UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

# Academic Plan – Year One: Progress and Achievements

Faculty of Applied Science & Engineering
University of Toronto

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# Executive Summary

In 2011, following a collaborative and intense two-year planning exercise, the Faculty approved the Academic Plan; a living document which guides our strategic activities for the five-year period ending in 2016.

The planning process commenced with the creation of the 2009 Self-Study; a reflective and critical self-assessment of the Faculty's academic and administrative performance over the preceding five years. The Self-Study served as the primary resource document for a team of distinguished external reviewers who assessed the overall quality of the Faculty in May 2010. In addition to reaffirming the high-quality of our educational, research and administrative activities, the External Review report made recommendations to address current and future challenges, and identified opportunities to advance our academic excellence.

To provide leadership and guidance to the planning exercise, an Academic Plan Steering Committee was formed, and actively consulted with Faculty stakeholders to identify emerging strategic themes and cross-Faculty synergies. The culmination of the Self-Study, the External Review, and the work of the Steering Committee converged on seven key themes:

1. Culture of Excellence
2. Positioning
3. Educating Future Engineers[1]
4. Student Experience
5. Research Foci
6. Outreach, Collaboration and Influence
7. Resource Allocation

These themes form the central goals of the Academic Plan. Assigned within each theme area are specific actions which support our ambitious, yet achievable goals. We actively monitor these actions to ensure progress is measured, setbacks are addressed and opportunities are seized. As we move into the second year of the Academic Plan, it is important to acknowledge our collective progress and achievements, and also to reiterate the goals set for the coming years.

### Culture of Excellence

Fostering a culture of excellence at all levels of the Faculty is fundamental to our success. When we are recognized for leading and achieving excellence in our teaching, scholarly and administrative work, we raise the visibility of the Faculty and inspire the pursuit of excellence in our students, colleagues and peers. The 2012 Academic Ranking of World Universities (ARWU) ranked us at number 13, six places higher than last year, and we continue to be the leading

[1] Due to the symbiotic nature of Educating Future Engineers and Student Experience, we have combined these themes.

Canadian Engineering School in all major international rankings. Our strong international reputation influences our ability to recruit diverse and talented students and educators. International undergraduate and graduate students account for 20 per cent of our total enrolment and the number of women entering our first year undergraduate programs continues to rise. In the 2012-2013 academic year, we will welcome four excellent women faculty members, raising our percentage of tenured and tenure-stream women from 15.1 per cent to 16.4 per cent; the highest it has been in the history of the Faculty.

### Positioning

The profound impact of our research and teaching extends beyond the laboratory and classroom. By generating the knowledge and innovation to help solve complex global problems, we contribute to the intellectual, social and economic status of Canada. The ability to effectively communicate our achievements to many diverse audiences is essential if we are to maintain our prominent reputation and grow our influence. At both the Faculty and departmental level we actively promote stories about our educational and research mission as we seek not only to inform but to build and foster partnerships with industry, government, and peer institutions.

### Educating Future Engineers & Student Experience

Delivering the highest quality education and experience to our students is a central part of our mission. Our goal is to provide students with broad exposure to advanced engineering concepts in addition to the practical experience that will prepare them to become successful global engineers. The Faculty has established a set of global objectives and learning goals that feature the key competencies our graduating students will need in order to pursue rewarding and meaningful careers. These objectives and goals will also inform our decisions on changes to our curriculum. We have created new minors, certificates, and a multidisciplinary capstone course, and have facilitated an increased number of opportunities for undergraduate research, summer internships, international placements, and studying abroad.

Enrolment in our graduate programs is at an all-time high. Our MEng students have doubled in size over the past six years, and we now have a total enrolment of 1,952 graduate students, with a goal of 2,000 by 2015. In an effort to improve the access to and delivery of our MEng program, we created MEng specific courses, and are offering some on evenings, weekends, and online to accommodate the large number of working professionals seeking to enrich their education.

### Research Foci

As a school recognized as a leader in advanced engineering research, we aspire to expand our global reach and impact. To support multidisciplinary and collaborative initiatives that align with our strategic research themes, we established three new Extra-Departmental Units (EDUs) to serve as the homes for these significant undertakings. This year we also established the new Research Leader Award, which recognizes and rewards leadership in major interdisciplinary research projects, industrial partnerships, and multiple investigator initiatives. We increased

our number of Canada Research Chairs and Industrial Research Chairs, and our research funding remains very strong, up by 24 per cent from the previous year. We also created a new position, Director of Corporate Partnerships, whose mandate is to proactively engage our industry partners, and identify opportunities for building new relationships in support of our research and advancement goals.

