The winners are:

- **Neal Callaghan (IBBME PhD candidate):** Co-supervised by professors Craig Simmons (MIE, IBBME) and Paul Santerre (IBBME), Callaghan is working on methods for culturing pluripotent stem cells, which have the ability to develop into any cell type found in the human body. By better understanding the chemical and physical signals that tell pluripotent stem cells when to turn into cardiomyocytes, or heart muscle cells, the research will accelerate progress toward custom tissues to repair hearts damaged by disease or injury, as well as lab-grown tissues and organs which can be used to test new drug candidates for potentially dangerous side effects.
- **Marta Overchuk (IBBME PhD candidate):** Under the supervision of Professor Gang Zheng (IBBME), Overchuk is combining light-sensitive molecules and lasers to treat cancer tumours. The molecules bind to specific proteins on the surface of cancer cells. Once they are bound, she shines laser light through the skin to activate the molecules, releasing reactive oxygen species that destroy cancer cells. The goal is to kill cancer cells without harming the healthy cells that surround them, providing a more targeted form of cancer treatment.
- **Reza Rafie (ECE PhD candidate):** Supervised by Professor Frank Kschischang (ECE), Rafie is using advanced mathematical tools to estimate the capacity — the ultimate limit to the rate at which one can reliably transmit information — of optical fibres. He then uses other mathematical tools to design communication mechanisms capable of operating at data rates near those theoretical limits. Fibre-optic cables are the backbone of global phone networks and the Internet, so increasing data rates will enable online services to become both faster and less expensive.
- **Christopher Sun (EngSci 1T3+PEY, MIE PhD candidate):** Under the supervision of Professor Timothy Chan (MIE), his research focuses on optimizing the distribution of life-saving automated external defibrillators (AEDs) in public places across the city. In 2015, his research revealed that many AEDs are located in buildings that are locked overnight, rendering them inaccessible. More recently, Chan and Sun created a "Top 10" list of prime spots to place AEDs in order to increase their availability and save lives. Ideal locations included coffee retailers like Tim Hortons, Starbucks and Second Cup as well as ATMs operated by large banks.

U of T Engineering team wins first AutoDrive Challenge

Graduate students Keenan Burnett (UTIAS MASc candidate) and Mona Gridseth (UTIAS PhD candidate), along with their supervisor Professor Angela Schoellig (UTIAS) are leading U of T Engineering's team in the AutoDrive Challenge™, a new intercollegiate autonomous vehicle competition. They are retrofitting a Chevrolet Bolt, an electric vehicle, with an array of sensors and machine learning algorithms, turning it into a self-driving car. Sponsors include General Motors, the Society of Automotive Engineers (SAE) and a number of companies that produce hardware and software for self-driving cars. More than 50 undergraduate and graduate students have joined the U of T Engineering team, named aUToronto. From April 30 to May 5, 2018, the team travelled to the General Motors Proving Grounds in Yuma, Ariz., for the first of three challenges in the competition. They performed in the top three in all six categories used to judge the teams, including: social responsibility report and presentation; concept design report and presentation; mapping challenge; stop line challenge; lateral challenge; and obstacle detection and avoidance challenge. Overall, the team earned first place among the eight North American universities invited to participate, including the University of Waterloo, Virginia Tech, Texas A&M, Michigan State, Michigan Tech, North Carolina A&T State and Kettering University.

U of T Awards of Excellence recognize U of T Engineering PhD candidate

Graduate student Locke Davenport Huyer (ChemE, IBBME PhD candidate) was named a University of Toronto Alumni Association (UTAA) Graduate Scholar in March 2018. His biomedical engineering research focuses on creating a new kind of polyester material for building artificial cardiac tissue, and he has already been the first author on two papers about his findings and organized two research conferences. An enthusiastic mentor, Davenport Huyer is a volunteer lecturer for the Let's Talk Science program and co-founder of the IBBME Discovery Program, an enriched science course taught by U of T students to high schoolers in one of Toronto's low-income communities. He was awarded a Vanier Scholarship in 2016.