



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Academic Plan

Faculty of Applied Science & Engineering
University of Toronto
2011 to 2016

Approved by Faculty Council October 6, 2011

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Executive Summary

The Faculty of Applied Science & Engineering's Academic Plan was developed through a highly consultative process involving strategic planning since autumn 2009 and was approved by Faculty Council on October 6, 2011. It renews our 2005 *Stepping Up* plan and affirms U of T Engineering's long-term goals, setting out the five-year measurable priorities that we will act upon. This Plan provides a framework for academic and administrative units to enhance collective contributions to our community and their disciplines. It allows us to measure, assess and adjust our activities, while maintaining a focus on our over-arching vision: to be a leader among the world's very best engineering schools – in its discovery, creation and transfer of knowledge and technology through teaching as well as research.

The Faculty has undertaken a number of strategic initiatives over the past six years that responded to the 2005 *Stepping Up* plan and External Review. The *Preamble* of this document provides a high-level overview of these key initiatives that assessed opportunities and challenges our Faculty addressed and provides the context of this Academic Plan.

In 2009-2010, within the framework of the University of Toronto's *Towards 2030* planning document, the Faculty prepared the Self-Study in accordance with the *Provostial Guidelines for Review of Academic Programs and Units*. Following intensive cross-Faculty discussions, the 2010 Self-Study represented a comprehensive overview, critical reflection and assessment of U of T Engineering's academic and administrative performance from 2005-2006 to 2009-2010. This document was provided to the External Reviewers who visited Engineering in May 2010. Their final report commended the Faculty on the quality and strength of our engineering education and research activities. It also identified many of the opportunities arising from the Self-Study, now addressed by this Academic Plan.

The Academic Planning Steering Committee with representatives from across the Faculty, in conjunction with academic and administrative leaders, developed an *Academic Planning Framework*. Engineering's departments, institutes and divisions, as well as administrative units, students and alumni, responded to the Framework, providing feedback upon which the Plan has been built. In addition, our academic and administrative units continue to develop their own plans, setting their sights on goals that support and contribute to the Faculty's goals, and that advance their research, educational and service priorities.

In 2007, U of T Engineering undertook an extensive positioning exercise that helped us understand how we perceive ourselves, how we communicate within and outside the Faculty, and how others perceive us. Building on that exercise, *Positioning* establishes our five-year goals to strengthen our messaging and enhance our communications abilities. Developing a strong communications complement, we will convey our excellence in engineering education and research programs, who we are, and how our alumni, faculty and students contribute to society through innovation and knowledge-sharing. We will clearly differentiate and articulate our messages, promoting our internationally renowned undergraduate and graduate programs and highlighting our educational and research missions. The Faculty aims to present a cohesive visual identity, strengthening our reputation and visibility across Canada and around the world.

Engineering excellence is a key component of our goal to create an environment that enables faculty, staff and student contributions, and where we build connections with our remarkable alumni. Our departments, institutes and divisions play a critical role through their contributions

to a *Culture of Excellence*. We plan to develop and share best practices, maximizing the skills of our administrative and technical staff who assist the Faculty to pursue this aim. This chapter outlines our priorities to increase gender, academic and international diversity, strengthen industrial partnerships and foster innovation, which enriches our educational and research pursuits. We will measure our progress towards our goals through annual reporting and building upon the opportunities arising from the cyclical reviews.

One of our Faculty's central missions is *Educating Future Engineers*. We will continue to strengthen our highly regarded undergraduate and graduate programs through curriculum reviews at both the Faculty and departmental levels. The Graduate Attributes Committee, in collaboration with departmental curriculum committees, will map Engineering's accreditation requirements with the University of Toronto Quality Assurance Process cyclical program reviews, measuring program quality and assessing graduating students' competencies.

We will continue to provide rigorous foundational learning in engineering principles and further enhance our high-quality educational programs. Across the Faculty, we will enrich students' learning experiences by integrating design, communication, entrepreneurship, leadership, global engineering and professional engineering competencies into Engineering's forward-looking curricula. We will also help students link their technical knowledge and engineering skills by providing opportunities for them to apply their learning in engineering settings. Our goal is to develop our students into lifelong learners and future global engineering leaders in the fields of their choosing.

To reach this goal, we must continue to attract the world's top applicants, as well as increase gender and international diversity within our student body. We must improve infrastructure, review our IT and computing facilities, support effective teaching, review grading practices, and provide effective knowledge transfer. We will enrich the MEng course offerings and instruction, work towards reducing dwell times for our research-stream graduate students, and balance the undergraduate-to-graduate enrolment.

Student Experience and *Educating Future Engineers* are naturally linked; together they support student learning and development as future global engineering leaders both inside and outside the classroom. Innovative teaching and engaged learning significantly impacts student experience. U of T Engineering will promote effective teaching practices to enhance learning, and bring in instructors from industry to share their perspectives and knowledge with undergraduate and MEng students. We anticipate that the curriculum review will result in enhanced opportunities for students to reflect on and integrate their learning, to participate in extra- and co-curricular activities, and to contribute to – and benefit from – the U of T community.