### Outreach, Collaboration & Influence

Our outreach, collaboration and influence activities enable us to strengthen our ability to recruit outstanding faculty and students; cultivate and sustain relationships with alumni, donors and volunteers; and ultimately enhance the reputation of the Faculty. Our goals include assessing pre-university activities, and developing and solidifying partnerships with other U of T Faculties, industry, alumni, and peer institutions in Canada and around the world. This year, we established the Master of Engineering in Cities Engineering and Management, a collaborative initiative across U of T. It includes an internship component which will allow students to work with industry, government agencies, or academia in addressing some of the world's most pressing problems as they relate to urban environments.

### Resource Allocation

A pressing resource issue for the Faculty is the shortage of quality space for our wide-ranging activities. This year we have been successful in adding more than 2,000 NASMs of new space in addition to improving existing areas within our Engineering buildings through renovation and facilities upgrades. We are also thrilled to have been allocated the parking lot between Simcoe Hall and St. George Street on which to build our new Centre for Engineering Innovation and Entrepreneurship (CEIE). We launched a $200 million fundraising campaign, and have already raised over $80 million towards this goal. Through our collective efforts, the Boundless campaign will have a broad impact across the Faculty by generating funds towards endowed chairs and professorships, graduate fellowships, undergraduate student aid, our new building, other capital projects, and research support.

Further details on our progress and achievements in each of the theme areas can be found in the sections that follow.

# Culture of Excellence

Our commitment to excellence is at the forefront of the decisions we make and the actions we take as a Faculty to achieve our mission. We measure our progress in pursuit of excellence in a number of ways, including increasing diversity; enriching the student experience; promoting research accomplishments; creating, generating and transferring knowledge; accelerating innovation; supporting the development of faculty and staff; strengthening our governance processes; and deepening alumni involvement.

Our goal is to support diversity in all forms. At U of T Engineering, we are committed to recruiting diverse and talented students, educators and researchers. This diversity enriches and enhances everyone's experience by introducing different perspectives to creatively solve global problems and work across cultures. In 2012, international enrolment increased to make up 21.1 per cent of our undergraduate class (25.7 per cent of our incoming first-year class) and 22.6 per cent of our graduate class. We also welcomed 61 undergraduate international exchange students from around the world, and more than 80 students from Brazil as part of the Science Without Borders scholarship program.

Through our efforts to increase gender diversity the number of incoming first-year female students went from 23.4 per cent in 2011 to 25.4 per cent in 2012. New this year is the Girls' Leadership in Engineering Experience (GLEE) weekend recruitment event for prospective female students. The event was very well-received with 70 per cent of registrants accepting our offer of admission. Women enrolled in our graduate programs have also increased to 26.0 per cent in 2012 from 24.9 per cent in 2011. Over a three-year period, from 2006–2009, we dramatically increased women assistant professors from 21.3 per cent to 41.5 per cent. However, without sustained efforts, this rate fell to 33.3 per cent in 2011. While we are pleased with our success recruiting outstanding women faculty, we must be mindful not to lose ground on the advances we have made.

Our Faculty's excellence in teaching and research are inextricably linked; so too are our goals for educating future engineers and enhancing student experiences. The most recent National Survey of Student Engagement (NSSE) shows that our students scored higher in areas such as collaborative learning and classroom engagement than those at the overall University of Toronto and at U15 schools. The Faculty's scores showed significant gains from the 2008 survey in important areas such as student-faculty interaction, enriching educational experiences and providing a supportive campus environment.

U of T Engineering faculty and staff excellence is evidenced by the 20 major awards we garnered in 2011–2012, including five AAAS Fellowships, four Royal Society of Canada Fellowships, one NAE Fellowship, three EIC Fellowships, our third consecutive Vivek Goel Faculty Citizenship Award, and the President's Teaching Award. This year we are on track to be equally successful. Barbara McCann, Faculty Registrar, received the Association of Registrars of the Universities

and Colleges of Canada Outstanding Achievement Award, which recognizes members who are making significant contributions to the registrarial profession, to their own institution, and/or to the improvement of service to students. Staff members from ECE and the Registrar's Office also received U of T's Excellence Through Innovation Award. Our faculty members have been prolific in earning accolades in recent months, including inductions into the Canadian Academy of Engineering, the Institute of Physics (UK), the Royal Society of Canada, the NSERC Steacie Prize and Fellowship, and the Canadian Academy of Health Sciences; and receiving awards such as the U of T Inventor of the Year Award, the R.S. Jane Memorial Award, the Young Engineer Achievement Award, and the McLean Award.

