

## 1

We continue to attract top students from around the world, and our incoming cohort is growing more diverse every year. We received a record number of undergraduate applications in 2017 – more than 12 for each place in our programs. The mean entering average of Ontario secondary school students was 93.2%, matching last year’s value for the highest yet. In 2017, women comprised 40.2% of our first-year class and more than one in four entering undergraduates came from outside Canada.

Further enhancing our culture of diversity and inclusion is crucial to the collaboration, creativity and innovation that drive excellence in the engineering profession. Through the Eagles’ Longhouse, our Engineering Indigenous Initiatives Steering Committee, and our new Dean’s Advisor on Black Inclusivity Initiatives and Student Inclusion & Transition Mentor, we are working to enrich academic experiences for all our students and to increase diversity within our programs and the engineering profession.

We launched a number of new programs in 2017–2018 to further expand the range of opportunities available for our students to customize their degree programs. These included our undergraduate minor in Advanced Manufacturing and certificate in Forensic Engineering, which welcomed their first students in September 2017. We also created an Engineering Science major in Machine Intelligence and, in partnership with the Faculty of Music, a minor in Music Performance and certificate in Music Technology, which will begin in September 2018.

Our professors and graduate students are thought leaders in engineering education and professional development. We enhanced our support for excellence in these areas through initiatives such as the Technology Enhanced Active Learning (TEAL) Fellows Program, the Hart Teaching Innovation Professorships and our newly created Institute for Studies in Transdisciplinary Engineering Education and Practice (ISTEP). (*For more information on ISTEP, see Chapter 4.*)

Active learning and experiential education are also built into our physical spaces. The new Myhal Centre for Engineering Innovation & Entrepreneurship contains flexible design studios, technology enhanced learning spaces and prototyping facilities. It also includes dedicated space for student clubs and teams to store equipment, rehearse and perform music and host events, further enriching our learning environment.

## Admissions and First-Year Students

We received 12,880 applications for admission to our programs for September 2017 entry, our highest total yet. This represents an increase of 4.7% from the previous year, and 79.6% since 2008. This rise in applicants has allowed us to be even more selective in terms of our offers of admission, which we provided to 24% of applications in 2017 compared with 43% in 2008. Our yield has remained nearly constant over the past 10 years, fluctuating between 34% to 39%.

Figure 1.1a Applications, Offers, Registrations, Selectivity and Yield of First-Year Undergraduates, 2008 to 2017

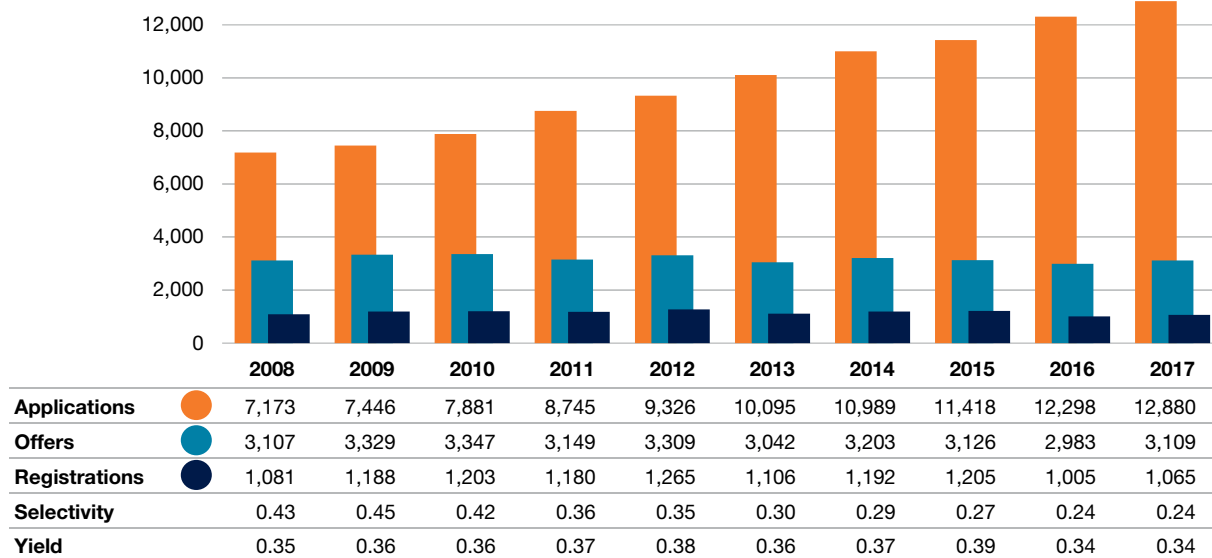
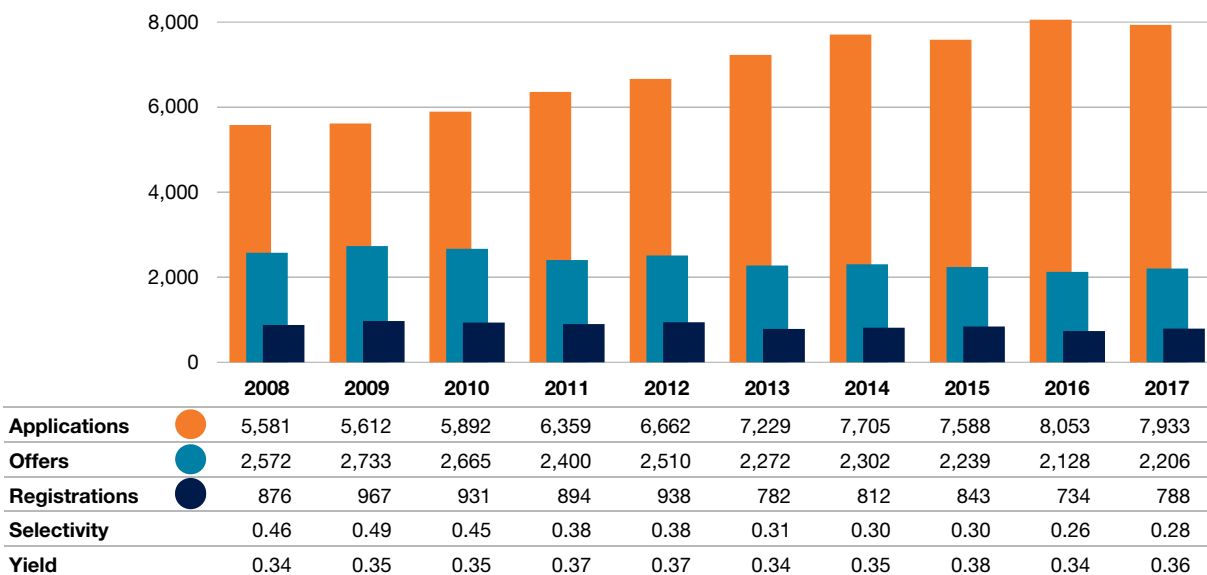


Figure 1.1b Applications, Offers, Registrations, Selectivity and Yield of Domestic First-Year Undergraduates, 2008 to 2017



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

**Note 1.1a, b, c:** Student counts are shown as of November 1. Applications and offers are for the fall admissions cycle.

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

Growing interest from international students is one indication of our strong global reputation and the quality of our research and educational programs. International applications rose 16.5% over the previous year, and have more than tripled over the last decade.

Our admitted students are of the highest calibre, earning prestigious accolades such as the Schulich Leader Scholarships, C. David Naylor University Scholarships, Lester B. Pearson International Scholarships and International Engineering Scholar Awards. Incoming Ontario secondary school students achieved a mean entering average of 93.2%, the

highest in our Faculty’s history for the second year in a row.

We recognize that grades alone do not provide a complete understanding of each applicant’s candidacy, and we have implemented a broad-based admissions process to account for key engineering qualities such as logical thinking, communication skills, adaptability and perseverance. The process includes online videos and written, timed responses that are evaluated by more than 70 trained alumni screeners (increased from 60 the previous year) including many based outside of the Toronto region.