Our priorities include increasing undergraduate research opportunities, strengthening our summer internship and Professional Experience Year (PEY) programs, and better facilitating international exchanges. The Faculty and our academic units will also enhance graduate students' sense of connection and community. Effective communication between students and their home department, division or institute and the Faculty includes open dialogue, sharing timely information, and responding to educational and non-academic needs.

U of T Engineering faculty members are global research leaders whose pursuits advance the forefront in their fields. A significant number of our endeavours touch upon at least one of our four broad, cross-Faculty *Research Foci* that we have established in the Academic Plan: Bioengineering, Sustainability, Information and Communication Technology, and Enabling

Technologies. In addition, departments and institutes are also setting research priorities that contribute towards and support Engineering's research excellence. We will leverage our strengths to develop multi-disciplinary research programs, enable our researchers to make significant impacts, advance engineering knowledge and innovation, and promote the Faculty's profile.

We will increase government research funding and seek alternative financial support mechanisms through strengthened collaborative industrial partnerships. Our world-renowned researchers will support our new and emerging faculty, sharing their expertise with the future generations of Engineering innovators. Our plans include ways to broaden our reach, engaging with policy makers, granting agencies and all levels of government.

This Academic Plan establishes priorities to broaden *outreach*, encourage *collaboration*, and enhance Engineering's *influence*. Our activities will help us attract academically strong, diverse students and internationally renowned scholars. We plan to further develop meaningful collaborations across U of T Faculties, among peer engineering institutions and with a broad range of industrial partners and engineering organizations in order to contribute to the technological, economic, and social prosperity of the region and of Canada. As a main participant in the U of T Campaign, we will expand our culture of stewardship and reinforce ties with alumni, friends and donors whose contributions enable us to pursue our mutual vision of excellence.

U of T Engineering allocates three main resources – academic time, infrastructure and finances – to enable research and educational activities. Driven by our academic priorities, *Resource Allocation* outlines how we balance, maintain and strengthen our resources to pursue our academic plan. Engineering's resource goals include faculty and staff hiring, infrastructure renewal, philanthropic fundraising, as well as balancing academic workload. Our Faculty continues to focus on the significant need to improve our physical infrastructure. To this end, we will enhance research facilities; create teaching, design, student club and flexible lab spaces; and develop reliable and effective computing and study spaces for undergraduate and graduate students.

This Academic Plan was developed closely with students, faculty and staff, with input from alumni. Together we pursue excellence in engineering education, innovation, knowledge creation and transfer. To remain a leading-edge Faculty, we must continuously measure, assess and strengthen our progress towards our goals. This Plan represents the first phase during this exciting time of renewal.

Chapter 1: Preamble

The University of Toronto's (U of T) Faculty of Applied Science & Engineering, founded in 1873, is a preeminent research and teaching institution. U of T affirmed in *Towards 2030* to strengthen its position as one of the world's leading publicly assisted universities. Key University objectives include:

- Maintaining our research-intensive culture, the academic rigour of our educational offerings at all levels, and the excellence of faculty, staff and students across all three campuses and partner institutions;
- Enhancing our global reputation for the generation of new ideas and transformative discoveries;
- Engaging all categories of faculty with our teaching mission, and maintaining an emphasis on nurturing inquiring minds and building the creative and analytical capacity of our students at all levels;
- Reinforcing our strengths in research and scholarship through our enrolment and recruitment strategies, and maintaining our leadership position in graduate and secondary professional education;
- Providing an excellent experience for students, inside and outside our classrooms; and,
- Contributing substantially to the prosperity of the Greater Toronto area, Ontario and Canada.

Our vision is to continue to be a leader among the world's very best Engineering Schools in our discovery, creation and transfer of knowledge and technological innovation through teaching and research.

Concurrent to the Faculty's planning activities, the University developed the *University of Toronto Quality Assurance Process* (UTQAP). This cyclic review process endeavours to monitor the academic standards of undergraduate and graduate programs, to ensure ongoing plans for improvement. The Canadian Engineering Accreditation Board (CEAB) identified 12 graduate attributes to which we align the outcomes. We will map these graduate attributes to the UTQAP Degree Level Expectations. These reviews, combined with our commitment to excellence in engineering education, ensure that our academic programs continue to strengthen and evolve.

Over the past five years, our rankings demonstrate a positive trajectory. Based on 2011 peers and publications and other external assessments, U of T Engineering is ranked the top program in Canada and among the very best in the world. We place first in all disciplines, according to the first-ever *QS (Quacquarelli Symonds) World University Rankings by Subject* in 2010. Being placed as one of the finest international engineering schools in the global rankings is an anticipated outcome of our success in approaching our goals, and reflects our main focus of supporting excellence in knowledge creation, discovery and engineering education.

Rankings highlight external perspectives on our Faculty. We are proud of our progressive environment that fosters excellence in engineering education through innovative teaching, cross-disciplinary learning and multidisciplinary and influential research. Our internationally renowned faculty, diverse and academically strong students, committed staff and vibrant alumni community all contribute to our reputation.

