# 2

We attract talented graduate students from around the world to our professional- and research-stream programs. We continue to expand both the size of our graduate cohort and the variety of rich learning opportunities we offer our students. Through academic, co-curricular and experiential programs, we empower our graduate students to become leaders in their chosen fields.

Over the past decade, we have significantly increased our graduate student population, leading to larger lab group sizes with the potential for increased research impact. Our current total of 2,498 is the highest in our history, and represents 35.6% of all students, up from 22.1% in 2006–2007. By growing the number of students more quickly than the number of professors, we have increased the ratio of research-stream students per faculty member from 5.8 to 6.8 over last 10 years. When professional students are included, the increase is even greater, rising from 7.1 to 10.2 over the same period. We have more than doubled MEng enrolment over the last 10 years, including a 14-fold increase in the number of international MEng students. Graduate students across our Faculty continue to win prestigious awards such as the Vanier Canada Graduate Scholarships.

As of September 2018, international PhD tuition is the same as domestic tuition, further enhancing our ability to support PhD students. Domestic PhD enrolment remains strong, and we are leveraging initiatives such as our annual Graduate Research Days event and our membership in the Canadian Graduate Engineering Consortium to continue to attract domestic students into our programs.

In 2018–2019, we offered our Opportunities for PhDs: Transitions, Industry Options, Networking and Skills (OPTIONS) program for the second year. OPTIONS builds on the success of our Prospective Professors in Training (PPIT) program and our Graduate Career Fair, enabling students to explore professional opportunities in a variety of sectors.

Through our campus-linked accelerators such as the Hatchery Launch Lab and Start@UTIAS, we provide opportunities for our graduate students to translate their innovations into market-ready solutions. Mentorship, seed funding and infrastructure provided by U of T Engineering has helped launch companies such as Amber Molecular, Pliant Power Devices and Phycus Biotechnologies.

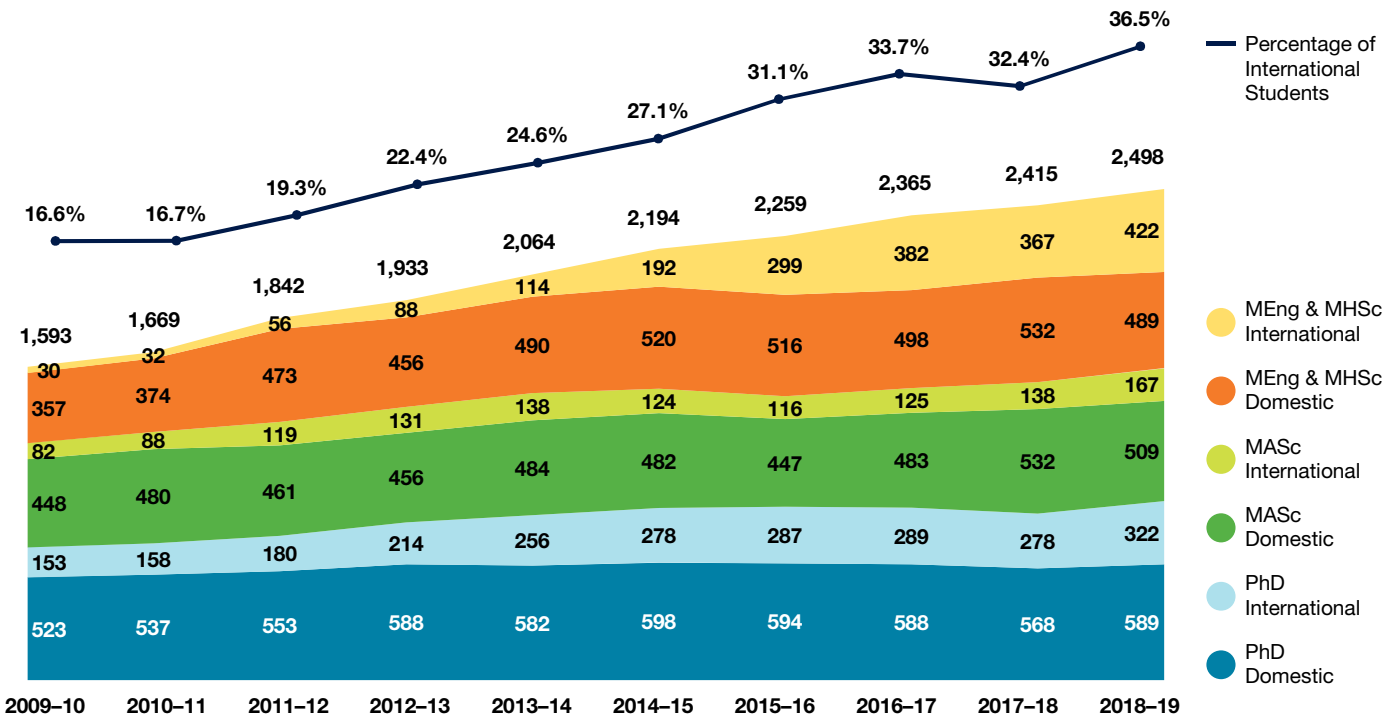
# Enrolment

We continue to increase our educational impact by growing the number of students in both our research-stream and professional-stream programs. Total enrolment is 911 for MEng and MHSc programs, 676 for MASc programs and 911 for PhD programs — all three of these totals are the highest yet recorded. Total graduate enrolment is 2,498, a 56.8% increase over the last 10 years. Graduate students now account for 35.6% of our entire student body on a full-time equivalent basis, a significant increase from the level of 22.1% in 2006–2007. We are now closer than ever to our long-term target of 40% graduate students.

International students account for 36.5% of total enrolment, demonstrating strong demand for our programs from around the world. International PhD enrolment is up 15.8% over the previous year, while domestic enrolment has remained strong, increasing 3.7% over 2017–2018. We continue to recruit talented graduate students both domestically and internationally through a number of initiatives, which are outlined in more detail in the *Admissions and Recruitment* section of this chapter.

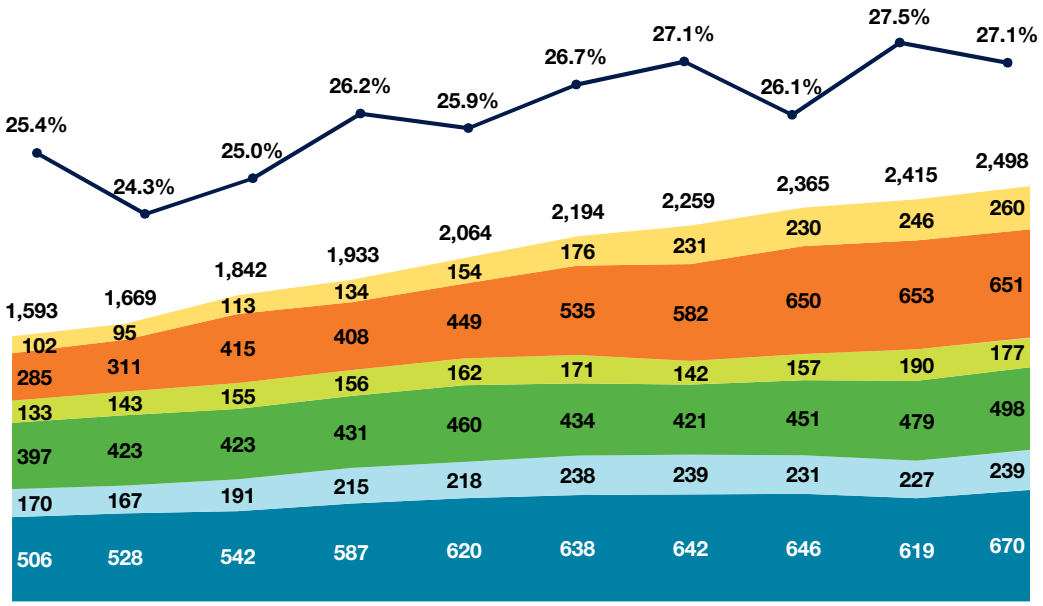
The proportion of women graduate students is 27.1%, and we expect this proportion to grow as the number of women graduating from undergraduate programs increases.