**Figure 1.1c Applications, Offers, Registrations, Selectivity and Yield of International First-Year Undergraduates, 2008 to 2017**

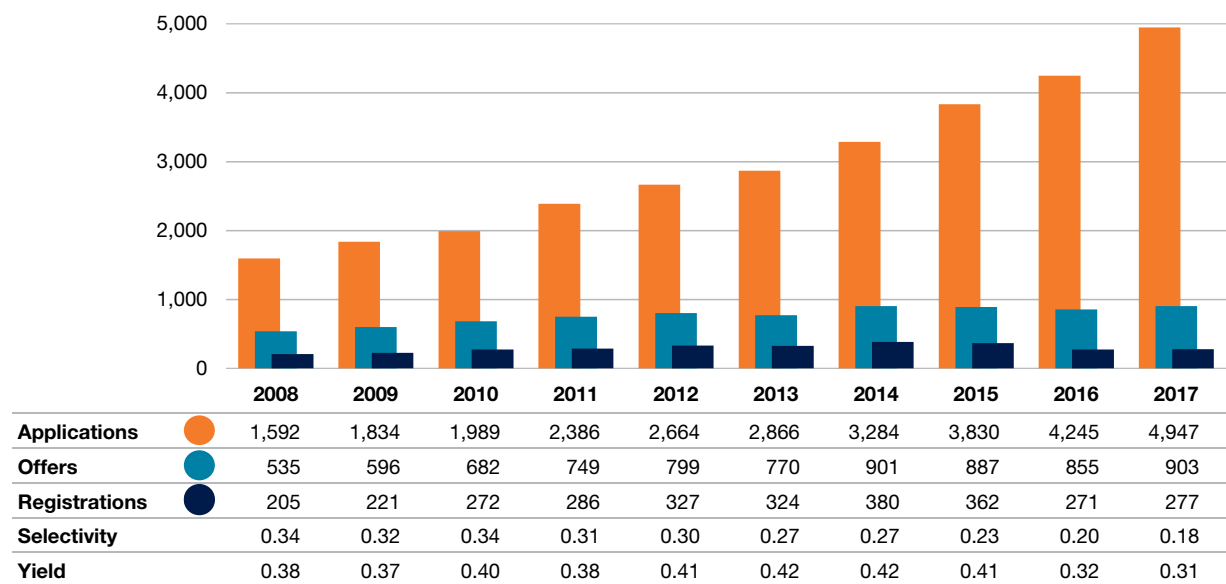
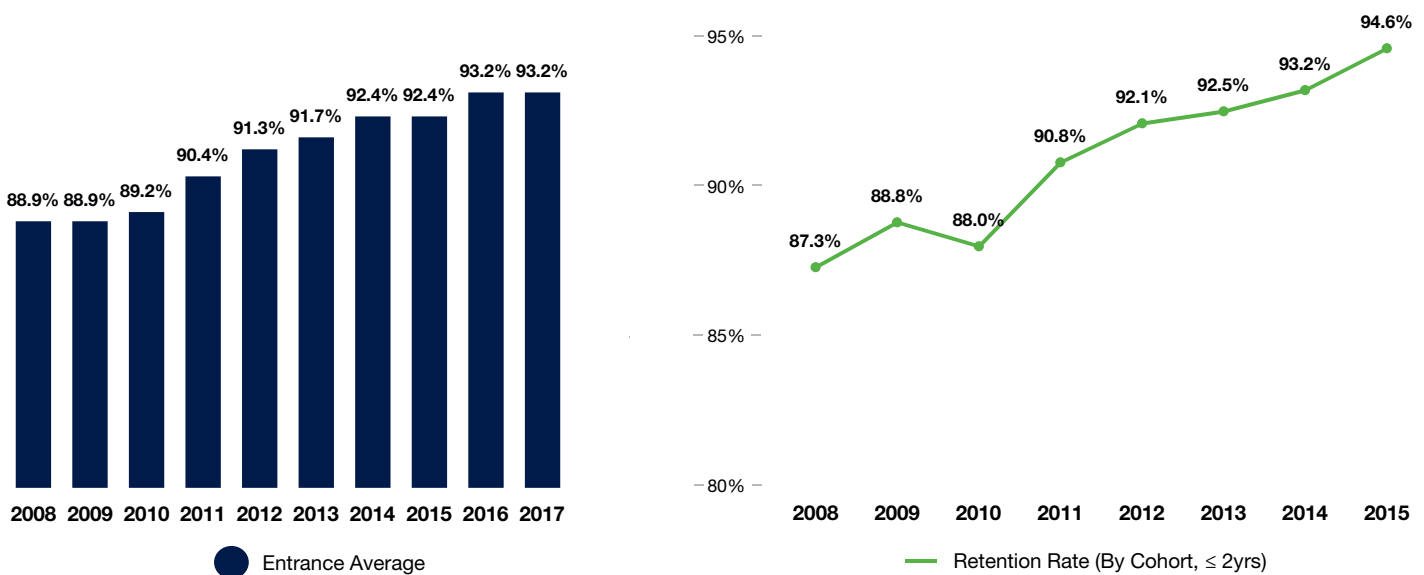


Figure 1.2 Ontario Secondary School Averages of Incoming First-Year Undergraduates and Retention Rate Between First and Second Year, 2008 to 2017



We augment the educational experience of our students with a robust suite of offerings aimed at supporting their success, from embedded academic advisors to peer-assisted study sessions. These initiatives have strengthened our high retention rates: 94.6% of the 2015 cohort continued on to second year, up from 93.2% in the previous cohort.

Our first-year undergraduate population was the most diverse in our history. Women comprised a record 40.2% of first-year students, the highest proportion of any engineering school in Canada, and international students made up 26.0% of our incoming cohort. A further 70 students (8.9% of the domestic cohort) completed their secondary education outside of Canada, but are Canadian citizens and therefore are considered domestic students (See Fig. 1.4).

Our ability to attract students from outside of Canada is enhanced by the Faculty’s Engineering International Scholar Awards, the MasterCard Foundation Scholars Program and the Lester B. Pearson International Scholarships. (For more details, please see Chapter 9: International Initiatives and Chapter 10: Diversity.)

Strategic recruitment events and activities enable us to attract the most accomplished candidates from across Canada and around the world. For the 2017 admissions cycle, key activities included:

- National Recruitment:** We distributed 12,567 *Discover Engineering* viewbooks at the Ontario Universities Fair at the Metro Toronto Convention Centre. We also increased the number of school visits in the Greater Toronto Area to 72 in 2017, up from 66 in 2016. Schools were selected on the basis of historic admission data, with an eye to our enrolment priorities. For the first time this year, we partnered with Youth Science Canada to conduct recruitment activities at the Canada-Wide Science Fair, the largest event of its kind, held May 12–19, 2018. We continued our traditional recruitment drives in Ottawa, Montreal, Vancouver, Calgary, Mississauga and Markham, as well as our participation in U of T’s Fall Campus Day.
- International Recruitment:** We conducted extensive recruitment activities including school visits, applicant events, information sessions, conference presentations and science fair participation in a wide range of countries, including Brazil, India, Turkey and the U.S. New this year: Colombia, Panama and Trinidad & Tobago.

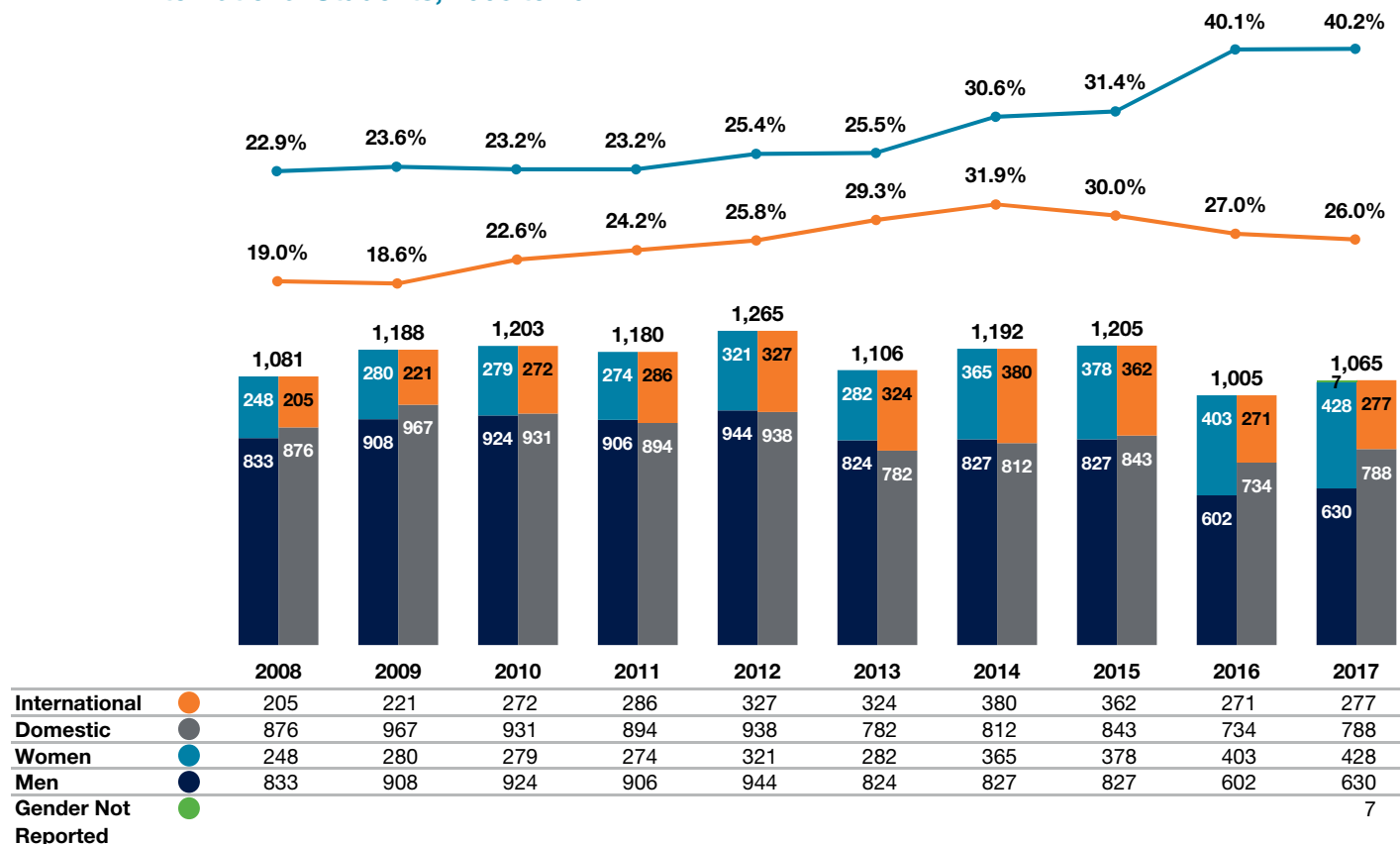
**Note 1.2:** Entrance average is calculated based on Ontario secondary school students. Retention rate is the proportion of students who successfully move on to second year within a two-year window of when they first enrolled. For example, the 2015 point refers to the proportion of the Sept 2015 entering cohort who had advanced to second year as of Nov 1, 2017.