Since 2004, our initiatives, planning and consultations have helped us address goals identified in the Faculty's 2004-2010 academic plan, *Stepping Up*. Our strategic evolution and our collective efforts have prepared us for this time of renewal as we update our Academic Plan to guide us for the next five years.

As part of our pursuit of excellence as a highly regarded international engineering school, we continuously review our activities, define emerging areas and assess our progress towards our objectives. This aligns with the University's planning model that asks divisions to consider the budgetary impact of changes, and connect them with academic directions.

To draw on our collective wisdom, our reviews and reflections have included in-depth engagement with our faculty, staff, students, alumni and the broader University community. Together, our efforts represent our Faculty's extensive consultative and iterative processes, and draw upon cross-Faculty perspectives and input. The following initiatives form foundational understanding and build further support for our continued pursuit of excellence.

In 2007, we began our *Positioning Exercise*, a strategic process that has helped us articulate the core values that underlie all aspects of our Faculty. Consultations with more than 800 Faculty community members, leaders from peer institutions, and University senior administration identified how we perceive ourselves and how the outside world perceives us. This enabled us to consider how we can further strengthen our internal and external visibility and positioning.

The *Dean's Task Force on Globalization and Engineering* in 2008 considered how the Faculty's education and research missions include globalization trends and challenges. To further our goals in preparing graduates for a global workplace and to address and influence global challenges through research, we established the Centre for Global Engineering in 2009. The Centre also serves as the focal point to invigorate our global activities and to engage alumni, faculty and students to continue advancing Canada's innovation agenda nationally and around the world.

The *Engineering and Public Policy Task Force*, which included Faculty members and colleagues from the School of Public Policy and Governance, developed a mandate in 2008 to articulate, evaluate and develop concepts for programming in engineering and public policy at both undergraduate and graduate levels.

From May 2008 to June 2009, the *Outreach Task Force* examined Engineering's outreach programs, in particular those focused on pre-university outreach. The Task Force recommended that the Faculty encourages outreach programs that support our mission, complement student interests, and help us attract academically strong students to the Faculty from a broad diversity of constituencies. The success of these outreach programs is measured in three areas: student experience, recruitment, and community impact. The Engineering Student Outreach Office (ESOO) was created in autumn 2009 to develop and administer our core outreach programs.

The 2009 *Catalogue of Advancement Priorities* focuses on six primary areas: Student Experiences; Globalization; Bioengineering; Energy, Environment and Sustainability; Information and Communications Technology; and, Nanoengineering. These philanthropic priorities financially support the Faculty's research and educational goals and our infrastructure needs.

In 2008, we began a comprehensive *Divisional Space Review and Development of a Master Plan* that evaluated the quality and quantity of space within the Faculty, as well as determined

our current and projected space requirements. The review determined that our current physical space no longer meets our needs as a world leader in engineering research and education. The Faculty continues to address these deficiencies, and is preparing new infrastructure plans.

The *Dean's Task Force on Engineering Leadership Education* reviewed the advances made by the Engineering Leaders of Tomorrow program and developed strategic directions to prepare engineers to address increasingly complex global challenges. The Task Force identified the need for engineers who can balance the ambitions of their organizations with the limits of the planet, and who can mobilize others towards a common good. The final report recommended to Faculty Council the establishment of a Centre for Leadership Education in Engineering, approved in the spring of 2010.

We formally engaged administrative and technical staff in the academic planning process at the *Defining Administrative Excellence Workshop* in February 2010. Participants developed a strategic plan for administrative and technical functions, identified three levels where administrative staff collaborate for excellence, and defined four visions of excellence.

The inaugural *Engineering Faculty's Annual Report 2009: Performance Indicators* compared Faculty data from 2008-2009 with both the Faculty's own historical data from as far back as 2000, and data from peer institutions. This report set the milestones by which we measure our progress, and it supplied the foundation material upon which we reflected in our self-study. Our *2010 Annual Report* builds upon the previous Report, and highlights the Faculty's most recent initiatives. The Annual Reports demonstrate the Faculty's commitment to transparency, accountability and critical reflection on our progress over time.

The *Faculty of Applied Science & Engineering Self-Study* was prepared within the University's academic planning framework that requires a broad-based review, and a reflective report on our academic programs and units. In September 2009, Dean Cristina Amon established the Self-Study Working Group that, through broad and intensive dialogue across the Faculty and the University, critically reflected on our achievements and evolution since *Stepping Up*. This process drew upon our previous initiatives and our reporting in the 2009 Annual Report. Consultation groups included Faculty academic leaders, undergraduate and graduate students, administrative managers, Faculty Council standing committees, faculty, alumni and staff. The *Self-Study* identified our strengths, opportunities, and challenges.

In May 2010 the Faculty's external reviewers, commissioned by the Provost, met with University and Faculty leaders, staff, faculty, students and alumni. As a part of the University's cyclic unit reviews, the external reviewers assessed our undergraduate and graduate studies and experiences, research activities, and organizational structure and resources. The resulting External Review Report acknowledged our accomplishments and performance over the past five years. It also provided an overall assessment of our areas of strength and opportunity. The Faculty's Administrative Response was approved by the University's Committee on Academic Policy and Programs in September 2010.