All international rankings place us as the leading engineering school in Canada and among the best in the world. No one ranking reflects all of the Faculty's strengths, however they do increase our visibility which helps to attract and recruit outstanding scholars and students from Canada and around the world — two important goals of our Academic Plan. We are pleased that our position in the 2012 Academic Ranking of World Universities (ARWU) rose by six places, bringing us to number 13. This is the first year that ARWU used a revised methodology for ranking universities outside of the U.S. that more accurately reflects differences in research funding.

With our fourth annual report of performance indicators now published, we continue to measure our progress towards achieving Academic Plan goals. This annual publication provides a wealth of metrics used throughout the year in decision making and planning initiatives in areas such as recruitment, retention, admissions and research, to name a few.

We have strengthened our Faculty governance processes through the creation of the Faculty Governance Officer role and have obtained several approvals for new degree programs under the University of Toronto Quality Assurance Process (UTQAP), including the Clinical Engineering PhD and Master of Engineering in Cities Engineering and Management. This past year, the Faculty Research Committee became an official standing committee of Council, and the Community Affairs and Gender Issues Committee received approval for a revised mandate and terms of reference. The Faculty also established a task force to review our Constitution, in particular the membership composition of Faculty Council. We look forward to receiving their report of recommendations in the new year.

We have taken steps to encourage, recognize and celebrate our alumni volunteers. In June we held the third annual Salute to Volunteers event, and we are placing more emphasis on profiling volunteer leaders. We are considering an expansion of the EAA Honours and Awards Committee to include recommendations of alumni for external awards. Our alumni's volunteer efforts were also recognized by the University with 13 Arbor Awards in 2012.

This year, our efforts continue to focus on attracting and recruiting exceptional students and faculty, and proactively working to increase diversity. Our GLEE event will be held earlier in the year to influence potential applicants sooner in their decision-making process, and we will

continue our on-site visits and interactive video sessions to reach exceptional international students. We are conducting five searches to add to the 25 new faculty members hired over the

past two years. Gender diversity among our academics remains a priority and will be reflected in our recruitment efforts in the coming year. Recognizing that our first-year curriculum was last reviewed a decade ago, the Faculty will establish a task force to examine the existing strengths of content and delivery and recommend opportunities for improvement. We will continue to identify and nominate early career faculty for prestigious awards, and we are excited to launch a new Sustained Excellence in Teaching Award to provide further recognition of our most proficient engineering educators.

# Positioning

U of T Engineering endeavours to be, and be seen as, a leader among the world's very best engineering schools. In 2007, the Faculty engaged in a consultative, multi-year process to determine our positioning statement, establish key messages, and clarify the way we communicate these messages to our many stakeholders. During this exercise the following vision was established:

*The Faculty of Applied Science & Engineering will be a leader among the world's very best Schools of Engineering in its discovery, creation and transfer of knowledge and technology through teaching and research.*

All of our actions, and indeed our pursuit of excellence, are anchored and driven by this statement.

In the years since we undertook this positioning exercise, our Strategic Communications team has been restructured to promote the Faculty through improved media relations, increased web and digital communications, and enhanced print materials and publications. During the academic planning process we identified ways in which the Communications team can support the strategic goals of the Faculty, including: proactively publicizing our educational and research mission and promoting our achievements to diverse audiences; strengthening key messages; producing high quality storytelling; making best use of modern media and technology; and increasing the Faculty's presence and visibility on social media platforms.

Over the past few years we have made a significant effort to increase communication and transparency with our stakeholders on areas of importance to the Faculty. We have several well established mechanisms including our annual report of performance indicators; three regular e-newsletters to faculty and staff, students and alumni, as well as regular town halls. We have a presence on Twitter (our Faculty account has 3,790 followers), and have installed digital displays in several Engineering buildings to provide updates on events, deadlines, and other relevant information for students.

The Engineering Communications Network (ECN) is a collaborative group of communications personnel housed in our departments, institutes, and Faculty units. The ECN meets regularly to share story ideas, best practices, and ensure consistent branding across the Faculty.

As a Faculty we have increased our focus on storytelling and use of modern social media. By showcasing the exceptional research accomplishments and knowledge generation of our faculty members, we have increased our media exposure through interesting and impactful stories such as the Reinvent the Toilet Challenge, organic light-emitting diodes, and breakthroughs in solar cell technology. As a supplement to traditional communications approaches, we have also created video interviews and blog posts to generate greater interest and engage our engineering community.

Telling our stories helps us attract some of the best and brightest students and researchers. Therefore, we want to ensure that our print publications and web presence reflect the high quality of our Faculty. As a result, we have initiated a plan to revitalize our communications materials so that our educational approach and research achievements are emphasized. To date, we have revised print materials to support our undergraduate and graduate recruitment activities, and refreshed the Faculty's online presence for alumni, prospective undergraduate and graduate students, and that of our largest academic unit, the Edward S. Roger's Sr. Department of Electrical & Computer Engineering.