- **Online Events:** We hosted 10 live-streamed events, panel discussions, live chats and videos throughout the admissions cycle to answer applicants' questions about such topics as application completion, program showcases, PEY Co-op and living on campus. We also piloted a program whereby current students speak online with admitted applicants from key regions.
- **Young Women in Engineering Symposium (YWIES) (May 2017 and May 2018):** For our fourth annual event in May 2017, we shifted our focus from female Grade 12 students early in their final year of high school to female Grade 11 students, enabling us to connect with students earlier in their decision-making process. We attracted 76 top female students from across the Greater Toronto Area to U of T where they learned more about engineering, participated in hands-on workshops and met students, faculty and alumni. Twenty-nine of the attendees ultimately applied to U of T Engineering. Our fifth annual symposium in May 2018 attracted 84 participants.
- **YWIES Red Carpet Overnight Program (November 2017):** New for the 2017–2018 recruitment cycle, this program is open to all YWIES participants, and provides an

opportunity to experience U of T Engineering firsthand by staying in residence and shadowing current women U of T Engineering students. Sixteen prospective women students from the Greater Toronto Area took part.

- **March Break Applicant Event (March 2018):** We hosted more than 650 applicants and their families during this invitation-only open house, which gave them an opportunity to learn more about the Faculty, specific programs, student life and our campus.
- **Engineer for a Day (May 2018):** We piloted this event in 2017 and expanded it in 2018, hosting 48 high-achieving Grade 11 math and science students from four Toronto schools that are typically underrepresented in our applicant pool, enabling them to experience a day in the life of a U of T Engineering student. Attendance was nearly double last year's level of 26.
- **Admitted Student Calling Campaign (March/April 2018):** Current U of T Engineering students reached more than 1,000 applicants from across Canada, the U.S., Mexico, South America and the Caribbean by phone to congratulate them on being offered admission and answer their questions with a focus on student experience.

Figure 1.3 Incoming First-Year Undergraduates with Percentage of Women and International Students, 2008 to 2017

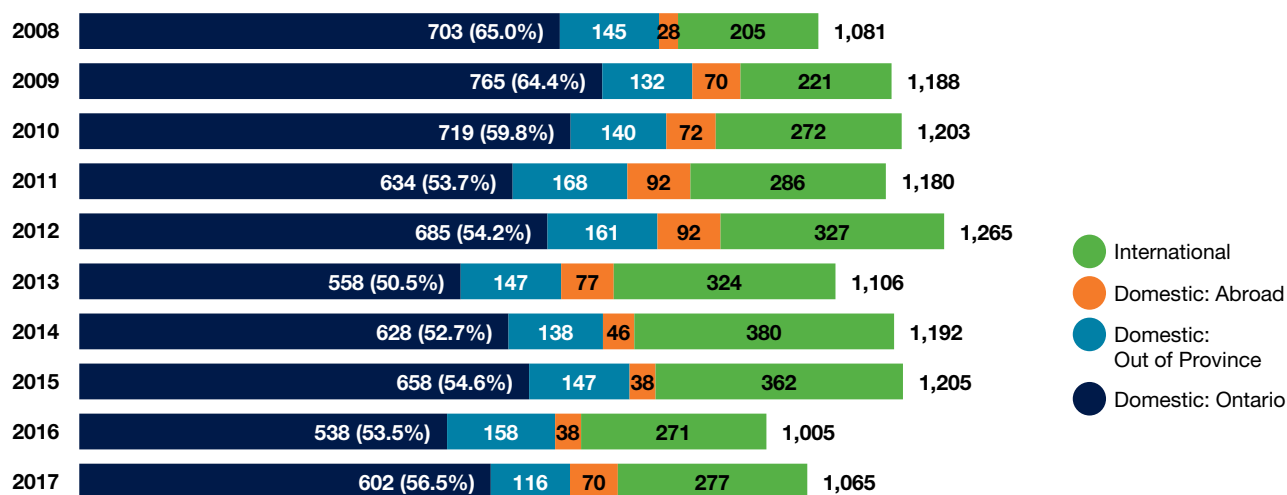


**Note 1.3:** Student counts are shown as of November 1. Domestic students are defined as citizens or permanent residents of Canada. Data on student gender comes from the OUAC admissions form. In 2017, gender identification on the form was changed from mandatory to optional and a third category, "Another Gender Identity," was added. All seven of the incoming students presented in Figure 1.3 chose not to report their gender.

- **GLEE: Girls' Leadership in Engineering Experience (March 2018 and May 2018):** This annual, weekend-long program inspires and empowers women who have received offers of admission to our programs by connecting them with women faculty members, students and alumnae. It includes a dinner and reception hosted by the Dean as well as a keynote address from one of our women professors. Two events were held in 2018: one in March that attracted 12 students from outside Ontario, and one in May for 105 more from within Ontario.
- **Welcome to Engineering (May 2018):** This full-day event gave admitted students an opportunity to learn more about U of T Engineering before the final deadline for applicants to accept offers from Ontario universities. More than 350 admitted students attended this event in 2018.

In 2017, we established the Eagles' Longhouse, our Engineering Indigenous Initiatives Steering Committee, with members from across our Faculty and the Oneida Nation. Chaired by Professor Jason Bazylak, our Dean's Advisor on Indigenous Initiatives, the mandate of the Eagles' Longhouse is to engage Indigenous representatives and engineering educators to design a *Blueprint for Action* to ensure a welcoming and supportive environment for Indigenous students, faculty and staff, and to intensify engineering outreach to these underrepresented communities. Its report was delivered in June 2018. (For more information, see Chapter 10: Diversity.)

Figure 1.4 Incoming First-Year Domestic and International Undergraduates, 2008 to 2017



## Enrolment

In 2017–2018, the undergraduate student population was 5,298, with the overall proportion of women reaching 33%, up from 30% in 2016–2017. This threshold is significant as U of T Engineering continues to work with Engineers Canada and other Canadian

engineering schools to achieve the “30 by 30” goal to have the proportion of women among newly licensed engineers reach 30% by 2030. Our international student population now stands at 28.6% of all undergraduates.

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

Figure 1.5a Undergraduate Enrolment with Percentage of Women and International Students, 2008–2009 to 2017–2018