Figure 2.1a **International and Domestic Graduate Students by Degree Type, with Percentage of International Students, 2009–2010 to 2018–2019**




*Data in this chapter are presented by academic year (September to August) unless otherwise noted. Highlights are from June 2018 to June 2019.*
**Note 2.1a:** Student counts are shown as of November 1, 2018.

## Figure 2.1b **Graduate Students by Degree Type and Gender with Percentage of Women Students, 2009–2010 to 2018–2019**




| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| **MEng & MHSc Women** | 102 | 95 | 113 | 134 | 154 | 176 | 231 | 230 | 246 | 260 |
| **MEng & MHSc Men** | 285 | 311 | 415 | 408 | 449 | 535 | 582 | 650 | 653 | 651 |
| **MEng & MHSc Gender Not Reported** | | | 1 | 2 | 1 | 1 | 2 | | | |
| **MASc Women** | 133 | 143 | 155 | 156 | 162 | 171 | 142 | 157 | 190 | 177 |
| **MASc Men** | 397 | 423 | 423 | 431 | 460 | 434 | 421 | 451 | 479 | 498 |
| **MASc Gender Not Reported** | | 2 | 2 | | | 1 | | | 1 | 1 |
| **PhD Women** | 170 | 167 | 191 | 215 | 218 | 238 | 239 | 231 | 227 | 239 |
| **PhD Men** | 506 | 528 | 542 | 587 | 620 | 638 | 642 | 646 | 619 | 670 |
| **PhD Gender Not Reported** | | | | | | | | | | 2 |

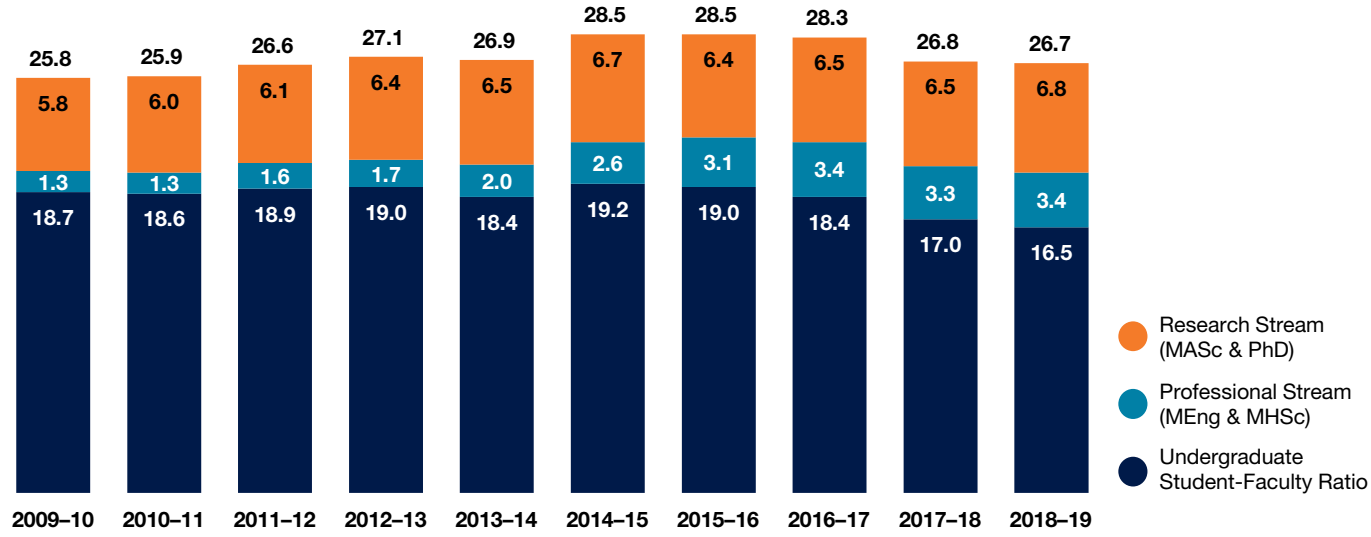
**Note 2.1b**: Student counts are shown as of November 1. Data on gender comes from the School of Graduate Studies' student enrolment cube, where gender is an optional category. Students who opted not to report their gender appear in the data table, but are not visible in the graph presented above.

## Figure 2.1c **Graduate Student Enrolment by Full-Time Equivalent (FTE) and Headcount (HC) by Academic Area, 2009–2010 to 2018–2019**

| | | UTIAS | IBBME | ChemE | CivMin | ECE | MIE | MSE | Total |
|---|---|---|---|---|---|---|---|---|---|
| **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** |
| **2018–2019** | **FTE** | 191.4 | 283.3 | 219.5 | 304.0 | 618.8 | 658.0 | 94.9 | **2,369.9** |
| | **HC** | 197 | 291 | 223 | 332 | 658 | 700 | 97 | **2,498** |

**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.

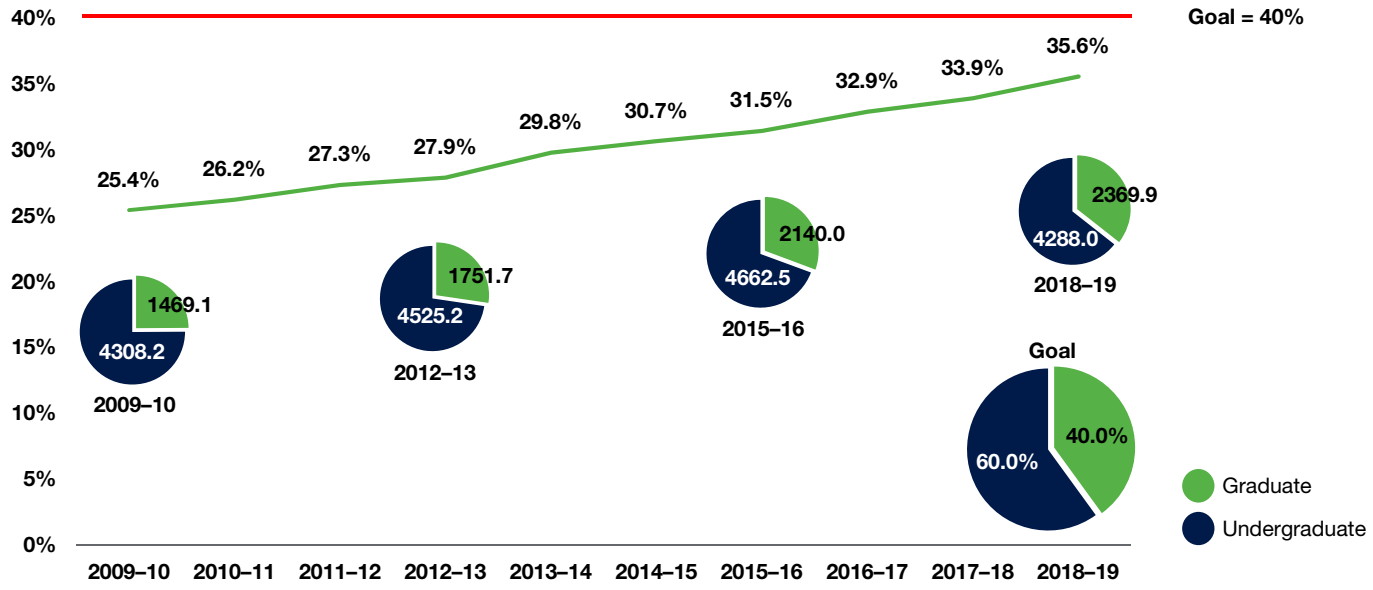
Figure 2.2a **Undergraduate and Graduate Full-Time Equivalent Student-to-Faculty Ratios, 2009–2010 to 2018–2019**