With the restructuring of the Strategic Communications office complete, our goal is to finalize several high priority projects this year including the development of a strategic communications plan, a crisis communications plan, and a blogger relations strategy. Plans are currently underway to develop a variety of print materials to illustrate the excellence of our research; to enhance the web presence of units such as the Engineering Career Centre and the Hatchery; and to strengthen relations with media partners.

# Educating Future Engineers & Student Experience

Our goals for educating future engineers and enhancing student experience are linked, just as our teaching and research are inextricably connected. Our world-renowned researchers help improve the international standing of U of T Engineering and attract industry partners. The promise of working with talented professors and research groups is also a draw for exceptional undergraduate and graduate students worldwide. To ensure that our students graduate with the skills and competencies required to address some of the world's most pressing problems, we are enhancing the student experience by providing engaging learning environments, opportunities for co-curricular and extracurricular activities and a variety of options for self-directed learning.

The Faculty's goals for enriching students' experiences include continuous assessment of programs and curricula to ensure: relevance, vision and the integration of professional competencies; increased flexibility in the undergraduate curriculum; support of opportunities for self-directed learning and for participation in extracurricular activities; continued attraction of diverse, outstanding students; reduction in dwell time for MASc and PhD students; development of vibrant MEng courses; and achievement of an undergraduate-graduate enrolment ratio of 60:40 by 2016. We also aim to enhance co-curricular and extracurricular experiences through research, internships, international student exchanges and summer and professional work opportunities while continuing to strengthen teaching effectiveness, infrastructure, communications, counselling and academic and personal support systems.

We have focused on increasing our pool of qualified applicants and enhancing our recruitment efforts to attract exceptional students. Our efforts have clearly taken root. This year we drew our strongest students from the largest undergraduate applicant pool we have ever experienced; one that increased by 6.5 per cent over the previous year to 9,330 applicants. The Faculty's initiatives to recruit a diverse student body continue to be successful with 12.7 per cent more international and 10.7 per cent more female students applying to our programs in 2012. We increased our undergraduate yield on offers of admission to 39 per cent in 2012 from 36 per cent in 2010, and selectivity improved to 35 per cent in 2012 from 42 per cent in 2010. We had the highest overall entrance average to date of Ontario secondary school students in our incoming first-year undergraduate class, rising to 91.3 per cent in 2012 from 89.2 per cent in 2010. Our retention rate from Year 1 to Year 2 improved to 93.7 per cent for the cohort entering in 2011; up from 89.4 per cent for the 2010 entering cohort. We also implemented a new undergraduate scholarship strategy this past year to attract top students, which we will evaluate to determine effectiveness and modify as necessary.

Our students spend many hours in classes, in labs, and working on projects. To ensure that our schedules are as efficient as possible, the Faculty initiated a special taskforce — comprised of faculty, staff and students — to review undergraduate scheduling. A Scheduling Report was introduced this past April outlining a strategy to plan, coordinate and execute the scheduling of undergraduate courses. Under the mandate of that report, we have already undertaken steps to

improve our policy and practices surrounding scheduling. We also approved, through the Dean's Strategic Fund, a subsequent proposal to upgrade technology that supports course and space allocation.

Our on-going review and assessment of curriculum and graduating students' competencies are essential to ensure that we are educating global engineers and preparing future leaders. This year, we formalized a list of global objectives and learning goals which represent the major competencies we want our students to achieve by the time of graduation. These outcomes will guide our curriculum development as we collect data on student performance in these areas and use these indicators to inform our curriculum decisions.

As a Faculty, we have enhanced our focus on multidisciplinary and collaborative education through the establishment of new minors and certificates this year. We launched the very well received undergraduate Engineering Business minor in fall 2011 and offered two core courses in the summer to meet overwhelming demand. We also created a Robotics & Mechatronics minor, a Mineral Resources certificate and a new Engineering Science major in Biomedical Systems Engineering. This multidisciplinary approach was further highlighted in fall 2012 when we established a new capstone design course across the curriculum.

We have continued our efforts to increase undergraduate research opportunities and to strengthen our summer internship and Professional Experience Year (PEY) programs. These programs provide students with practical experiences and skills that further enhance their U of T education. In 2011–2012, 580 (56 per cent) third-year students participated in PEY compared to 554 (51 per cent) in 2010–2011, and 291 students participated in summer research opportunities compared to 202 the previous year.