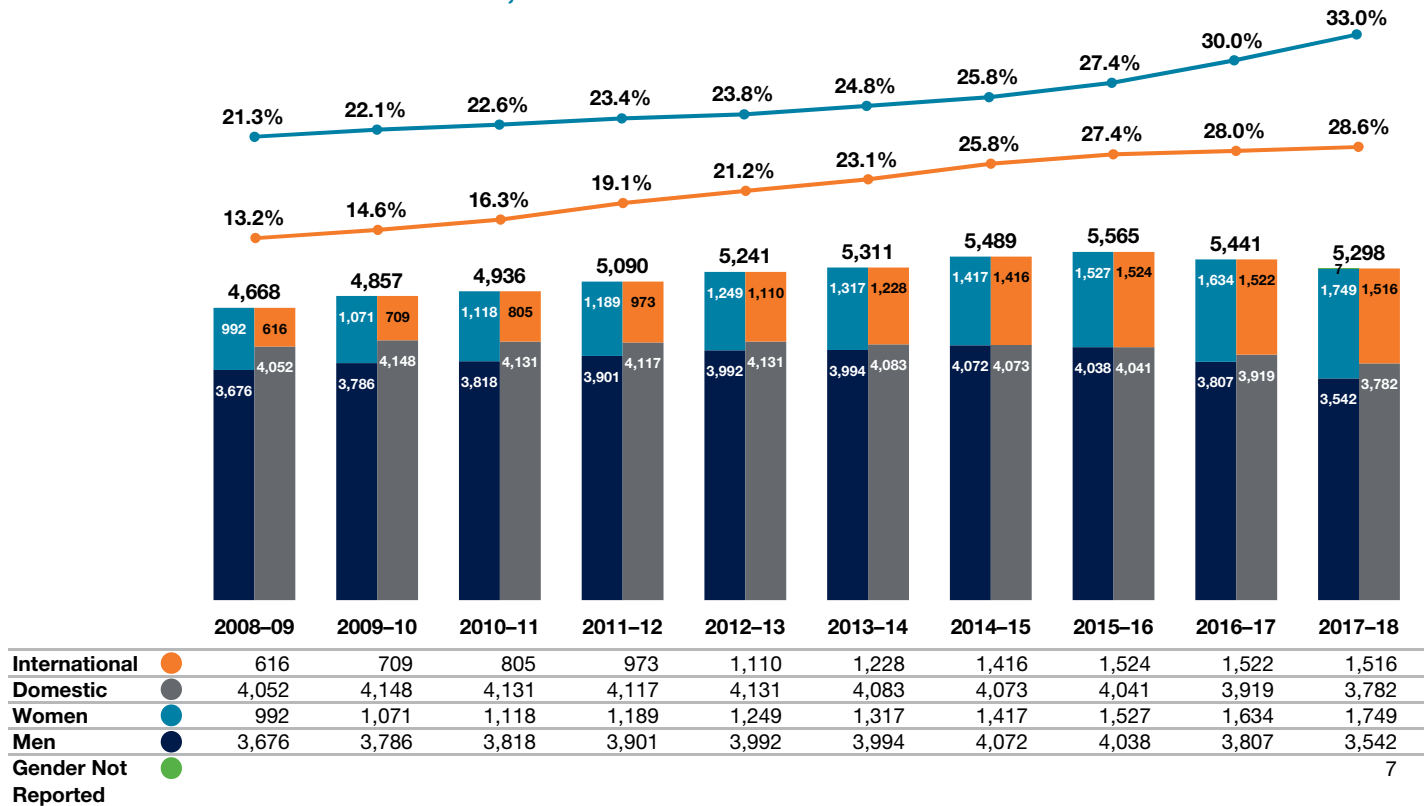
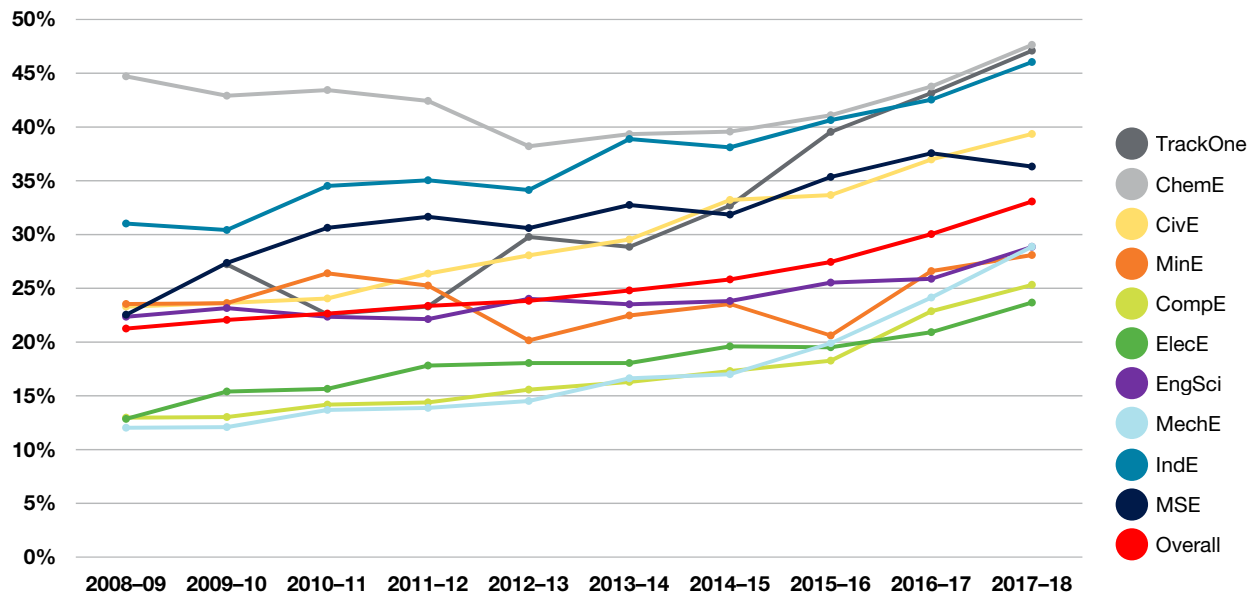
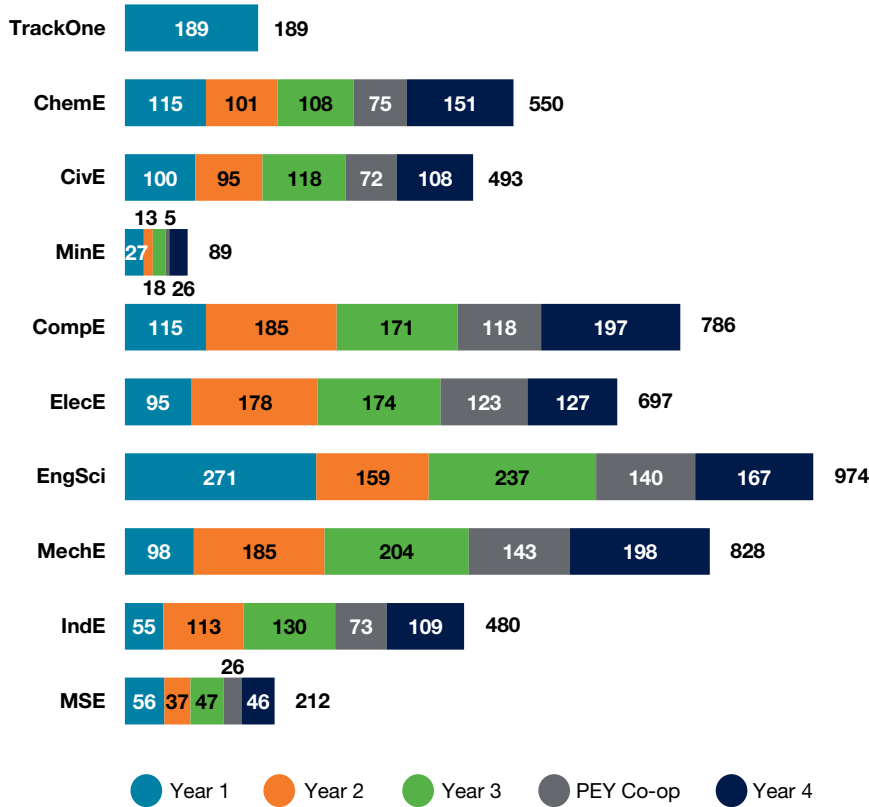


Figure 1.5b Percentage of Women by Undergraduate Program, 2008–2009 to 2017–2018



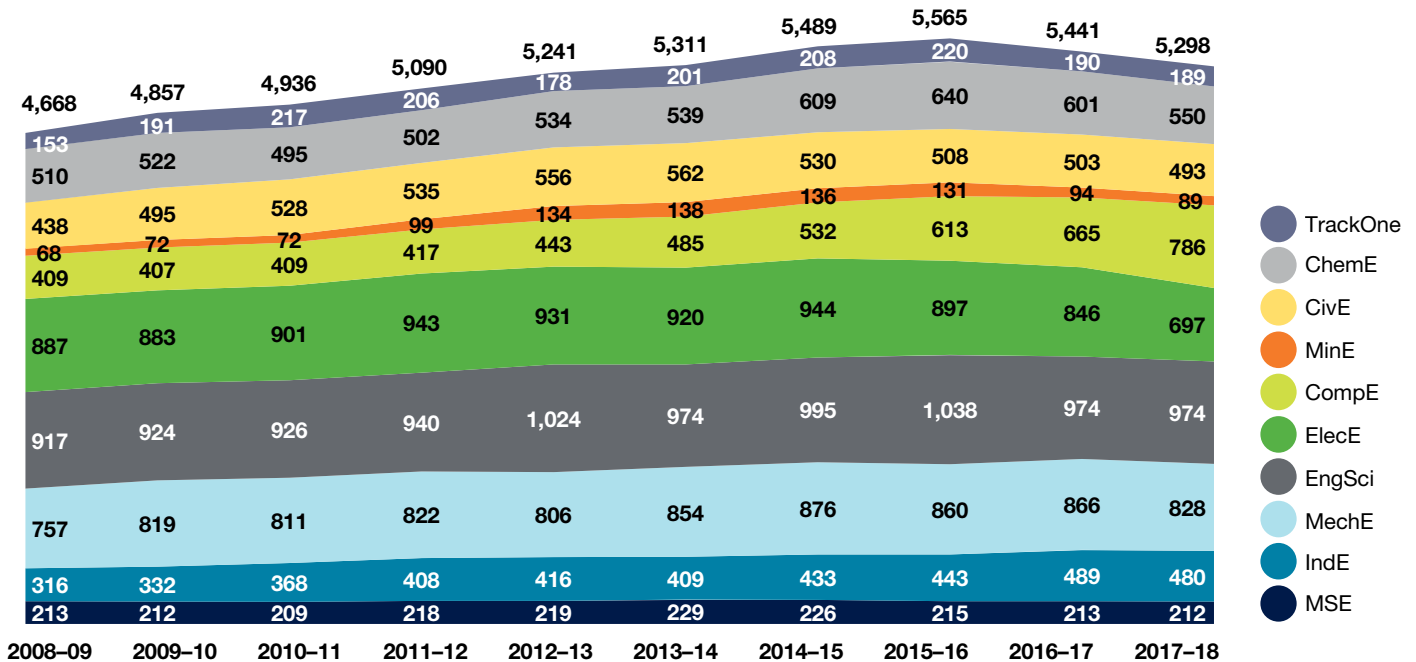
**Note 1.5a:** Includes full- and part-time students and those working full time through the Professional Experience Year Co-op Program (PEY Co-op). Does not count students with special (non-degree) status. Student counts shown as of November 1, 2017. Domestic students are defined as citizens or permanent residents of Canada. Data on student gender comes from the OUAC admissions form. In 2017, gender identification on the form was changed from mandatory to optional and a third category, “Another Gender Identity,” was added. All seven of the students presented in Figure 1.5a chose not to report their gender.