Academic Planning

The Faculty of Applied Science & Engineering's academic planning process has relied heavily on a carefully constructed, iterative loop of assessment, consultation, reflection and planning. In autumn 2009, the Dean struck an Academic Planning Steering Committee (for 2009-2010) with representatives from our major constituencies:

Cristina Amon, Dean; Professor, MIE
Grant Allen, Vice-Dean, Undergraduate; Professor, ChemE
Erika Bailey, Director, Office of the Dean
Catherine Gagne, Chief Administrative Officer
Jason Grenier, Graduate Student, ECE
Greg Jamieson, Associate Professor, MIE; Curriculum Committee Chair
Wayne Lin, VP, Student Life, Engineering Society; Undergraduate Student, IndE
Brenda McCabe, Chair, CivE
Eugene Polistuk, Alumnus and Member, Dean's Advisory Board
Paul Santerre, Director, IBBME; Professor, Faculty of Dentistry
Ted Sargent, Associate Chair, Research; Professor, ECE

In consultation with Faculty leaders, the Steering Committee developed an Academic Planning Framework designed to elicit responses that reflect the Faculty's collective wisdom. It presented a list of focus questions in eight topic areas: Positioning; Culture of Excellence; Educating Future Engineers; Student Experience; Research Foci; Outreach, Collaboration and Influence; Resource Allocation; and Priorities, Weaknesses and Implications.

Between December 2009 and May 2010, academic and administrative units responded to the Framework questions and were encouraged to conduct cross-Faculty discussions during early stages of their parallel academic planning. Unit responses provided input on emerging themes of our most important foci, identified cross-Faculty synergies, and helped us consider how we will renew our strategic directions. Ultimately, the Framework provided Faculty-wide input that represents us as a community dedicated to the highest standards of engineering research, teaching and student experience.

Responses from departments and institutes to the Framework, formative material from the ongoing initiatives and reports, and our internal reflective processes through the cyclic reviews form the foundations of the Faculty's Academic Plan chapters. We developed the Plan's three core chapters through the summer of 2010, and built the remaining chapters through the 2010-2011 academic year.

This Plan is a result of broad and iterative consultations with the Faculty's central leadership, Chairs and Directors of academic units, Associate Chairs, the Faculty's governing committees, Faculty Council members, faculty, undergraduate and graduate students, staff members, alumni and University stakeholders.

This Academic Plan sets our academic and administrative directions within the University's strategic context for the next five years and aims to achieve our goals to continue strengthening our research-intensive culture, academic rigor, global reputation and visibility, enrolment, excellence in students experiences inside and outside the classroom, funding models and our internal and external collaboration, outreach and influence. It was approved by Faculty Council on October 6, 2011.

Chapter 2: Positioning

Introduction

Beginning in 2007, the Faculty of Applied Science & Engineering engaged in a highly consultative and comprehensive process to determine our positioning statement that uniquely places us among our peers, by identifying our brand promise, gaps in internal and external perceptions and aspirations. Through this activity, we sharpened and clarified the way we communicate our unique messages. Through a multi-year exercise involving a third-party branding firm, we led approximately 800 contact conversations that helped articulate the Faculty's vision, mission and key messages:

Vision

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.

Mission

- To discover and share knowledge with students by offering undergraduate, professional and graduate degree programs of the highest quality in an environment that provides immersion in world-class research and ensures a supportive student experience;
- To ensure our students are equipped with the leadership skills, communication skills and global awareness required by the engineering profession and by society in general;
- To create new knowledge and to contribute to society through advanced research, innovation and technology transfer; and,
- To realize an exemplary degree of citizenship and ethical behaviour among our faculty, staff, alumni and students.

Key Messages

The world's cultural and commercial convergence makes for an unprecedented richness in opportunity for Engineering.

The University of Toronto's Faculty of Applied Science & Engineering pursues this important opportunity by enabling our community of today's students and tomorrow's Engineering leaders to build a stronger global society.

We prepare well-rounded future world leaders who flourish in the breadth and depth of our rigorous, inter-Faculty academic and co- and extra-curricular Engineering programs.

Our longstanding tradition and spirit of innovation in Engineering leads us to excel at integrating creative techniques and ideas from dynamic, evolving sources to catalyze meaningful new research directions that address the needs for building a stronger global community.

During this exercise, and through follow-up discussions and input from internal and external stakeholders, we have identified opportunities to further develop these statements and deliver a concise message that sets us apart. The Faculty does a great deal well; our innovative staff, researchers and educators generate great stories and bold ideas. We offer undergraduate and graduate programs that empower students to achieve academic excellence, technological savvy, a sense of global and societal responsibility, and superior leadership capability. An effective marketing and communications strategy cannot focus on everything, or we will end up focusing on nothing. A revitalized positioning must:

- Set us apart from our peers;
- Clearly identify our core, cross-disciplinary strengths;
- Capture the attention of academically strong prospective students and attract top scholars and staff;
- Establish a strong platform for relevant news stories;
- Align with the Academic Plan's long-range goals; and,
- Define a clear and cogent set of messages that says what makes us unique in the engineering higher education marketplace and why it matters.