The Academic Plan emphasizes our goals of increasing students' global fluency and graduating global engineers. Our recruitment efforts have attracted many international students; this year alone we have more than 140 undergraduate exchange students. We also encourage our own students to go abroad to expand their international perspective and learn from other cultures. To add more visibility to our initiatives, we recently launched a campaign promoting international exchange opportunities including a webpage with video (uoft.me/engexchange), distributed posters throughout our departments and held two town hall meetings on the topic. To encourage and facilitate students to study abroad, departments are working to establish structured pathways and streamlined course approvals so that it is easier for students to receive credit for courses taken at other institutions. We also continue to work with international institutions to provide our students and researchers with opportunities to gain further expertise and a global perspective. Examples include activities with the Institute of Earthquake Sciences, the NARETI initiative, the Indian Institute of Technology, King Abdullah University of Science and Technology, Addis Ababa University and Peking University.

Graduate enrolment is at an all-time high at the Faculty. We moved closer to achieving our goal of 2,000 graduate students by 2015 with an increase of six per cent over last year to 1,952 students. We have improved our diversity here as well, with international students accounting

for 22.6 per cent of our graduate student body. Our goal of having 50 per cent of Master's degree students (full-time equivalent) within the MEng program is attainable and currently sits at 38 per cent. Along with traditional recruitment methods — including presence at eleven graduate fairs — we are implementing new ones. They include: holding a Faculty-wide graduate recruitment event from February 28 to March 2, 2013; planning local events to highlight our doctoral programs; and, offering a special MEng information event.

In the past 6 years alone, we have doubled the number of MEng students. Our goal focusses on creating programs that provide students with broader transferrable skills to contribute in corporate environments, and enriching course offerings and instruction. Several programs now have MEng-specific graduate courses and are offering select courses on evenings and weekends, along with an online course. This past year, we introduced four new graduate certificates (Energy Studies, Healthcare Engineering, Computational Mechanics in Design, and Robotics & Mechatronics) and five new ELITE certificate courses, four of which are taught by industry professionals.

This past September, seven students began their graduate studies at U of T Engineering through the Graduate International Foundation Program, which combines conditional acceptance to the MEng program with intensive English language instruction in an engineering environment. Students are guaranteed full-time admission to the MEng program starting in January 2013 after successfully completing this four-month program. We also welcomed a cohort of 45 students to the Licensing International Engineers into the Profession (LIEP) program. LIEP is a collaborative effort between our Faculty and the School of Continuing Studies, with funding from the Ministry of Citizenship and Immigration.

We believe that students thrive when there are opportunities to seize their creative entrepreneurial spirit and participate in developing leadership skills. In support of this, we created The Entrepreneurship Hatchery, which houses an Idea Market where our business-minded undergraduates can meet and interact. A group of seasoned entrepreneurs participate in the program by evaluating student ideas, offering mentorship and leading inspiring talks. Our Engineering Leaders of Tomorrow (LOT) program and the Institute for Leadership Education in Engineering (ILead) complement the work of The Hatchery by exposing students to leadership education. Through our co-curricular leadership offerings, students have the opportunity to develop their leadership and team skills while developing their personal leadership style, interpersonal competence and understanding of team vision. Students also learn to lead by organizing leadership-oriented events, participating in leadership development meetings and pursuing certificates in Organizational Leadership and Team Skills. We have also increased the number of curricular (for credit) leadership courses from three to five with the addition of two undergraduate courses.

We created a new role of Associate Director, Student Experience and Learning Development to initiate and support enhancements to the student experience in consultation with student leaders and faculty. Examples include development of the co-curricular record program and

organizing workshops for student leaders and clubs on topics such as governance, leadership and risk management.

As part of our ongoing improvements in student services, we have worked with the library to increase access to educational technology. Our engineering library now has scanners available for students and a laptop-sharing program. Students have free access to the scanners and can check out laptops at the circulation desk for use during the day. The Faculty has also enhanced the student experience through proactive use of technology. Examples include capturing more lectures on video, developing select online courses, and creating instructional methods for inverted classroom learning.

Enhancing our teaching effectiveness is a key component of our Academic Plan. One way we plan to accomplish this is through gathering feedback from students. To achieve this, we implemented an anonymous midterm course evaluation system, and launched a *Your Feedback Matters* campaign to encourage students to participate in course evaluations. We will be piloting the new course evaluation system from the University, which will allow us to better assess student learning. The electronically based system will allow for easier data tabulation and sharing.

Many of these initiatives are ongoing and require further refinement. This year, we will continue our efforts to enhance teaching and learning support and resources. Examples include piloting an inverted classroom model in ECE221: Electricity and Magnetism, along with carefully selected online courses. We have issued a call for proposals to develop strategic instructional innovation, specifically for the creation or substantial renovation of large undergraduate courses, or learning experiences. We will continue the implementation of our global outcomes and curriculum mapping process. New course evaluations for both undergraduate and graduate students will allow us to gather important feedback on our courses so that we can further refine them. Other initiatives include development of the co-curricular record, and enhancement of multidisciplinary, collaborative and international educational opportunities.