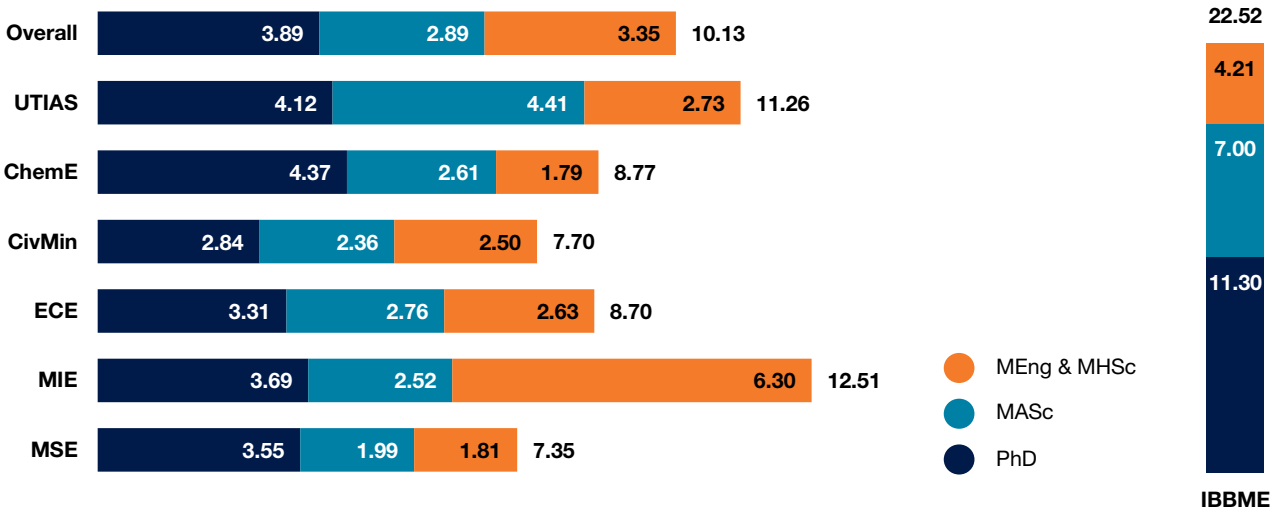

As our complement of faculty members has grown over the past decade, we have strategically managed our student-to-faculty ratios to both strengthen our multidisciplinary research and enhance the quality of our educational programs. By growing the number of graduate students more quickly than the number of professors, we have raised the ratio of research stream students (MASc & PhD) to faculty members from 5.8 to 6.8 over the past 10 years. This increase reflects larger lab groups sizes with the potential for increased research impact. When professional students (MEng and MHSc) are included, the increase is even higher, rising from 7.1 to 10.2, the highest in our history. 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, 2009–2010 to 2018–2019**




## Figure 2.2c **Full-time Equivalent Graduate Student-to-Faculty Ratios by Academic Area and Degree Type, 2018–2019**




**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.

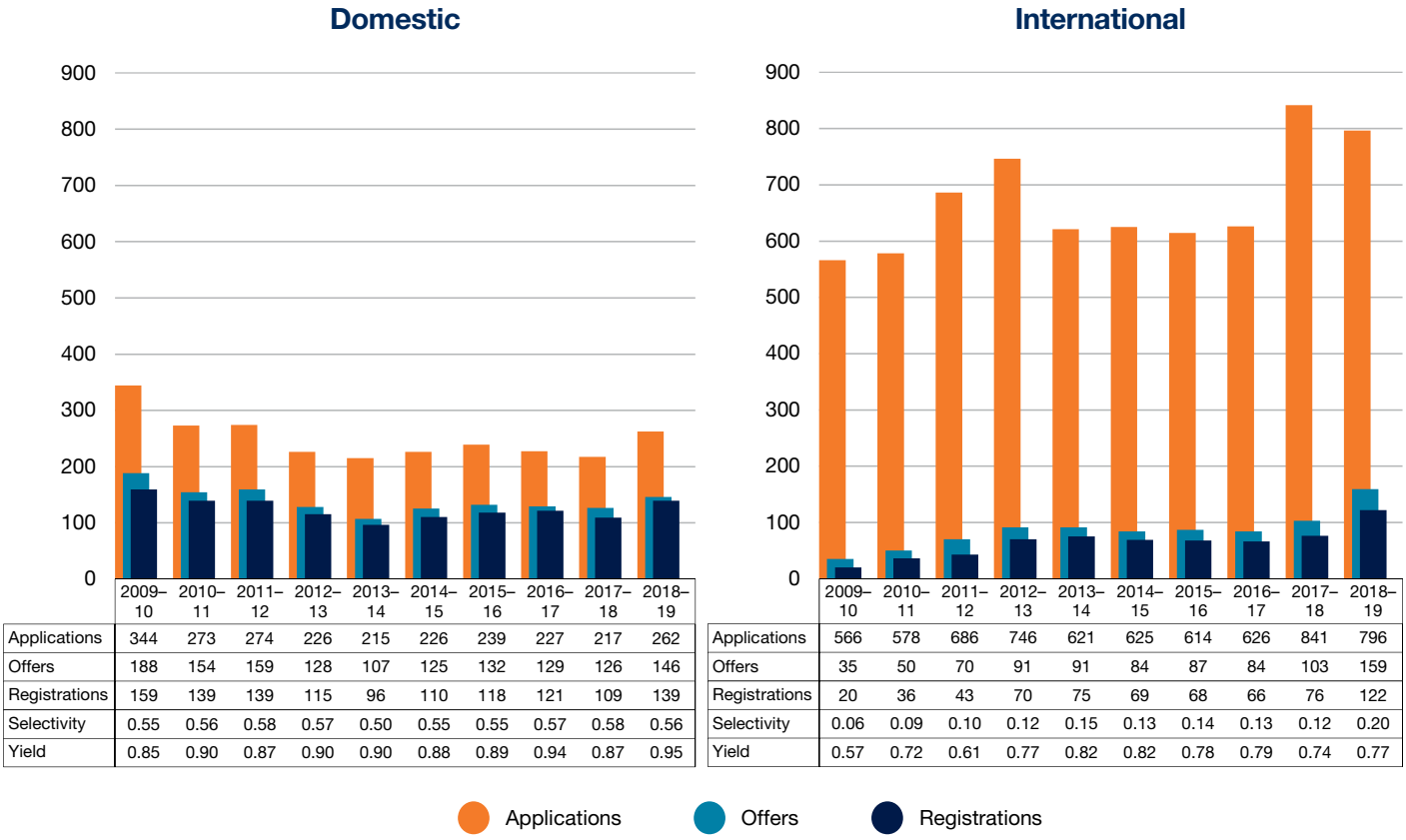
# Admissions and Recruitment

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 admissions and program information.