This positioning must be based on our core values and competencies and needs to be backed up by the Faculty's abilities and track record.

We also need to analyze the competitive marketplace. What are our top competitors saying about themselves and how are they saying it? As well, we need to speak to our primary audience(s), using the words and media that resonate with them.

The Faculty identified a number of Canadian and international peer and aspirational institutions with which we collaborate and compete. The University of Waterloo, University of Alberta, University of British Columbia and McGill University were ranked as our top national peers. Internationally, Massachusetts Institute of Technology, University of California – Berkeley, University of Michigan and Georgia Tech are identified both as peers and as aspirational engineering schools. We also identified discipline-specific institutions or departments with which we aspire to compete.

We must get our message out to diverse audiences, considering the unique media of choice, language (e.g., level of diction, vocabulary) and frequency of contact of each. Our target audiences include:

- University of Toronto leadership, faculty and staff
- Current and prospective students
- Influencers such as parents, spouses and high school guidance counsellors
- Colleagues at peer post-secondary institutions
- Alumni and donors
- Industry and corporate partners
- Funding agencies and government
- Traditional print and broadcast media
- Bloggers and other social media leaders

Universities, including many of our peers, are growing adept at using social media, blogging, mobile devices and emerging technology to communicate effectively and immediately across audiences. Concurrently, traditional media have re-imagined themselves, yet the demands of more traditional publications and delivery tools do not slacken. It is within this context that the Faculty will move forward in our positioning and communications strategies to support the Academic Plan.

Goals

The following goals will guide our Faculty's strategic communications activities for the next five years.

1. Deliver a plan that articulates our communication goals, maintains consistency of our branding and products, keeps on top of markets and clearly outlines methods so that we can remain competitive and set the Faculty apart.
2. Strengthen the Faculty's key messages and customize them for target audiences.
3. Establish the Faculty as the go-to resource for media looking for comments and engineering expertise on breaking news issues.
4. Continue to increase the quality of our storytelling, journalism and communications processes and tools to make our practices best-in-class and in pace with emerging technologies and their uses by our target audiences.
5. Remain flexible to changing media and technologies, nurture blogger and social media relationships, and build relationships and communications with traditional media.
6. Increase the Faculty's presence, visibility and reputation on modern social media platforms.

Chapter 3: Culture of Excellence

Introduction

A culture of excellence is a key component of the vision of the Faculty of Applied Science & Engineering. We strive to be a leader among the world's very best Schools of Engineering in our discovery, creation and transfer of knowledge and technology through teaching and research. Our departments, divisions, institutes and extra-departmental units play a vital part of this culture of excellence, making unique contributions in their fields and to our community.

The Faculty aims to attract the top, diverse faculty, staff, and students and thereby conduct ground-breaking, leading-edge research and provide exceptional engineering education in Canada and the world. Diversity – whether gender, academic or international – helps us achieve excellence in an enriched learning and innovative environment. It is a place where the entire community aspires towards excellence in the outcomes of all our activities: research, innovation, technology transfer, knowledge generation and engineering education.

Our overarching vision, our students, faculty and staff, systems and processes, and our resource management enable us to strengthen the foundations of our *Culture of Excellence*. Together, we contribute toward U of T Engineering's educational and research mission, and create an environment in which students, faculty and staff can flourish.

Spearheading our research and teaching excellence are our internationally renowned faculty members. Leading-edge research, as further articulated in the chapter on *Research Foci*, redefines a field, creates new engineering devices or techniques, and influences policy, innovation and industry. Our faculty members advance their research to benefit society, to support Canada's research agenda and to answer the world's most pressing concerns.

Teaching excellence links to research excellence through our professors, instructors and teaching assistants. We strive to impart knowledge and a strong engineering foundation, develop innovative courses and delivery methods, and contribute to Engineering's learning environment.

The chapters on *Educating Future Engineers* and *Student Experience* both focus on the ways we plan to strengthen the educational environment for our students, building on our excellence in undergraduate education and enriching student experiences. Undergraduate students develop their professional engineering skills during international exchanges, professional experiences during summer or Professional Experience Year placements, in research opportunities, and by being involved in co-curricular and extra-curricular activities. Our graduate students contribute towards the Faculty's research and learning mission as emerging researchers, as teaching assistants and as aspiring engineering professionals and leaders.

University of Toronto Engineering alumni further build upon their education as life-long learners who apply fundamental engineering skills, professional outcomes and an engineering knowledge base as they become members of academic, professional and global communities. In turn, our alumni give back, supporting their alma mater through their advisory, volunteer and philanthropic contributions.