Figure 1.6 Undergraduates by Program, Year of Study and Professional Experience Year Co-op, 2017–2018



Engineering Science Majors	Enrolment
Aerospace Engineering	40
Biomedical Systems Engineering	54
Electrical and Computer Engineering	97
Energy Systems Engineering	15
Infrastructure Engineering	17
Mathematics, Statistics and Finance	58
Engineering Physics	24
Robotics Engineering	99
<b>Total</b>	<b>404</b>

Figure 1.7 Undergraduates by Program, 2008–2009 to 2017–2018



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

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



## Need-Based Funding

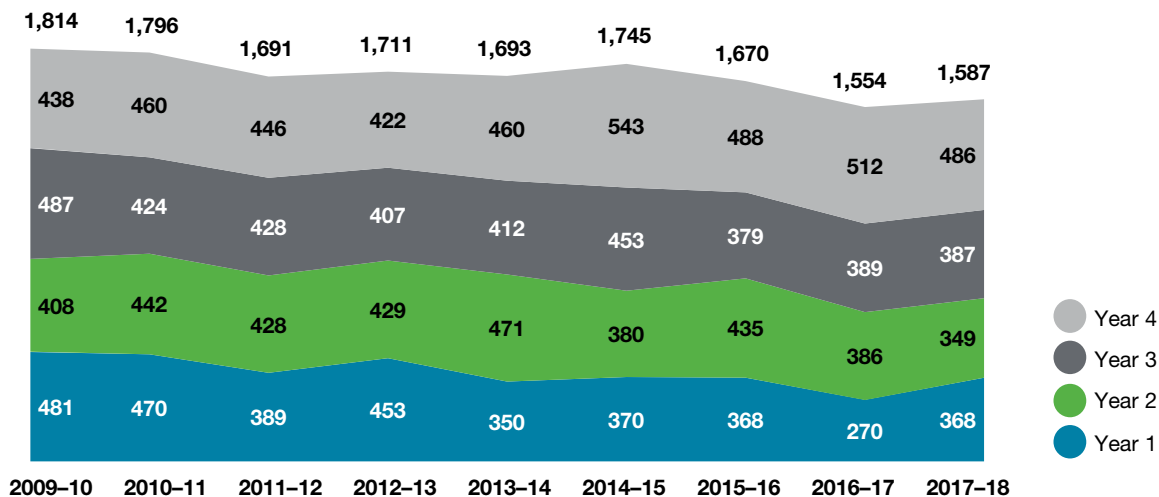
Our Faculty is committed to the University of Toronto's Policy on Student Financial Support, which states that no student offered admission to a program at the University of Toronto should be unable to enter or complete the program due to lack of financial means.

We offer a wide range of student aid options — including scholarships, bursaries and other awards based on merit and need — funded by donors and the University of Toronto Advanced Planning for Students (UTAPS) program. Our financial aid officer helps students prepare personal budgets, learn about funding sources and manage appeals through the Ontario Student Assistance Program (OSAP) process.

The number of undergraduate students receiving need-based awards in 2017–2018 was 1,587 with the total amount of student support reaching \$12.0 million. This funding is distributed relatively evenly across all years of study, and represents a 25.0% increase over the last 10 years.

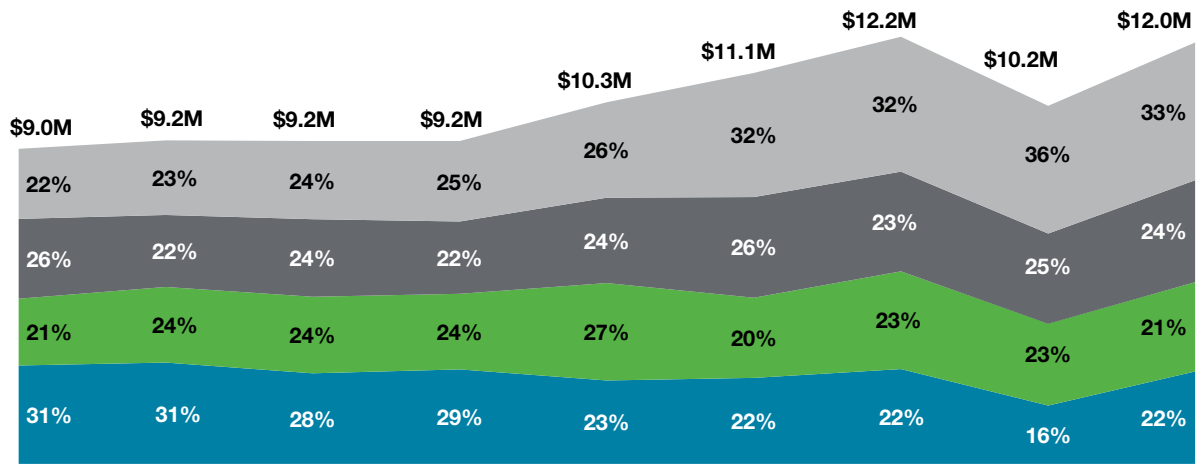
The amounts reported in Figures 1.8a and 1.8b do not include external merit-based scholarships or awards, or funding from provincial assistance programs, including OSAP.

**Figure 1.8a Number of Awards Received by Cohort with Total Number of Undergraduate Need-Based Award Recipients, 2009–2010 to 2017–2018**



**Note 1.8a:** Data comes from the Student Accounts Reporting Cube.

**Figure 1.8b Total Value of Undergraduate Financial Assistance and Percentage Distributed by Year of Study, 2009–2010 to 2017–2018**



	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Year 4</b>	\$1,995,808	\$2,130,098	\$2,229,278	\$2,296,173	\$2,725,785	\$3,534,244	\$3,853,161	\$3,644,310	\$3,933,142
<b>Year 3</b>	\$2,280,152	\$2,049,237	\$2,205,736	\$2,061,174	\$2,429,321	\$2,871,229	\$2,839,851	\$2,570,428	\$2,912,515
<b>Year 2</b>	\$1,897,712	\$2,157,800	\$2,185,640	\$2,160,969	\$2,781,695	\$2,289,069	\$2,792,715	\$2,335,933	\$2,545,499
<b>Year 1</b>	\$2,806,624	\$2,886,898	\$2,580,676	\$2,687,414	\$2,372,994	\$2,450,470	\$2,700,169	\$1,662,682	\$2,631,654
<b>Total</b>	<b>\$8,980,296</b>	<b>\$9,224,033</b>	<b>\$9,201,330</b>	<b>\$9,205,730</b>	<b>\$10,309,795</b>	<b>\$11,145,012</b>	<b>\$12,185,896</b>	<b>\$10,213,353</b>	<b>\$12,022,810</b>

**Note 1.8b:** Data comes from the Student Accounts Reporting Cube.

# Degrees Awarded

U of T Engineering students earn either a Bachelor of Applied Science (BASc) or Bachelor of Applied Science in Engineering Science (BASc EngSci). Both degrees can be completed in four years. However, many of our second- and third-year students choose to augment their degrees with a 12- to 16-month job through the

Professional Experience Year Co-op Program (PEY Co-op), which adds one year to their time to completion. *(For more information on PEY Co-op, please refer to Chapter 4: Cross-Faculty Education and Experiential Learning.)*