We are also a founding member of the Canadian Graduate Engineering Consortium (CGEC). Through CGEC, we hosted the U of T Graduate Engineering Fair on September 25, 2018, with 473 students in attendance, a 46.0% increase from the previous year. We conducted similar events in Vancouver, Edmonton, Calgary, Hamilton, Waterloo, Kingston and Montreal throughout the fall of 2018.

We held our fifth annual Graduate Research Days event from February 21 to 23, 2019, inviting talented students to learn more about our innovative research projects and meet with professors and current students. We hosted 142 prospective graduate students from eight 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, 2009–2010 to 2018–2019




**Domestic**

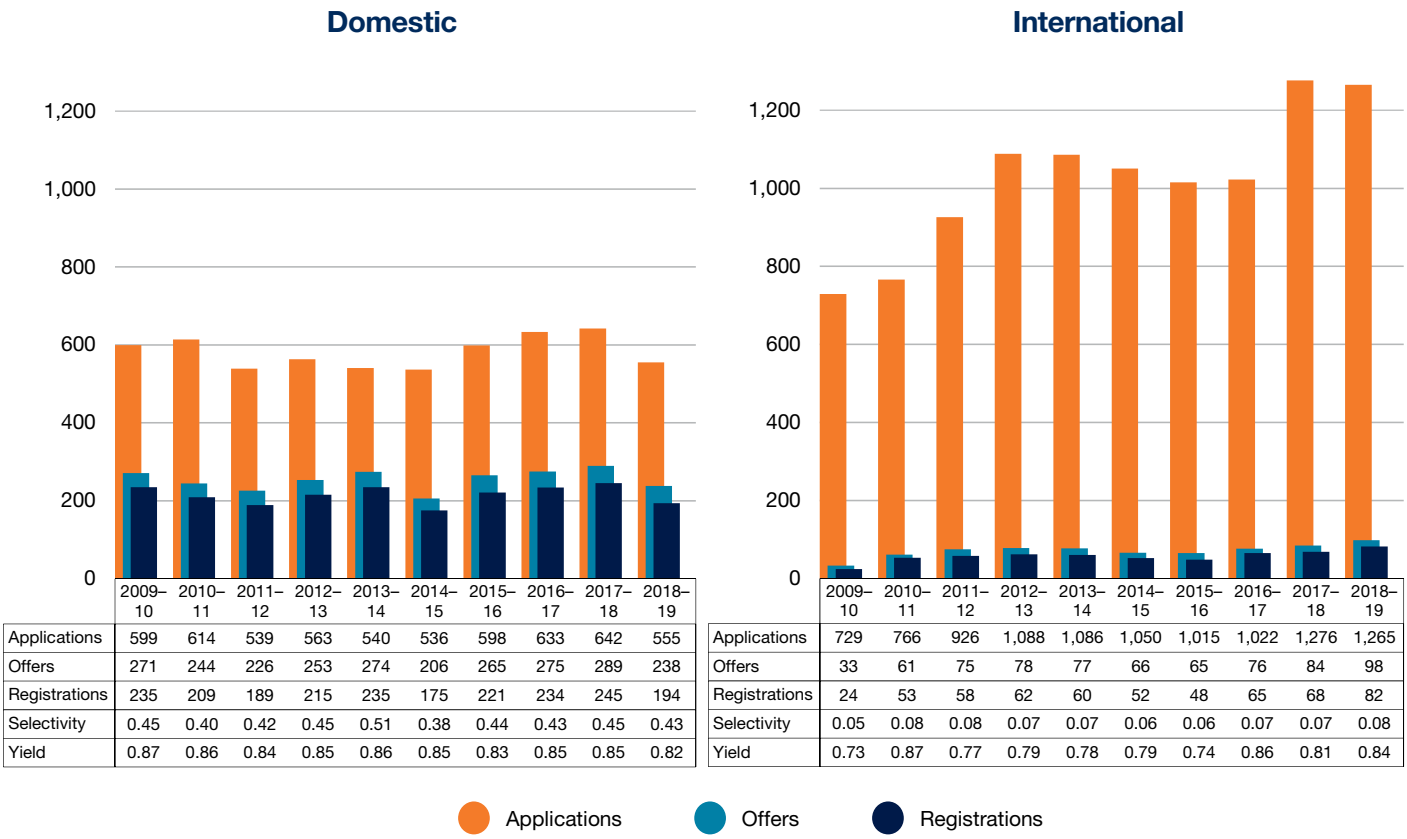
| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Applications | 344 | 273 | 274 | 226 | 215 | 226 | 239 | 227 | 217 | 262 |
| Offers | 188 | 154 | 159 | 128 | 107 | 125 | 132 | 129 | 126 | 146 |
| Registrations | 159 | 139 | 139 | 115 | 96 | 110 | 118 | 121 | 109 | 139 |
| Selectivity | 0.55 | 0.56 | 0.58 | 0.57 | 0.50 | 0.55 | 0.55 | 0.57 | 0.58 | 0.56 |
| Yield | 0.85 | 0.90 | 0.87 | 0.90 | 0.90 | 0.88 | 0.89 | 0.94 | 0.87 | 0.95 |

**International**

| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Applications | 566 | 578 | 686 | 746 | 621 | 625 | 614 | 626 | 841 | 796 |
| Offers | 35 | 50 | 70 | 91 | 91 | 84 | 87 | 84 | 103 | 159 |
| Registrations | 20 | 36 | 43 | 70 | 75 | 69 | 68 | 66 | 76 | 122 |
| Selectivity | 0.06 | 0.09 | 0.10 | 0.12 | 0.15 | 0.13 | 0.14 | 0.13 | 0.12 | 0.20 |
| Yield | 0.57 | 0.72 | 0.61 | 0.77 | 0.82 | 0.82 | 0.78 | 0.79 | 0.74 | 0.77 |

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

## Figure 2.4 Domestic and International MASc Students: Applications, Offers, Registrations, Selectivity and Yield, 2009–2010 to 2018–2019



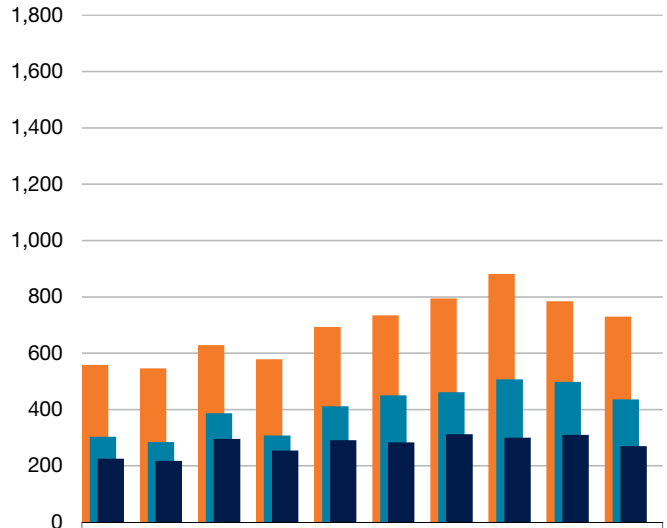

| Domestic | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Applications | 599 | 614 | 539 | 563 | 540 | 536 | 598 | 633 | 642 | 555 |
| Offers | 271 | 244 | 226 | 253 | 274 | 206 | 265 | 275 | 289 | 238 |
| Registrations | 235 | 209 | 189 | 215 | 235 | 175 | 221 | 234 | 245 | 194 |
| Selectivity | 0.45 | 0.40 | 0.42 | 0.45 | 0.51 | 0.38 | 0.44 | 0.43 | 0.45 | 0.43 |
| Yield | 0.87 | 0.86 | 0.84 | 0.85 | 0.86 | 0.85 | 0.83 | 0.85 | 0.85 | 0.82 |

| International | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Applications | 729 | 766 | 926 | 1,088 | 1,086 | 1,050 | 1,015 | 1,022 | 1,276 | 1,265 |
| Offers | 33 | 61 | 75 | 78 | 77 | 66 | 65 | 76 | 84 | 98 |
| Registrations | 24 | 53 | 58 | 62 | 60 | 52 | 48 | 65 | 68 | 82 |
| Selectivity | 0.05 | 0.08 | 0.08 | 0.07 | 0.07 | 0.06 | 0.06 | 0.07 | 0.07 | 0.08 |
| Yield | 0.73 | 0.87 | 0.77 | 0.79 | 0.78 | 0.79 | 0.74 | 0.86 | 0.81 | 0.84 |