Enabling the Faculty's priorities and activities, our technical and administrative staff are innovative professionals who are agents of change, and who collaborate to provide a stable, reliable and efficient environment for the Faculty to achieve its goals. Their contributions create a positive work environment, developing strong collaborations throughout functions and across

the Faculty. They provide high-quality service, communication and the necessary technology, knowledge and support to community members.

The systems we establish and use serve as a framework to support our Faculty's endeavours. These systems include governance, cyclical program reviews and quality assurance processes; evaluations, surveys and reporting activities; a budgetary model; strategic hiring, recruitment, training and performance review processes; and the ways in which we acknowledge, communicate and celebrate our successes.

The Annual Reports and this Academic Plan work in tandem to measure our progress towards our goals. These tools help us to critically reflect on what we do, to identify ways in which we can build on our strengths and create new opportunities, and to adjust our direction when necessary.

How well the Faculty functions and fulfils our vision and mission is critically dependant on sound resource management. *Resource Allocation* details how we enable our culture of excellence. Our academic and administrative efforts, budget model, technological resources and our infrastructure all allow us to innovate, share knowledge, work, learn and teach.

Goals

Culture of Excellence goals are applicable across all constituencies, referencing the excellence of our student and faculty members in dedicated chapters, while giving emphasis here on the goals for staff and alumni. The following broad, cross-Faculty goals aim to strengthen our culture of excellence.

1. Maintain a strong Faculty vision for excellence in engineering education and research.
2. Measure our progress in achieving our mission and vision.
3. Increase diversity, focusing on gender diversity among students and faculty.
4. Support the development of faculty members as outstanding engineering educators and researchers.
5. Support our students by strategic efforts to build upon educational, extra- and co-curricular experiences.
6. Maximize the skills of our staff members and create opportunities to strengthen their performance and develop them as integral contributors to the Faculty's mission.
7. Increase staff retention and enhance succession planning within the Faculty.
8. Build upon alumni involvement with the Faculty to share their world-based expertise and perspectives, to strengthen our reputation and to inspire the next generation of U of T engineers towards innovation and excellence.
9. Enhance governance processes, cyclical reviews and quality assurance processes.
10. Strengthen communications both internally and externally.
11. Continue to acknowledge the accomplishments of our students, faculty and administrative staff.

12. Establish and maintain a strong resource base to enhance teaching and design facilities; to provide reliable, accessible, effective computing services and study spaces; to standardize graduate student funding; and to increase research funding.

Chapter 4: Educating Future Engineers

Introduction

The Faculty of Applied Science & Engineering at the University of Toronto currently offers nine fully accredited, highly rated and internationally competitive undergraduate programs and two undergraduate degrees: the Bachelor of Applied Science (BASc) and the Bachelor of Applied Science in Engineering Science. These programs attract academically strong, culturally diverse students from across Canada and around the world.

Since 2000, we have enhanced our undergraduate curricula to integrate collaborative teamwork, design, communication, leadership and other professional competencies. Our undergraduate curricula have also been evolving to offer Faculty-wide minors and certificates that allow students to tailor their programs to their unique interests. We continue to build upon our superior curricula and seek innovative approaches to further strengthen our course delivery, teaching and learning methods.

The Faculty offers seven highly sought-out graduate programs and four graduate degrees: Doctor of Philosophy (PhD), Master of Applied Science (MASc), Master of Engineering (MEng) and Master of Clinical Engineering MHSce. The quality of our graduate programs is unsurpassed among Canadian schools and further contributes to our position among the world's best engineering schools. Our graduate programs include highly regarded Faculty-wide certificate courses that link technical subjects to engineering practice and collaborative programs that encompass cross-disciplinary interests. We attract excellent graduate students, provide them with outstanding course programming, and offer them opportunities to advance the frontiers of engineering knowledge by conducting leading-edge research with professors who are the top experts in their fields. We seek to produce graduates who are exceptionally well-prepared for roles as academic faculty, researchers, leading engineering practitioners in industry, and business leaders.

Our constant pursuit of engineering education excellence aligns with requirements that have been defined by the University, the Province, and the Canadian Engineering Accreditation Board (CEAB). Ontario's provincial Quality Assurance Framework (QAF) requires that we articulate our Undergraduate and Graduate Degree Level Expectations (UDLEs and GDLEs). The *University of Toronto Quality Assurance Process (UTQAP)* for academic programs, developed in response to the provincial QAF, supports our collective goal of "being an internationally significant research university, with undergraduate, graduate and professional programs of excellent quality." CEAB moved towards an outcome-based approach to undergraduate program reviews and will require that by 2014, we monitor and improve our programs based on our students' success in meeting criteria within 12 categories of Graduate Attributes.

Educating Future Engineers and *Student Experience* are inextricably linked. Our students' time at the Faculty primarily focuses on academic curriculum requirements. How our students learn, their co- and extra-curricular activities, and their engagement beyond classroom walls play a vital part in their ability to succeed as students and as our alumni. This chapter's priorities focus on the in-class and co-curricular learning experiences that help our students achieve academic outcomes at the time of their graduation as future engineers in whatever field they choose to pursue.