# Research Foci

We take great pride in our vibrant research community, comprised of faculty members, research associates, undergraduate and graduate students, postdoctoral researchers, and laboratory technicians. Each one plays a vital role in furthering the creation of knowledge, enhancing our reputation and fostering multidisciplinary and collaborative research. We continue to advance the goals of engineering research excellence and innovation while further strengthening this community. Our objectives include: creating and supporting research centres around strategic emerging themes; increasing Tri-Council and other funding sources, as well as the number of Canada Research Chairs, Industrial Research Chairs and Endowed Chairs; nurturing junior faculty and emerging research leaders; raising awareness and promoting our research contributions; expanding and strengthening our partnerships with industry; and elevating our leadership within the research community.

Bringing researchers together on collaborative initiatives creates exciting new opportunities, often at the intersection of disciplines, for innovative knowledge generation and transfer. We are committed to creating and supporting activities that centre around strategic research themes, and with the potential to make significant and relevant impacts on society. Three Extra-Departmental Units (EDUs) were created this year, to serve as the home for new multidisciplinary and collaborative activities. The new EDUs are:

- The Centre for Resilience of Critical Infrastructure (CRCI). The CRCI focuses on the ability of infrastructure to withstand the unexpected, including natural disasters and terrorist threats.
- The University of Toronto Institute for Multidisciplinary Design and Innovation (UT-IMDI). The UT-IMDI aims to create a unique Project-Based Learning environment in partnership with industry. The Institute provides students with real-life training opportunities by involving them in practical, industry-based projects.
- The Centre for Research in Sustainable Aviation (CRSA). The CRSA promotes collaborative research and enhances our reputation as a centre of excellence in sustainable aviation.

To further encourage and support multidisciplinary and collaborative research we established the Research Leader Award, which recognizes and celebrates faculty members who undertake leadership roles on major interdisciplinary research projects, industrial partnerships and multi-investigator initiatives. The Faculty's Research Committee, created in 2010, continues to foster collaborative endeavours that increase our success on research funding proposals and enhance partnerships with industry. This year, some of those activities included hosting workshops on writing successful NSERC Strategic Project grants, and attracting U.S. government funding, facilitating a panel discussion on NSERC Discovery grants, and recognizing our industry partners with a reception.

Data available for the University regarding research funding is continually updated and changing. We can now report that in fiscal year 2011, the Faculty's research funding increased by 24 per cent from the previous year to an unprecedented $77.9 million. Efforts continue to increase our Tri-Council funding, which also impacts our allocation of Canada Research Chairs.

Highlights from this past year include:

- INTEGRATE — the Innovative Technologies for Groundwater Remediation project funded by the Ontario Research Fund — Research Excellence (ORF-RE) Water Round grant. The main goal of the project is to advance innovative water treatment technologies for site remediation, through the development of a combination of different technologies. The team is comprised of professors, researchers, and students from the University of Toronto, University of Western Ontario and Queen's University.
- The NSERC Strategic Network in Smart Applications on Virtual Infrastructure (SAVI) brings together partners from academia, Canadian industry, high performance computing centres, and research and education networks. The goal of the project is to design a national distributed application platform testbed flexible enough to be used to create and deliver future Internet applications. Research in application-oriented networking, cloud computing, integrated wireless/optical access networks, and future Internet architectures will be conducted to advance Canada's Digital Economy Strategy.
- The NSERC CREATE Program in Environmentally Sustainable Aviation will support students exploring the field of sustainable aviation. The program will train students to conduct research with world-class technical capabilities, and expose them to the highly interdisciplinary knowledge needed by sustainable aviation professionals. We will also launch a new certificate program and introduce an annual workshop. More than 130 undergraduate and graduate students are expected to participate in the program over the six-year period of the grant.
- This past year we have been successful in increasing the number of Canada Research Chairs and Industrial Research Chairs, with three new CRCs, two IRCs, one NSERC Chair in Multidisciplinary Design, and two Junior Chalmers Chairs.

Looking forward, we plan to intensify our engagement with industry, government and peer academic institutions, and have appointed a Director of Corporate Partnerships to assist in this effort. Increasing industry partnerships along with large interdisciplinary collaborative initiatives will provide us with the synergy and the funding that can be leveraged and developed over time. Although our invention disclosures remain strong, with four out of every 10 filed at U of T originating from our Faculty members, we must develop ways of translating more of these innovations from the laboratory into start-up companies and commercial products.