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

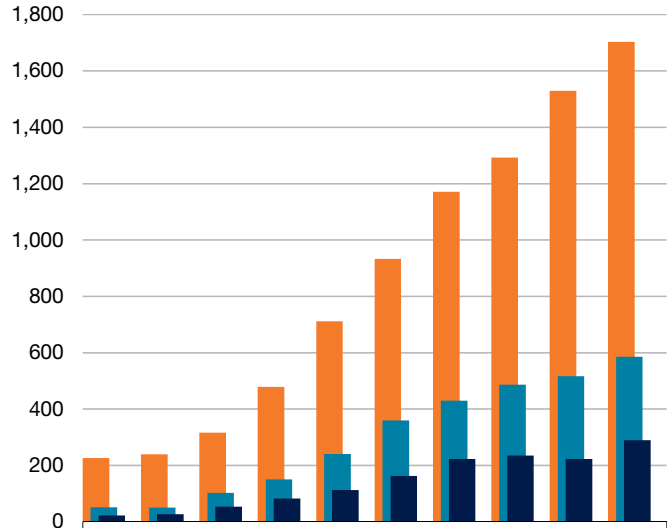
## Figure 2.5 Domestic and International MEng and MHSc Students: Applications, Offers, Registrations, Selectivity and Yield, 2009–2010 to 2018–2019

### Domestic




| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Applications | 558 | 545 | 628 | 578 | 692 | 734 | 794 | 881 | 784 | 729 |
| Offers | 303 | 284 | 386 | 307 | 411 | 450 | 461 | 506 | 498 | 435 |
| Registrations | 225 | 217 | 295 | 254 | 290 | 282 | 311 | 299 | 309 | 269 |
| Selectivity | 0.54 | 0.52 | 0.61 | 0.53 | 0.59 | 0.61 | 0.58 | 0.57 | 0.64 | 0.60 |
| Yield | 0.74 | 0.76 | 0.76 | 0.83 | 0.71 | 0.63 | 0.67 | 0.59 | 0.62 | 0.62 |

### International




| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Applications | 226 | 239 | 316 | 478 | 711 | 932 | 1,171 | 1,292 | 1,529 | 1,702 |
| Offers | 51 | 50 | 102 | 150 | 240 | 359 | 429 | 486 | 516 | 585 |
| Registrations | 22 | 27 | 53 | 82 | 112 | 162 | 223 | 235 | 223 | 289 |
| Selectivity | 0.23 | 0.21 | 0.32 | 0.31 | 0.34 | 0.39 | 0.37 | 0.38 | 0.34 | 0.34 |
| Yield | 0.43 | 0.54 | 0.52 | 0.55 | 0.47 | 0.45 | 0.52 | 0.48 | 0.43 | 0.49 |


**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 2017–2018, the most recent year for which data is available, total graduate funding reached an historic high of $50.9 million, a 5.2% increase over the previous year.

As of September 2018, all programs offer a minimum funding amount sufficient to cover tuition and fees and provide an additional annual stipend of at least $17,000 per year for PhD students, and $16,000 per year for MASc students. Most students earn more than this minimum as a result of scholarships and teaching assistantships, bringing the average engineering graduate student stipend for those in the funded cohort to approximately $25,000 per year.

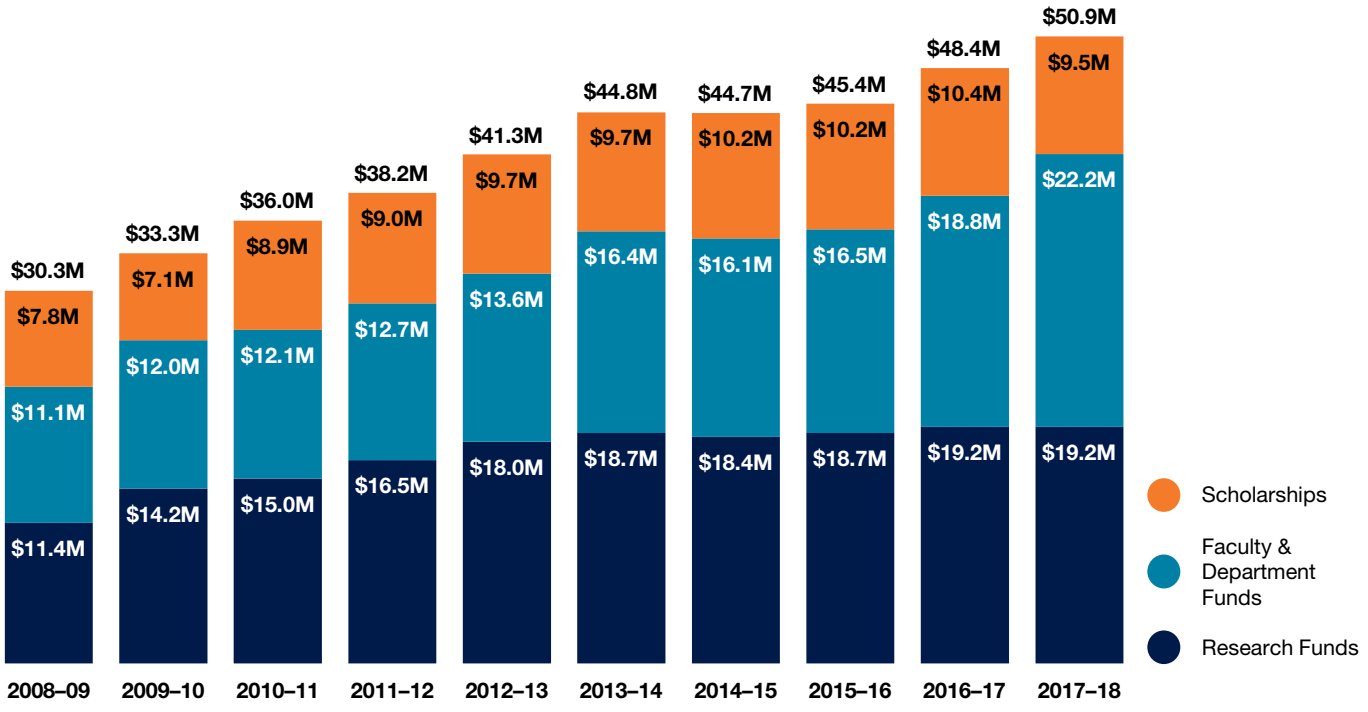
As of September 2018, international PhD students across the entire University now pay the same tuition fees as domestic students. The new fee structure affects students in all years of a PhD program. It excludes students in research master's programs.

The total amount of graduate student scholarships decreased from $10.4 million in 2016–2017 to $9.5 million in 2017–2018 (Fig. 2.6a). These scholarships come from a wide range of sources, both external to U of T Engineering (e.g., Ontario Graduate Scholarships, NSERC) and internal (including donor-supported scholarships). However, this total does not include University-level scholarships, such as the Vector Institute Scholarships (see *Selected Graduate Student Highlights* below).