Figure 1.9a Undergraduate Degrees Awarded by Program, 2008–2009 to 2017–2018

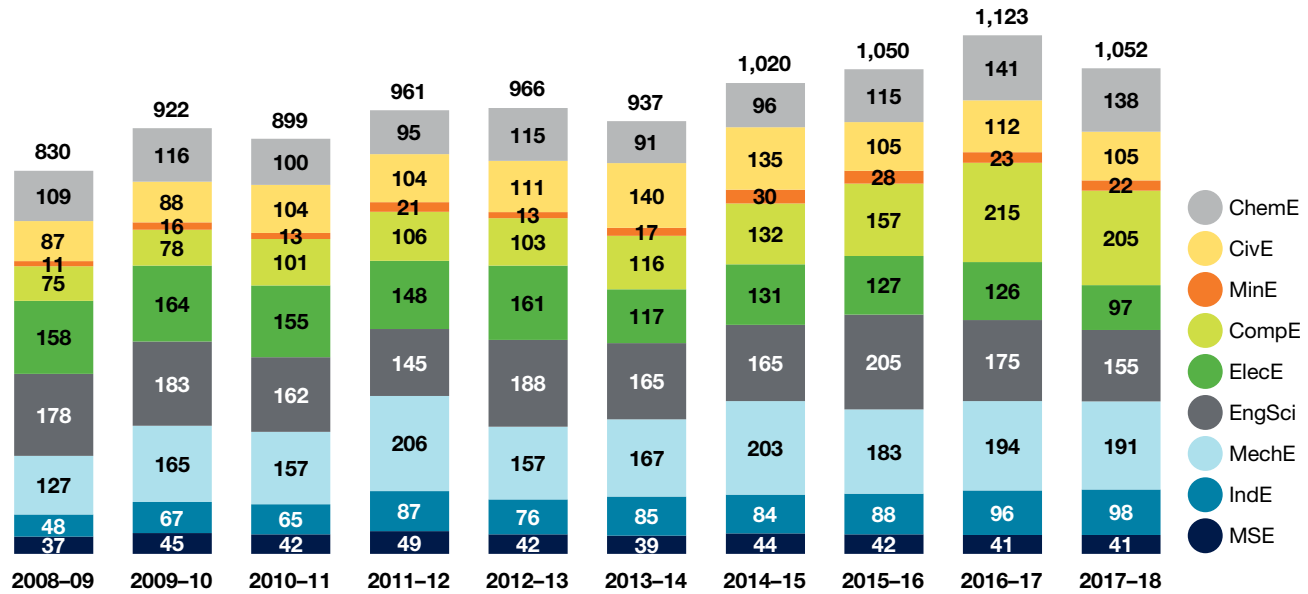
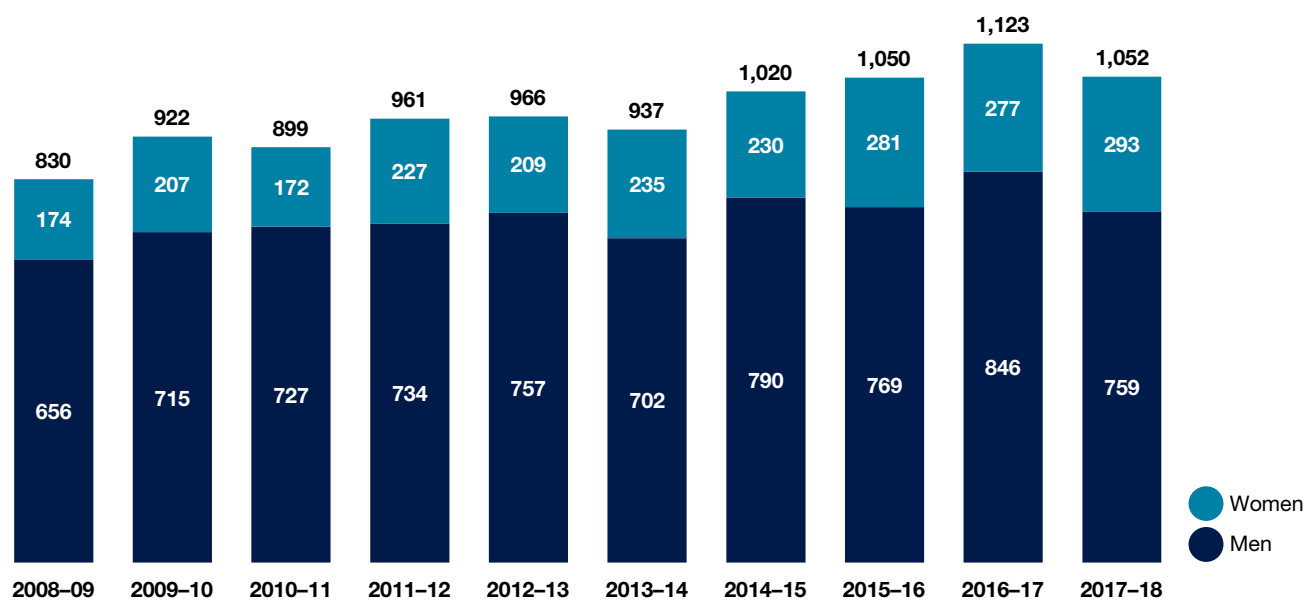
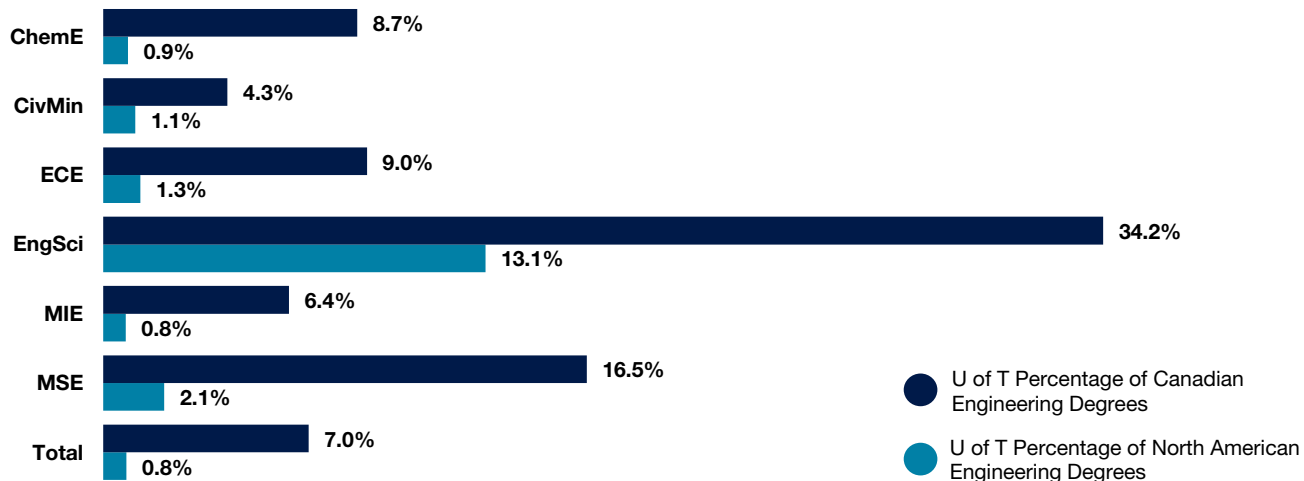


Figure 1.9b Undergraduate Degrees Awarded by Gender, 2008–2009 to 2017–2018



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

Figure 1.9c U of T Engineering Degrees Awarded by Academic Area Compared with Canadian and North American Degree Totals, 2016



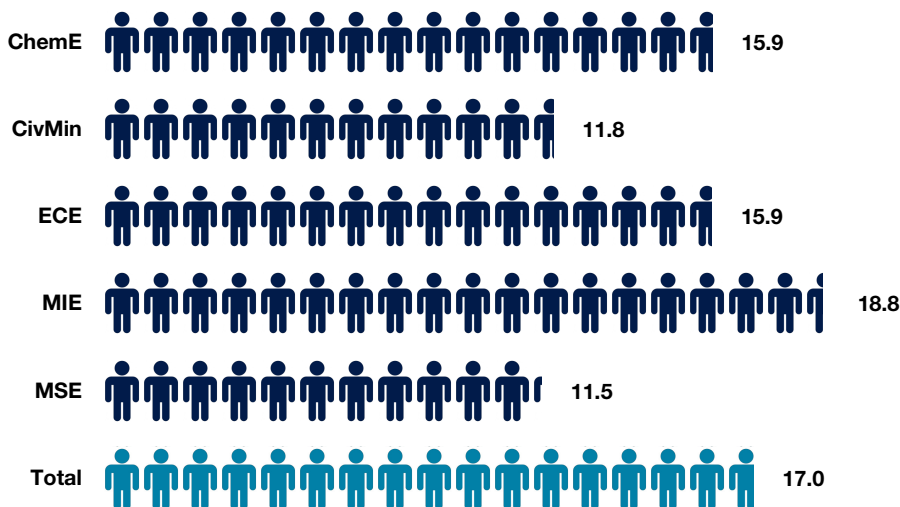
## Student-to-Faculty Ratios

Figure 1.10a shows the number of undergraduates relative to the number of faculty in each department. Students in programs that employ a cross-Faculty teaching approach, such as Engineering Science and TrackOne, Undeclared, are included only in the “Total” bar.