For the purposes of the Faculty's Academic Plan, this chapter, *Educating Future Engineers*, elucidates the curriculum-based goals including infrastructure, technology and teaching. The

following chapter, *Student Experience*, will include other important aspects including participation in sports, clubs, arts, research, international opportunities, and summer and professional work experiences.

Goals

In parallel with our aim to develop and provide superior engineering education, excellence in teaching and innovative course delivery, the Faculty's Self-Study and External Review identified opportunities to address and further our goals for Educating Future Engineers. The following goals will guide our Faculty's activities pertaining to undergraduate and graduate student learning for the next five years.

1. Maintain and strengthen our high-quality education through continued review and assessment of our programs and curricula for currency, vision and relevance. Establish desired learning outcomes for graduates and undergraduate students to ensure they are well prepared as future engineers. Evolve our cyclic reviews and plan for continuous quality assessment within the new UTQAP and CEAB Graduate Attribute systems.
2. Further integrate professional competencies, such as global engineering, entrepreneurship, leadership and communication into undergraduate and graduate curricula. Define, assess and measure our programs and curricula successes through the UTQAP UDLEs, GDLEs and cyclic reviews and through the CEAB Graduate Attributes.
3. Enrich the quality of undergraduate academic experience by increasing the flexibility in undergraduate curriculum, continuing to develop progressive opportunities for students to pursue their professional interests, and integrating professional competencies throughout the curriculum.
4. Continue to support and enhance undergraduate students' opportunities for self-directed learning and study time, and participation in the enriching extra-curricular activities within our Faculty, across the University, and beyond.
5. Enhance our instructional space to facilitate innovative teaching methods and create efficiencies on how we share space. This includes flexible interactive teaching space for substantial numbers of students, design and group project space and lecture/lab combination space.
6. Provide reliable, accessible, effective computing services and study spaces within and outside computer laboratories, library and classrooms to enhance efficient interactive learning and socialization where today's student 'lives'.
7. Link the quality of student learning, the quality of their education and their improved future performance with teaching effectiveness. Continue to inspire and support the Faculty's culture of teaching excellence and encourage Faculty members and teaching assistants to reflect upon their teaching effectiveness through enhanced feedback mechanisms. Support teaching initiatives and opportunities that will improve their professional development as educators.
8. Continue to attract and retain diverse, outstanding students from a wide range of backgrounds in order to provide an exceptional education for future global engineers

and leaders. In particular, we must strive to attract more female students into our programs.

9. Strategically award admission scholarships to meet our student recruitment goals.
10. Reduce the dwell time for MASc and PhD students and address time-to-graduation issues.
11. Continue to develop vibrant MEng programs and offer a larger variety of courses suitable to MEng students.
12. Increase graduate student enrolment to reach 2,000 graduate students by 2015, with particular focus on increasing PhD and MEng students and aiming to reach an average of one PhD graduated annually per faculty member. At the same time, we will endeavor to reduce our undergraduate student enrolment to 4,000 by 2015, with 25% of undergraduates consisting of international students. In fall 2010, the November 1 Full-Time Equivalents (FTE) were 4,599 undergraduate and 1,527 graduate students, a percentage of 75.1% to 24.9%.

Chapter 5: Student Experience

Introduction

Engineering students' gender and cultural diversity, academic strengths, interests and experiences enrich this dynamic learning and research environment, both in and outside the classroom. Our unique community offers the benefits of being part of a large, research-intensive university located in a major urban centre. Student diversity, our large commuter population and our multicultural urban environment present both opportunities and challenges. Our programs and infrastructure go beyond basic student needs, supporting students to face these challenges and providing them with opportunities to excel outside of the classroom.

In this chapter, we outline the goals that will further support our students and their active engagement with the Faculty and across the University, which enhances their development as future global engineering leaders.

The Faculty's goals to improve student experience stem from input received from many sources: comprehensive consultation with students, faculty members and staff across our Faculty during the Self-Study and subsequent External Review; responses from Departments, Institutes and Administrative Units in the academic planning process; and ongoing student dialogue with the Engineering Society and through the regular Dean's Student Town Hall meetings.

Student Experience focuses on how we will enhance undergraduate and graduate students' co- and extra-curricular experiences, including participation in sports, clubs, arts, research, internships, international student exchange opportunities, and summer and professional work experiences. We will continue to support and promote student-oriented activities, particularly those affiliated with our Engineering Society. Student experience also includes factors such as teaching effectiveness, infrastructure, student information systems, communications, counselling and academic and personal support systems. The previous chapter, *Educating Future Engineers*, highlighted the curriculum-based goals including infrastructure, technology and teaching.

As noted in the previous chapter, *Educating Future Engineers* and *Student Experience* are inextricably linked. Our students' time at the Faculty primarily focuses on academic curriculum requirements. How our students learn, their co- and extra-curricular activities and their engagement beyond the classroom play a vital part in their ability to succeed as students and, ultimately, as Engineering alumni. Both academic and extra-curricular activities impact students' holistic experiences; the connections they make between cohorts, disciplines and activities that deepen student learning and broaden their perspectives as global engineering leaders in whatever field they choose to pursue.