While the total from the provincial level (Ontario Graduate Scholarships, OGS) grew over the previous year, the amounts in the other categories (federal-NSERC, External-Other, Internal) were smaller than the previous year. This change has a number of possible causes:

- Canada Graduate Scholarships for master's students (CGSM) are allocated to universities based on a formula that is recalculated every two years. The allocation for the University of Toronto was 110 in 2016–2017, but decreased to 74 for 2017–2018.
- If CGSM scholarships are offered to prospective students who then choose to study at other institutions, the declined scholarship is not necessarily offered to another U of T Engineering student, and may go to a student in another area of the University.

Figure 2.6a **Graduate Student Funding by Category, 2008–2009 to 2017–2018**




**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.

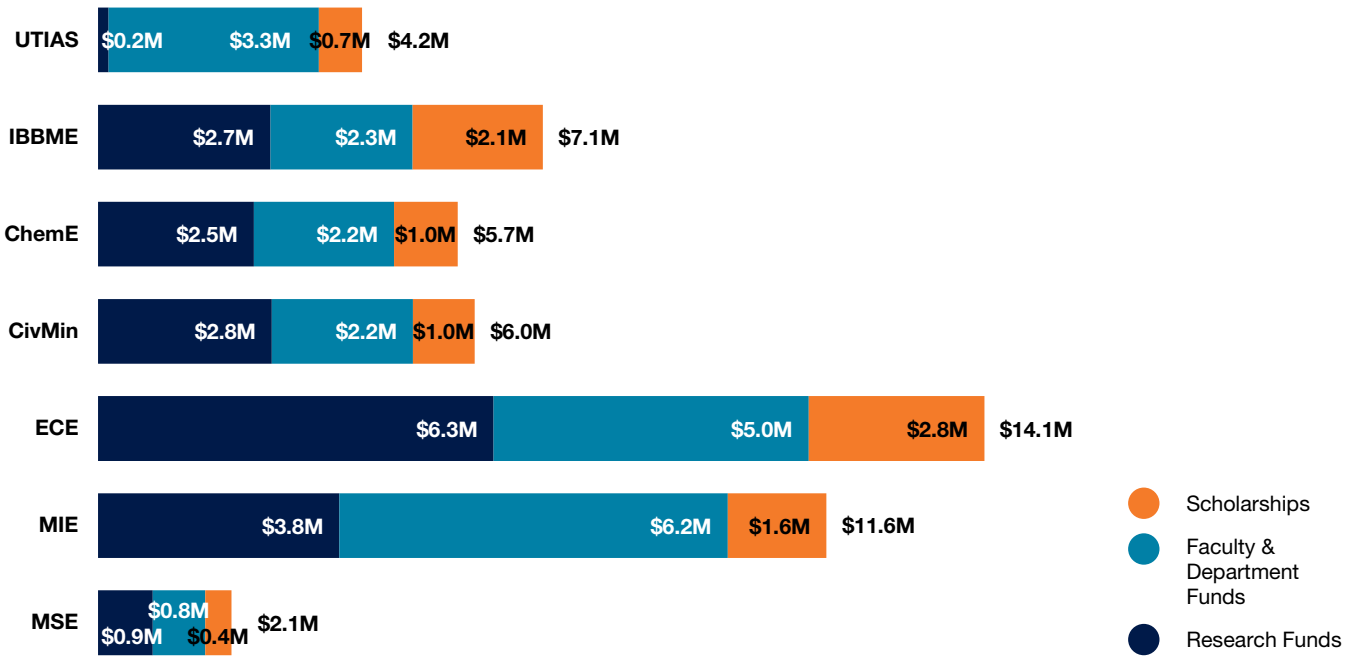
- PhD students may be receiving more two-year scholarships than three-year ones as a result of either applying later or being more successful later in their program. We will analyze this data in future reports.
- Undergraduate students may be taking more industry-related jobs (including work terms through PEY Co-op) rather than summer research placements that would qualify them for these scholarships.

We continue to work with the School of Graduate Studies to increase the number of successful scholarship applications among our graduate students. One recent example of success is the NSERC/CIHR/SSHRC Banting Postdoctoral Fellowship, which aims to attract and retain top-tier postdoctoral talent, both nationally and internationally. Dr. Mengfei Wu (ECE) earned this award in 2019–2020, which provides a total of $140,000 in support over two years.

Over the past 10 years, we have also increased the number of internal awards, including donor-supported scholarships, which now represent 46.9% of total graduate student funding compared to 39.5% in 2008–2009. This reflects the dedication of our diverse 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 opportunities to our graduate students and encourage them to apply for external scholarships. In parallel, we continue to work with the provincial and federal governments to increase the amount of funding available in direct support.

Figure 2.6b **Graduate Student Funding by Category and Academic Area, 2017–2018**

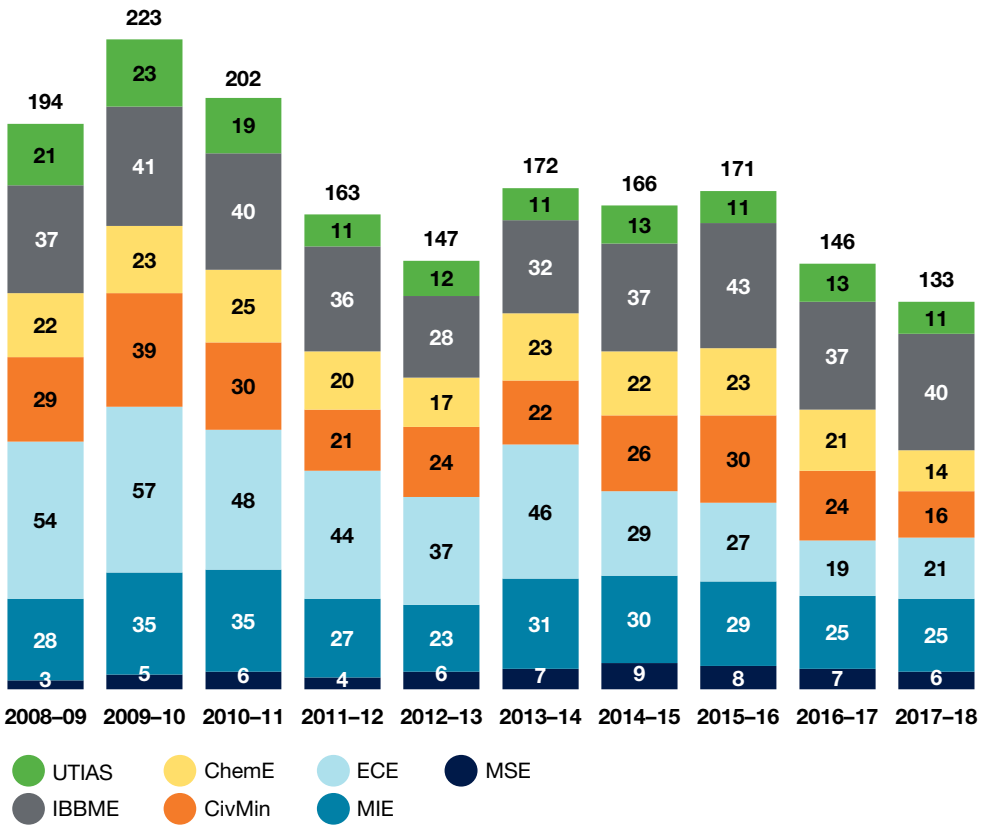



**Note 2.6b:** Data were obtained from the new Student Accounts Reporting Cube. Data for previous annual reports were obtained from the Graduate Student Income Reporting Cube. For more information, see Data Sources.