# Outreach, Collaboration & Influence

The social impact and influence of our work is demonstrated through our external outreach and collaboration activities. These activities underpin our ability to attract exceptional scholars, recruit academically strong students and professional staff, influence policy, and allow us to develop and strengthen relationships with alumni, donors and volunteers who contribute to the Faculty in a myriad of ways. In our Academic Plan, we have established goals to assess our pre-university activities, and develop and solidify relationships with other Faculties, industry and government partners, alumni and peer institutions across Canada and around the world.

Our pre-university outreach activities allow us to inspire future engineers and attract exceptional students, as well as the opportunity to engage with alumni and graduate students. As an example, with advanced subject matter expertise and demonstrated passion for teaching, our graduate students act as instructors for our Da Vinci Engineering Enrichment Program (DEEP) Summer Academy. This past year, we have introduced three new outreach initiatives:

- RobotX — an intensive, hands-on, four-day program for high school students that explores complex engineering and mechatronics.
- In-school workshops in middle school classrooms for grades 4 to 8.
- The engineering family program where participants and their parents attend a research showcase featuring instructors who teach in our outreach programs.

Building and maintaining strong partnerships with industry is an essential component to the success of our research, innovation and collaborative activities. This year we held a Faculty-wide reception to recognize our industry partners, and have created a new position, Director of Corporate Partnerships, whose mandate is to build and strengthen relationships with industry partners. We continue to build mutually beneficial links between industry and our students, both in the classroom and in the engineering business community. This year we have engaged industry professionals to teach four new courses through our MEng program; and we have facilitated 12-to-16-month internships for 580 undergraduate students through our Professional Experience Year program, up from 462 in 2009–2010.

We made strides on advancing our goal of developing meaningful collaborations across U of T Faculties, peer institutions and industry partners through the creation of the Master of Engineering in Cities Engineering and Management. Part of the curriculum will be taught by faculty members from Arts & Science as well as Architecture, Landscape & Design. The internship component will allow students to work with city agencies, industry or academia in addressing some of the world's most pressing problems as they relate to urban environments. Through the Centre for Urban Science & Progress (CUSP), students may also work with partner universities such as New York University/NYU-Poly, Carnegie Mellon University, IIT Bombay, and the University of Warwick.

Our influence is also evidenced through our strong participation and leadership in professional societies. Faculty members currently serve as President or Past-President of organizations such as the Engineering Institute of Canada, the Canadian Academy of Engineering and the Canadian Society of Mechanical Engineering. We are also actively contributing our expertise on NSERC and other government agency panels, professional societies and CEAB accreditation reviews.

We continue our activities centred on alumni engagement. In 2012 we established a San Francisco-Bay Area Alumni Chapter and increased outreach in Asia where we expect an alumni chapter to emerge soon. Thank-a-Thons were held in October and March where students who have benefited from alumni supported Student Club Funding called donors to express appreciation for their recent gifts. Nearly 300 alumni were contacted on these two occasions and personally thanked by our students.

We officially launched our $200-million philanthropic campaign, Boundless on September 15, 2012 with *An Afternoon of Engineering Innovation*. This content-rich event was designed to highlight the impact of U of T Engineering research, teaching and innovation. It was the largest event in our history bringing together alumni, industry partners, faculty, staff and students. Panel discussions, lectures and graduate poster sessions involved more than 50 faculty, students and alumni and proved to be a wonderful opportunity to engage and strengthen the Skule Community. We were also very proud to announce that we had raised more than $82 million of our $200-million goal. Through the work of our campaign executive, we plan to continue our successful fundraising efforts, particularly as they relate to the new building, the Centre for Engineering Innovation & Entrepreneurship which will be highlighted in the next section of this report.

# Resource Allocation

Now more than ever, we must be resourceful in generating funds and containing costs. For a number of years, the Province of Ontario has provided less than adequate funding per student and has now frozen the undergraduate funding amount received by the University per student. Coupled with the challenge of finding new space in a downtown campus, we must also enhance and create efficiencies in academic time, physical space, administrative and technical staff, and budgets in support of our academic goals.

We have now entered the third year of the Faculty's revised budget model in a strong financial position. The model distributes revenues based on key drivers and activities, thus improving transparency and providing incentives for academic units to increase revenues and contain costs, while ensuring that decisions are made based on academic priorities. The budget allocation process has worked extremely well and enabled us to increase our revenues and invest in promising initiatives. While financial resources are certainly constrained, the Faculty is pleased that we were able to increase revenues by 10 per cent to $159.1 million in 2011–2012. We will review the system and make minor adjustments at the end of the year based on the lessons learned these past three years.