the last 10 years and a goal of our previous Academic Plan. This decrease reflects our increasing selectivity, resulting in a smaller undergraduate student body, as well as the addition of 14 new professors hired in recent years. Lower undergraduate student-to-faculty ratios allow for smaller class sizes and enhanced interaction between professors and students. *(For more information on student-to-faculty ratios at the graduate level, see Figure 2.2a.)*

Figure 1.10b shows that the overall undergraduate student-to-faculty ratio has decreased to 17.0, our lowest value in

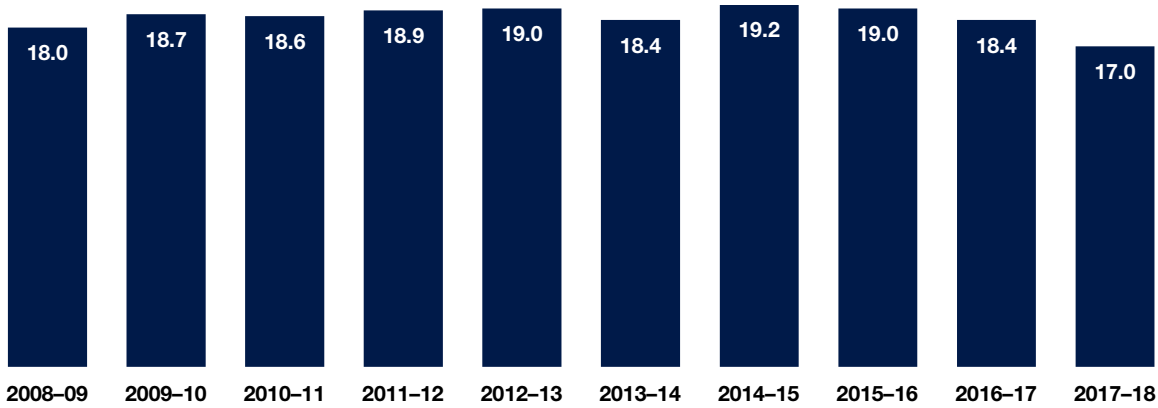
Figure 1.10a Undergraduate Student-to-Faculty Ratios by Academic Area, 2017–2018



**Note 1.9c:** Data sourced from reports produced by Engineers Canada and the American Society for Engineering Education; 2016 is the most recent year for which reports from both these institutions have been published. Total percentages show U of T as a proportion of all engineering degrees in North America, including those awarded in fields for which U of T does not have a specific degree program (e.g. Biomedical, Environmental, Software, etc.).

**Note 1.10a, b:** Student and faculty counts are shown as of November 1. For full-time equivalency (FTE), each part-time student is counted as 0.3 FTE. Students with special (non-degree) status or on PEY Co-op are not included. Faculty counts include tenure-stream and teaching-stream faculty.

Figure 1.10b Undergraduate Full-Time Equivalent Student-Faculty Ratios, 2008–2009 to 2017–2018



## Dean’s Honour List

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

In 2018, 1,011 of our students achieved Honours or High Honours, representing 44.0% of the graduating class (Figure 1.11a). This is our highest-ever proportion and reflects the high calibre of our students and the success of our many programs designed to support students throughout all years of study.

Figure 1.11a Number of Students and Percentage of Class Graduating with Honours, 2009 to 2018

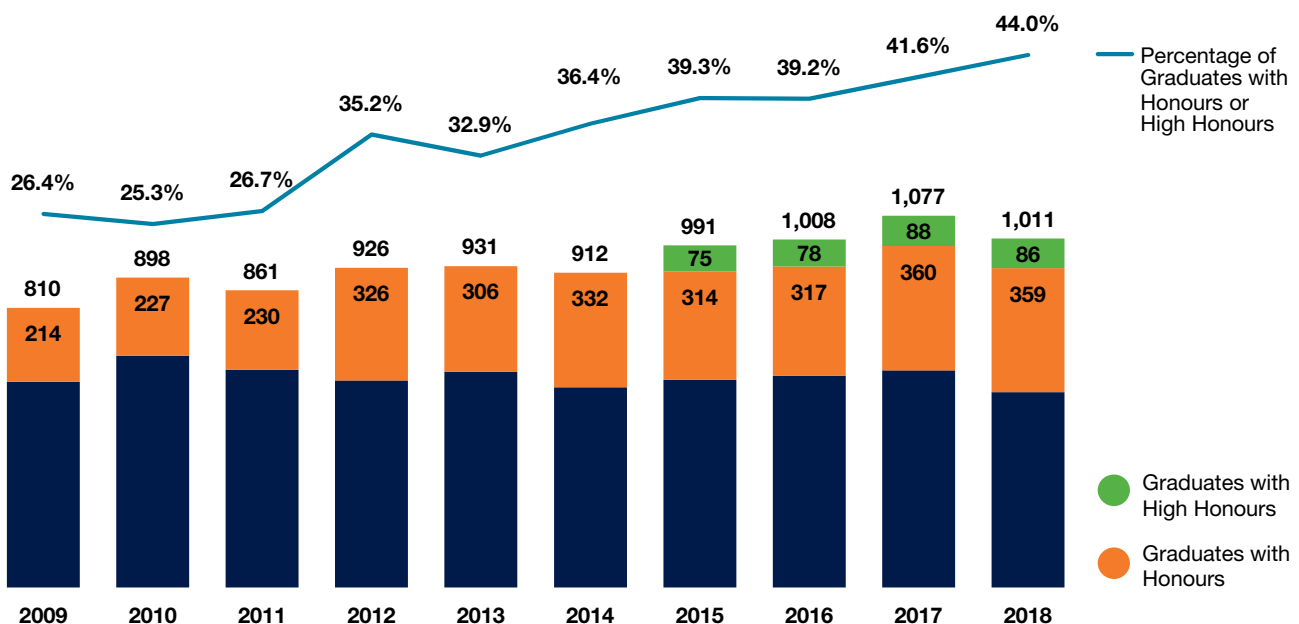
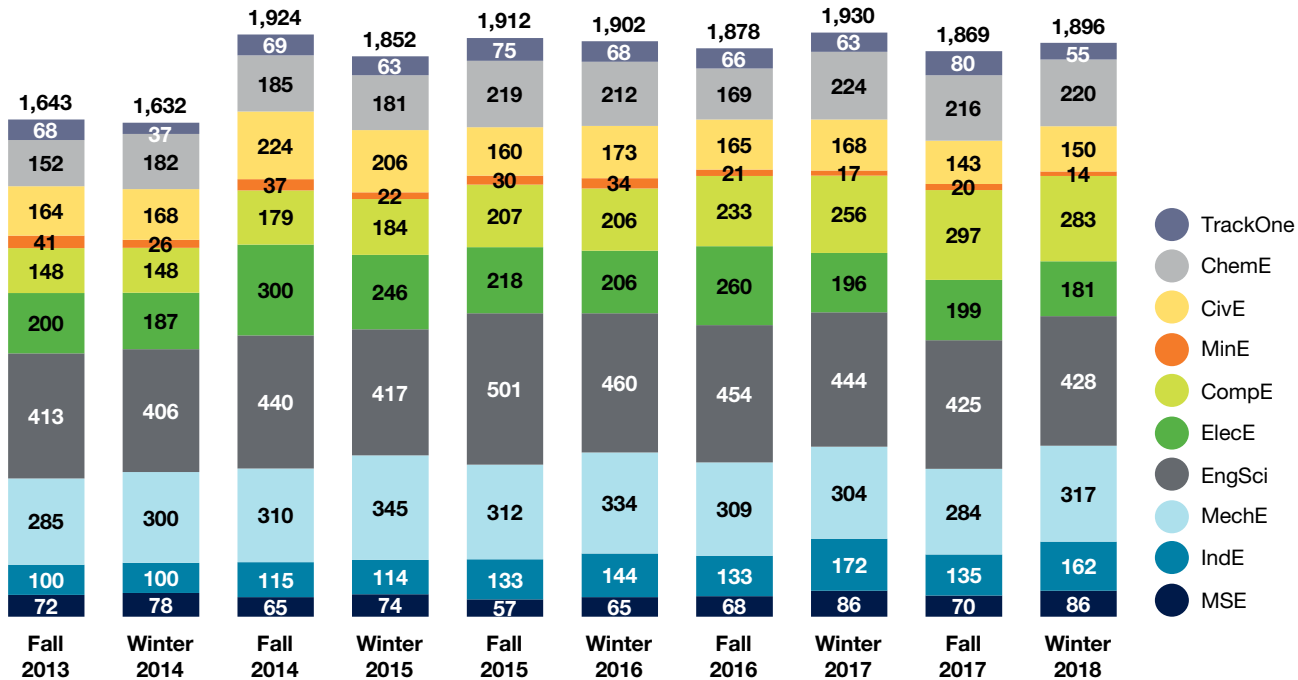


Figure 1.11b Number of Students on the Dean's Honour List by Term and Academic Area, Fall 2013 to Winter 2018



## Enriching the Undergraduate Engineering Experience

Our undergraduate experience includes both curricular and co-curricular learning opportunities, with an emphasis on multidisciplinary collaboration, leadership and professional development. In 2017–2018, we continued to enrich our programming with new specializations and initiatives for student support.