## Figure 2.7a **Total External Graduate Student Scholarships by Source, 2008–2009 to 2017–2018**

| | NSERC | OGS | External-Other | Internal | Total |
|---|---|---|---|---|---|
| **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 |
| **2017–18** | $2,779,055 | $1,525,000 | $762,281 | $4,479,707 | $9,546,043 |

## Figure 2.7b **Number of NSERC Graduate Student Award Recipients by Academic Area, 2008–2009 to 2017–2018**




**Note 2.7a, b:** 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 2018-2019, 45 students fast-tracked, our highest total to date, and 27 students started direct-entry PhD programs, our highest total to date.

## Figure 2.8a **Number of Students Fast-Tracked from MASc to PhD by Academic Area, 2009–2010 to 2018–2019**

| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| **UTIAS** | 6 | 5 | 2 | 5 | 6 | 10 | 1 | 3 | 10 | 5 |
| **IBBME** | 12 | 8 | 5 | 8 | 8 | 12 | 14 | 8 | 10 | 14 |
| **ChemE** | 11 | 4 | 8 | 7 | 14 | 8 | 5 | 7 | 5 | 6 |
| **CivMin** | 3 | 2 | 5 | 2 | 3 | 1 | 5 | 5 | 7 | 3 |
| **ECE** | 1 | 6 | 4 | 2 | 4 | 5 | 4 | 3 | 6 | 14 |
| **MIE** | 7 | 6 | 6 | 6 | 5 | 2 | 8 | 13 | 6 | 3 |
| **MSE** | 1 | 3 | 7 | 1 | 3 | 4 | 2 | 2 | 0 | 0 |
| **Total** | **41** | **34** | **37** | **31** | **43** | **42** | **39** | **41** | **44** | **45** |

## Figure 2.8b **Number of Direct-Entry PhD Students by Academic Area, 2009–2010 to 2018–2019**

| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| **IBBME** | 6 | 6 | 5 | 5 | 7 | 3 | 5 | 7 | 11 | 9 |
| **ChemE** | | | 1 | | | | 5 | 1 | | 12 |
| **CivMin** | | | | | | | | 1 | | 2 |
| **ECE** | | | | | | 2 | 2 | 2 | 2 | 2 |
| **MIE** | | | 1 | 1 | | | | 4 | | 2 |
| **Total** | **6** | **6** | **7** | **6** | **7** | **5** | **12** | **15** | **13** | **27** |

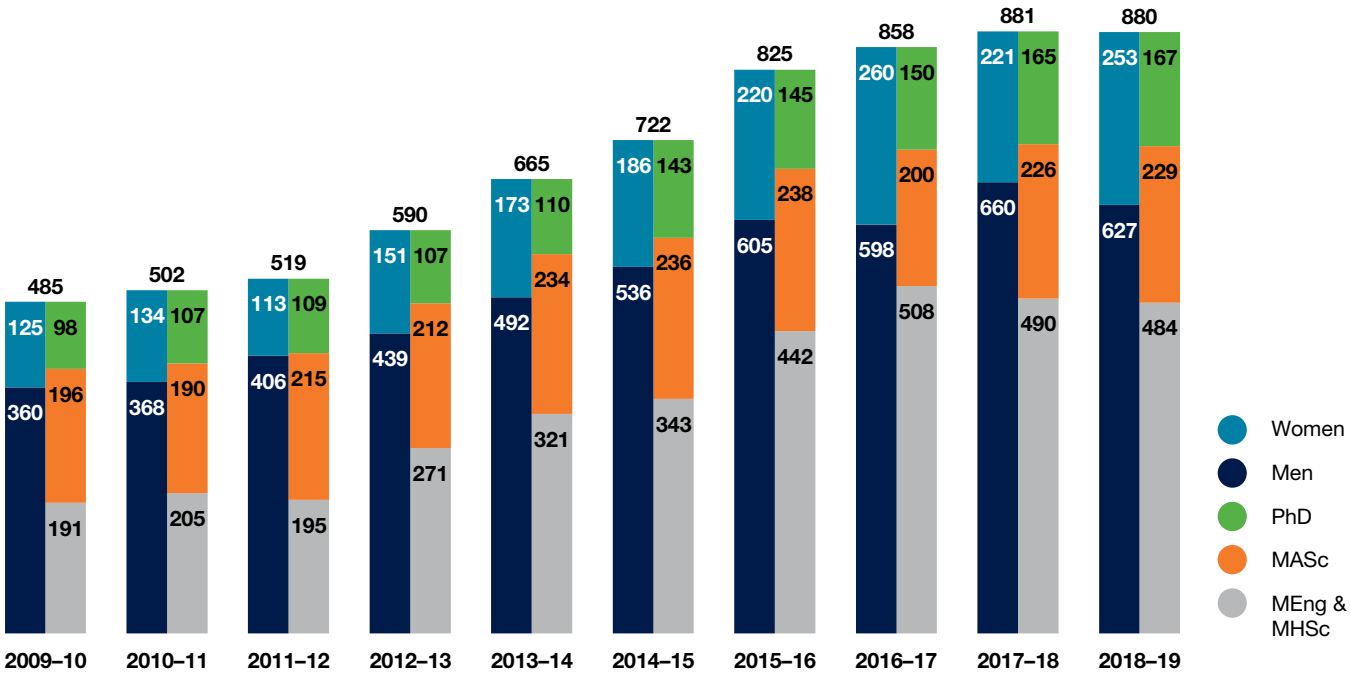
**Note 2.8a and b:** For counting purposes, the academic year is from May to April.

## Figure 2.9 **Time to Completion for PhD, MASc, MEng and MHSc Students, 2009–2010 to 2018–2019**

| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| **PhD** | 4.7 | 5.3 | 5.0 | 5.3 | 5.2 | 5.3 | 5.3 | 5.3 | 5.0 | 5.3 |
| **MASc** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **MEng & MHSc (FT)** | 1.0 | 1.0 | 1.0 | 1.3 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| **MEng (ExtFT)** | | | | | | 1.3 | 1.7 | 1.7 | 1.7 | 1.7 |
| **MEng (PT)** | 2.3 | 2.3 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.3 | 2.0 | 2.0 |

In 2018–2019, women made up 28.8% of our graduating class. The number of women receiving degrees has more than doubled over the past decade. The number of PhDs awarded in 2018–2019 was 167, representing a 70.4% increase over the past 10 years.

## Figure 2.10 **Graduate Degrees Awarded by Degree Type and Gender, 2009–2010 to 2018–2019**




**Note 2.9:** For a complete breakdown of time to completion for PhD, MASc, MEng and MHSc students by department, please see Appendix B.

# Enriching the Graduate Student Experience

Graduates of our master's and doctoral programs represent the next generation of leaders in academia, industry and government, as well as in entrepreneurship. We continue to expand and enrich our curricular and co-curricular programs to further enhance opportunities for them to develop competencies that enable lifelong career success.