The Faculty created the Dean's Strategic Fund as a way to financially support strategic initiatives and cross-disciplinary collaboration that may not otherwise be pursued due to lack of operating funds. Proposals address a number of key areas such as academic programs, student experience and research collaboration. This was the second year of the Fund and we approved initiatives such as the MEng program in Advanced Water Technologies and Process Design, new academic scheduling software, and the Centre for Research in Sustainable Aviation (CRSA).

We have accomplished our goal of standardizing the funding policy for graduate students and have made progress towards reducing time-to-graduation for PhD students. We have standardized the minimum stipend for graduate students throughout the Faculty. The funding duration is set at four years for the PhD, and between 20 months and two years for the MASc. Our time-to-graduation for PhD students (5.0 years) has improved modestly from the previous year (5.3 years) and we are working with Chairs and Associate Chairs, Graduate Studies to develop mechanisms to develop further improvements and take us closer to our goal.

Space continues to be one of our most pressing needs. The Faculty's divisional space review, conducted in 2008–2009, found that of the 16 buildings we occupy on the St. George campus and at Downsview, less than one-third of net assignable square metres (NASMs) were deemed adequate to meet the current or future needs of our scholars and students. Since that time several infrastructure projects, addressing the creation of new space as well as the renovation of existing space, have been completed and initiated. We have provided updates on these projects in our Faculty newsletters and annual reports as they have been completed. This past year, we added more than 2,000 NASMs and spent more than $30 million in three key spaces: the

Lassonde Mining Building attic renovation including the Goldcorp Mining Innovation Suite; BioZone; and, the UTIAS Microsatellite Science and Technology Centre. Other examples of space improvements, to name a few, include: the IBBME undergraduate teaching lab renovation; air-conditioning upgrades in the Galbraith and Mechanical Engineering buildings; relocation of PEY and the Engineering Career Centre to the Fields Institute; renovation of the student design labs; the Cross-Discipline Energy Fundamentals Lab; and, the MIE Student Services Centre.

We also seek to maximize the efficiency of space currently being used and have undertaken a series of space audits, two of which are now complete, to present recommendations for consideration. The student club and study space audit, along with the meeting and seminar room audit have yielded recommendations for improved space sharing, scheduling and allocation which are in the process of being implemented.

Our location in the heart of downtown Toronto presents certain challenges in terms of acquiring new space as we are constrained by the University's footprint. For this reason, we were extremely pleased to received approval from Governing Council this past spring for the allocation of Site 10, the Simcoe Hall parking lot, which is the last remaining building site on the St. George campus. To ensure that our plans for the new building, now identified as the Centre for Engineering Innovation & Entrepreneurship (CEIE), are responsive to the Faculty's space needs, a project planning committee has been established. We are very fortunate to have as chair of this committee, Professor Emeritus Ron Venter, who is a former Vice-Dean of the Faculty and former Vice-Provost of Facilities and Space Planning for U of T. The design of the building will integrate four main elements: multidisciplinary research units, people presence, educational facilities, and entrepreneurship. This will result in a multidisciplinary centre that fosters cross-Faculty collaboration in research, learning, design and innovation. An aggressive timeline has been set with completion projected for fall 2016; however, due to U of T borrowing constraints, the Faculty must raise the estimated $88 million to cover the building costs before construction can begin. We have been actively fundraising for this important initiative and have already raised $12 million in donations towards CEIE. This amount, coupled with other funds allocated for the project, takes us to $38 million of the $88 million cost already in hand. We continue to work closely with University administration on this project and are well on our way to making this building a reality.

This coming year, we will increase the momentum on our fundraising and accelerate planning efforts for the new building, as well as renovating and creating new spaces where appropriate. Further efficiencies of our physical space, and academic and administrative time, will be identified as we streamline processes. One example is the restructuring of our administrative HR unit to serve the Faculty exclusively (currently we share our HR services with five other Faculties) and assist managers in recruitment, professional development, and succession planning activities. We will continue to strengthen our financial position and identify new revenue streams that support our academic priorities, and evaluate processes and procedures to improve our time-to-graduation for PhD students.

# Conclusion

We are proud of the extraordinary progress we have made, one year into the implementation of the Academic Plan. Our achievements have set us on a trajectory to meet our ambitious goals by 2016. Sustaining and building on this positive momentum will be paramount to our success. It is only thorough the collective efforts of all members of the Faculty, including our extended engineering community, that we will accomplish the goals set out in the Academic Plan despite the new and continuing challenges we will surely face.

Over the course of the coming year, we will accelerate our plans as we build on our strengths and capitalize on the great opportunities that lay ahead.