### New programs, courses and learning opportunities

Our newest undergraduate minor in Advanced Manufacturing and our newest certificate in Forensic Engineering both launched in September 2017. In September 2018, we will launch a new cross-disciplinary minor in Music Performance and a certificate in Music Technology, created in partnership with the Faculty of Music. *(For more information on cross-disciplinary minors, see Chapter 4, Cross-Faculty Education and Experiential Learning).* All of these programs enable our students to customize their degrees and to collaborate with experts in other disciplines and areas of shared interest.

In September 2018, we will add a new Engineering Science major in Machine Intelligence. It will provide

students with a cutting-edge education in the concepts and tools that underlie state-of-the-art advances in machine learning, artificial intelligence and data analytics. Students will study, develop and apply algorithms that can learn and make decisions based on data. They will be able to enter and innovate in this rapidly developing field, which sits at the intersection of engineering and computer science.

We created 10 new undergraduate courses in 2017–2018, including:

- MIE324H1: Introduction to Machine Intelligence
- BME520H1: Imaging Case Studies in Clinical Engineering
- MSE415H1: Environmental Degradation of Materials
- MSE437H1: Process Metallurgy of Iron and Steel
- ECE367H1: Matrix Algebra & Optimization
- ECE368H1: Probabilistic Reasoning
- MIE567H1: Dynamic & Distributed Decision Making
- CIV578H1: Design of Building Enclosures
- ROB311H1: Artificial Intelligence
- CME500H1: Fundamentals of Acid Rock Drainage

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

Our First-Year Summer Research Fellowship launched in summer 2016 with its first cohort of eight research fellows. The Fellowship provides \$5,000 in support to students seeking to gain research experience immediately after their first year of study. Students enrolled in all first-year programs are eligible. Nine students participated in the program in summer 2017, and 10 in summer 2018.

## Student support

We recognize that the transition from secondary school to university can be challenging for many students, so we provide a wide range of programs to support success for our first-year students. These include:

- **Success 101:** This three-day mini-course is part of the First Year Foundations program that includes courses on engineering design and computer programming. Success 101 runs three times over the summer, providing guidance on time management, effective note taking, and classroom etiquette and communication.
- **T-Program:** The Transition Program, or T-Program, enables first-year students faced with academic challenges to redistribute their course load, defer courses to the summer session and retake up to three fall courses in the winter term.
- **GEARS:** Guided Engineering Academic Review Sessions (GEARS) are weekly drop-in sessions led by upper-year students. They provide guidance on both course material and specific strategies for academic success, including study habits and time management skills.
- **Support personnel:** The Faculty provides a full-time Learning Strategist who develops academic programming and workshops to assess and enhance students' academic

## Pre-University Engineering Outreach

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

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

competencies related to task prioritization, note taking, critical thinking, problem solving, exam preparation, and coping with stress and anxiety. Our embedded advisors provide students with personalized support for learning strategies, health and wellbeing, and international transition.

- **Online courses:** We offer four courses online in order to enhance the flexibility of the first-year course schedule, including one (*APS162: Calculus for Engineers I*) held over the summer before first year begins. Enrolment across all of these courses increased to 219 in 2017–2018 from 192 the previous year.

In 2017–2018, we further strengthened our embedded supports by adding a full-time academic advisor to augment the work of our existing part-time advisors. We also developed an online advising portal that enables students to book appointments with their academic advisors. The portal serves as a central repository for data related to academic well-being, such as advising notes and resources for advisors. This program was piloted among first-year students and is now moving to upper years. These initiatives respond to the recommendations of the Decanal Task Force on Academic Advising, which was completed in 2016.

In partnership with the Health & Wellness Centre, we provide 'Identify, Assist and Refer' folders to all professors. These packages advise staff and faculty what to look for, say and do when responding to a student in distress. We also provide complementary training for staff and faculty through the Engineering Engagement & Development Network. These initiatives respond to the January 2017 recommendations of the Decanal Task Force on Mental Health.

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

In 2017–2018, we reached more than 7,500 pre-university students through our outreach programs. (*See Appendix B for a full list of these programs.*)

Selected highlights of our outreach programs include:

- **Partnerships with the National Society of Black Engineers (NSBE):** During Black History Month in February 2018, we partnered with the U of T NSBE chapter and two other chapters to host the NSBE Region 1 East Canada Zone conference, designed to strengthen the pipeline of students from traditionally underrepresented groups into engineering careers and leadership positions. We also continued to partner with U of T's local chapter of NSBE on existing outreach programs such as our ENGage summer day camps, ENGage in Schools and ENGage in Your Community. *(For more detail on these initiatives, please see Chapter 10 — Diversity.)*
- **Go North:** Created in partnership with Google Canada and Actua, a national STEM charity, Go North is designed to encourage students to become the inventors, innovators

and makers of tomorrow by playing and experimenting with technologies today. On June 5, 2018 we hosted Go North for the third consecutive year, engaging more than 1,100 Ontario students in Grades 4 to 8 in hands-on activities, demonstrations and workshops designed to ignite curiosity about the vast potential of STEM.

- **City of the Future: Launch of Quayside:** On October 17, 2017, 20 aspiring engineers in Grades 4 to 6 spent the day imagining, designing and building components of the neighbourhood of the future. In the afternoon, they met with Prime Minister Justin Trudeau as well as Ontario Premier Kathleen Wynne, Toronto Mayor John Tory and representatives of Sidewalk Labs, a company that aims to design Quayside, an innovative mixed-use, technology-enabled community on Toronto's Eastern Waterfront.

## Selected Undergraduate Student Highlights

### U of T Engineering students win global speedbike competition

U of T Engineering's Human-Powered Vehicle Design Team (HPVDT) placed first in the 2017 World Human Powered Speed Challenge. Their recumbent bicycle, named Eta Prime, was clocked at an impressive 127.6 kilometres per hour, the fastest in this year's competition at Battle Mountain, Nev. Eta Prime's design is modelled closely on Eta, the vehicle that currently holds the record for the world's fastest bicycle at 144.17 km/h. Eta was built by AeroVelo, a company founded by U of T Engineering alumni Todd Reichert (EngSci 0T5, UTIAS PhD 1T1) and Cameron Robertson (EngSci 0T8, UTIAS MAsc 0T9). Although it did not race at this year's competition, Eta was the result of a long-standing collaboration between AeroVelo and HPVDT. Through a combination of innovations, HPVDT was able to make Eta Prime 20% lighter than Eta, while maintaining its internal strength. In fact, the team's models showed that the difference in speed between the two vehicles was due primarily to the power output of the rider, raising the possibility that Eta Prime, or a redesigned version of it, could set a new world record in next year's competition.

### Unraveling physics mysteries in microgravity

In July 2017, four U of T Engineering students earned the rare chance to carry an experiment they designed onto a Falcon-20 jet, an aircraft similar to those used to train astronauts. Their goal was to better understand how liquids flow in microgravity, and to explore how 3D printers could make long-term space missions more feasible. Team AVAIL (Analyzing Viscosity And Inertia in Liquids) — consisting of Neell Young (EngSci 1T4 + PEY, UTIAS MAsc candidate), Caulan Rupke, Michael Lawee and Andrew Ilersich (all Year 4 EngSci) — was among four chosen to participate in the Canadian Reduced Gravity

Experiment Design Challenge (CAN-RGX), supported by the National Research Council and the Canadian Space Agency. In May 2018, a second team — Team FAM (Fluids Affected by Magnetism) consisting of Twesh Upadhyaya, Tyler Gamvrelis, Jacob Weber and Hanzhen Lin (all Year 3 EngSci) — was among four finalists in the 2018 competition. Their experiment was designed to examine heat transfer in paramagnetic fluids and their behavior under external magnetic fields. The results could lead to improved heat management in space crafts, space stations and satellites.

### Engineering student and alumnus named to list of future aerospace leaders

Jeremy Wang (Year 4 EngSci) and recent graduate Arthur Brown (EngSci 1T6) were among 20 people in their 20s named to a prestigious aerospace industry list of future engineering leaders. The list of *Tomorrow's Technology Leaders: The 20 Twenties* was published by the Aviation Week Network in January 2018. The awards recognize academic performance, civic contribution and a research or design project. Wang was recognized for overseeing a major expansion of the University of Toronto Aerospace Team (UTAT) while serving as its executive director, as well as presenting at the 2016 International Astronautical Congress (IAC) in Guadalajara, Mexico. He currently serves as the Chief Technology Officer for The Sky Guys, a company that supplies drones and aerial photography services for sporting events, inspecting industrial sites and a variety of other applications. While at U of T Engineering, Brown was an aerodynamicist with Blue Sky Solar Racing and with the Human-Powered Vehicles Design Team (HPVDT). In 2015, he became the first Canadian student to win the American Institute of Aeronautics and Astronautics Foundation's Undergraduate Individual Aircraft Design Competition. He is now pursuing a master's degree at MIT.