Our professional master's programs enable students to advance their technical knowledge, develop professional competencies and specialize in emerging areas, from Analytics to Forensic Engineering. One of our most popular emphases is the Entrepreneurship, Leadership, Innovation & Technology in Engineering (ELITE), which integrates advanced instruction on emerging technical topics such as blockchain and AI with courses on management consulting, portfolio management, business strategy and leadership. In 2017–2018, 109 students completed an ELITE emphasis. We also expanded our ELITE curriculum to include new courses in emerging areas, such as:

- APS1050H: Blockchain Technologies and Cryptocurrencies
- APS1051H: Portfolio Management Praxis Under Real Market Constraints
- APS1052H: AI in Finance

Our newest MEng emphasis in Analytics launched in January 2018, and draws on the Faculty's expertise in areas such as operations research, computational genomics and intelligent mechatronic systems. It provides students with techniques and strategies focused around three themes: descriptive analytics (e.g. data mining), predictive analytics (e.g. machine learning) and prescriptive analytics (e.g. system optimization). Using these tools, students gain new competencies in translating large data sets into useful insights for sectors such as manufacturing, transportation, banking and health care. New courses, including the ones listed above, have been developed to support this emphasis.

Figure 2.11 **ELITE Emphases Awarded, 2009–2010 to 2018–2019**

| | 2009–10 | 2010–11 | 2011–12 | 2012–13 | 2013–14 | 2014–15 | 2015–16 | 2016–17 | 2017–18 | 2018–19 |
|---|---|---|---|---|---|---|---|---|---|---|
| **AeroE** | 1 | 2 | | 7 | 2 | 4 | 11 | 1 | 17 | 3 |
| **ChemE** | 2 | 12 | 11 | 17 | 8 | 20 | 20 | 18 | 13 | 15 |
| **CivMin** | 11 | 13 | 11 | 9 | 12 | 12 | 24 | 22 | 16 | 21 |
| **ECE** | 3 | 3 | 3 | 22 | 32 | 22 | 14 | 28 | 30 | 15 |
| **MIE** | 7 | 19 | 20 | 26 | 36 | 39 | 50 | 53 | 41 | 48 |
| **MSE** | | 1 | 1 | 4 | 6 | 11 | 5 | 15 | 1 | 7 |
| **Total** | **24** | **50** | **46** | **85** | **96** | **108** | **124** | **137** | **118** | **109** |

## Professional Development

Several of our co-curricular programs focus on enabling graduate students — especially those in the research streams — to develop their professional competencies and gain industry exposure. They include:

- **Prospective Professors In Training (PPIT):** For more than a decade, PPIT has prepared 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, and best practices in teaching and learning. In 2018–2019, more than 30 PhD candidates were enrolled in PPIT.
- **Opportunities for PhDs — Transitions, Industry Options, Networking and Skills (OPTIONS):** Transitions, Industry Options, Networking and Skills (OPTIONS): Now in its second year, OPTIONS builds on the format of PPIT, 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. Through the Fall 2018 semester, 30 students completed all the requirements of OPTIONS, and a total of 229 participated in complementary events associated with the program.
- **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. A new initiative this year was the creation of the Graduate Engineering Networking Series, in which U of T Engineering alumni offered insider perspectives on how to stand out in a competitive marketplace, and advice on developing competencies that are valued in their respective fields. Events focused on Data Analytics & Artificial Intelligence, Advanced Manufacturing and Sustainability were held throughout the fall of 2018 and winter of 2019.
- **Graduate Career Fair:** Since 2017, we have hosted a Graduate Career Fair, bringing together a diverse array of employers seeking to recruit U of T Engineering graduate students and alumni with graduate degrees. At the event's third iteration in May 2019, GECoS partnered with the Engineering Career Centre to broaden the range of company partnerships. The career fair attracted 41 companies, from Intel Programmable Solutions Group to U of T Engineering startup Kepler Communications. Attendees also had the opportunity to participate in a speed networking event, which enabled career-seekers to build connections with industry. A total of 430 graduate students and engineering professionals with graduate degrees attended.
- **Graduate Peer and Career Support (Grad PACS):** A new initiative for 2018–2019, Grad PACS supports new graduate students as they identify career pathways and launch their career planning early in their degree. The program is facilitated by Grad PACS Guides, who are experienced PhD students that are trained as mentors. The first three mentors — Chaim Katz (IBBME), Ezzat Jaroudi (ChemE) and Darya Maedeh Amirmaleki (MIE) — began as Grad PACS Guides in January 2019.

# Selected Graduate Student Highlights

## Six U of T Engineering graduate students awarded Vanier Scholarships

The Vanier Canada Graduate Scholarships recognizes and supports PhD students who demonstrate excellence in academics, research impact and leadership. This year, six U of T Engineering students received these prestigious awards, including:

- **Amin Kamaleddin Ezabadi (IBBME PhD candidate)** — Ezabadi is identifying drug targets at a molecular level to develop clinically effective treatments for chronic pain.
- **Surath Gomis (ECE PhD candidate)** — Gomis focuses on designing microfluidic devices to characterize and sort retinal stem cells — a rare cell type with promising therapeutic applications of reversing blindness due to degenerative eye disease.
- **Chaim Katz (IBBME PhD candidate)** — Katz is investigating deep brain stimulation — the process by which electrical pulses are delivered to the brain to regulate its activity — to learn how the process can be used to improve memory and alleviate the cognitive effects of, and lend insight to, memory modification for other neurodegenerative diseases.
- **Hannah Kozlowski (IBBME MD/PhD candidate)** — Kozlowski aims to improve current diagnostic tests for infectious diseases such as HIV, hepatitis and influenza by creating an algorithm that looks at changes in microorganisms and uses that information to predict whether a test will provide a true diagnosis.
- **Shane Saunderson (MIE PhD candidate)** — Saunderson's research anticipates a future where social robots become nearly ubiquitous and are required to take on a variety of roles that collaborate with humans. He is currently investigating how interactions with robots influence and affect humans, particularly in roles involving trust, persuasion and empathy.
- **Trevor Stirling (ECE PhD candidate)** — Stirling works on the design and implementation of entangled photon lasers on silicon-based computer chips. These devices will be used to interconnect quantum bits on chip to help realize scalable quantum computing, as well as provide a platform for further research into the applications of quantum light.

## Nine U of T Engineering graduate students awarded Vector Institute Scholarships in Artificial Intelligence

Nine U of T Engineering master's students were among 66 recipients from across Ontario to receive Vector Scholarships in Artificial Intelligence (VSAI) from the Vector Institute. The Vector Institute supports Ontario's growing artificial intelligence (AI) ecosystem through a number of initiatives, including scholarships to increase the number of graduates from AI-related master's programs. Vector scholars are invited to various networking and professional development events at the Institute throughout the year.

The U of T Engineering Vector scholars are:

- **Matthew Crowson** (MIE)
- **Ke Dong** (UTIAS)
- **Daniel Dworakowski** (MIE)
- **Salma Emara** (ECE)
- **Yan Fu** (ECE)
- **Adam Hall** (UTIAS)
- **Sepehr Samavi** (UTIAS)
- **Xiaodan (Serina) Tan** (ECE)
- **Jeremy Wong** (UTIAS)

## aUToronto wins AutoDrive Challenge™ for second year in a row

For the second year in a row, the U of T Engineering team aUToronto placed first overall in the AutoDrive Challenge™, beating out teams from seven other universities across North America. During the three-year competition, undergraduate and graduate students from engineering and computer science work together to convert an electric Chevrolet Bolt into a fully self-driving car. The team is led by **Keenan Burnett** (EngSci 1T6+PEY, UTIAS MASc candidate) and is advised by several U of T Engineering professors with expertise in autonomous vehicles. The second leg of the competition took place at MCity, a simulated town for self-driving vehicle testing built at the University of Michigan in Ann Arbor. aUToronto and their vehicle, dubbed "Zeus", placed first in nearly every category, from concept design to social responsibility. The third leg of the competition will take place in the spring of 2020.