Goals

We continue to strive for excellence in student experience. The following goals will direct our Faculty's activities pertaining to undergraduate and graduate student experience for the next five years.

1. Ensure that all of our undergraduate curricula provide our students with sufficient self-directed time to fully reflect on and understand the material in their program, the vision and relevance to 'learn how to learn', and the advantage of taking opportunities to experience and engage in University life outside the classroom through extra-curricular and co-curricular activities.

2. Engage more undergraduate students in faculty research activities. Enhance summer opportunities for our undergraduate students by expanding the Engineering Summer Internship Program (eSIP) and by increasing summer research opportunities both within the Faculty and through agreements with international institutions.
3. Enhance our students' access to electives outside technical courses.
4. Enhance our undergraduate and graduate students' non-traditional educational opportunities, including international academic exchanges and internships, courses offered abroad, field courses, and credit for work in extra-curricular activities such as design teams.
5. Continue to inspire the Faculty's culture of teaching excellence and support teaching initiatives that improve student experience, support their connections with course content, increase in-class engagement and strengthen students' understanding of course relevance.
6. Promote extra-curricular activities through communications, faculty mentoring and suitable space and facilities.
7. Actively engage and support students in their unique academic and non-academic experiences as soon as they enter our Faculty, so they can thrive throughout their studies.
8. Engage Master of Engineering (MEng) students to improve the quality of their experience.
9. Enrich graduate students' academic life and build a stronger sense of community among graduate students across the Faculty.

Chapter 6: Research Foci

Introduction

The Faculty of Applied Science & Engineering supports a vibrant research community, situated within a research-intensive, pre-eminent university. Our Faculty members diligently raise funding through Tri-council, provincial and industry programs, participate in major research initiatives both nationally and internationally, build and lead spin-off companies, and collaborate with key industrial sectors. The Faculty's extended research community includes research associates, undergraduate and graduate students, postdoctoral researchers and laboratory technicians. A number of our research initiatives are interdisciplinary and involve faculty members from multiple departments across the University of Toronto.

Through our research endeavours, we create new knowledge and technologies and share these results with local, national and international research communities, and with industry, through publications, patents and technology transfer. These require interdisciplinary engineering innovation that benefits Canadians and our increasingly inter-connected global community.

Starting in 2007, we have created Associate Chairs, Research positions in all departments. These Associate Chairs, along with the Directors of the University of Toronto Institute for Aerospace Studies (UTIAS) and the Institute of Biomaterials & Biomedical Engineering (IBBME), serve on the Faculty's Research Committee. Through this Committee's work, U of T Engineering promotes research, mentors colleagues and identifies cross-Faculty research opportunities.

Our world-class departments and institutes support unique strengths and provide research leadership, redefining the forefront of innovation in their fields and further strengthen our research endeavours.

Chemical Engineering & Applied Chemistry has research strengths in biomolecular and biomedical engineering, bioprocess engineering, chemical and materials processing, environmental science and engineering, informatics, pulp and paper, surface science, and sustainable energy.

Civil Engineering is concerned with virtually all aspects of the urban habitat and the interactions that exist between the built, natural and human environments, including geoscience, mining, building, environmental, transportation, and structural engineering.

Electrical & Computer Engineering has research strengths in communications, computer engineering, energy systems, systems control, biomedical engineering, electro-magnetic engineering, electronics, and photonics.

Materials Science & Engineering provides a research focus for advanced materials applications that have a global impact in sustainability and energy systems. These include advanced electronic materials and systems; alternative energy systems; nanomaterials; and sustainable materials processing.

Mechanical & Industrial Engineering includes research foci on applied mechanics; robotics and manufacturing; biomedical engineering; computer-aided design and materials engineering; energy studies; thermodynamics and surface science; environmental engineering; fluid sciences and mechatronics; human factors and ergonomics; information engineering as well as operations research.

UTIAS' scope of research includes aeronautical engineering (aircraft flight systems, flight simulation, propulsion, combustion, aerodynamics, computational fluid dynamics and structural mechanics) and space systems engineering (spacecraft dynamics and control, space robotics, mechatronics as well as microsatellite technology).

IBBME is a cross-Faculty institute in collaboration with Engineering, Medicine and Dentistry. As an interdisciplinary institute, its research includes neural sensory system and rehabilitation engineering, biomaterials, tissue engineering and regenerative medicine, molecular imaging and systems biology and engineering in a clinical setting.

Growing from these key strengths, the Faculty establishes extra-departmental units to foster research that focuses on specific cross-Faculty and University-wide areas (See Appendix 14 for full list). Our research enhances collaborations within our community, supports undergraduate and graduate student research skills, builds external partnerships, increases our funding portfolio and draws donor support that will further enable research initiatives.

Through our Self-Study and Academic Planning processes, we adopted four broad themes that represent cross-Faculty research foci. They align with the University of Toronto's research goals, and contribute to the local and national research agendas. Our internationally recognized Research Chairs – funded by governmental agencies, industry or by endowments – enable and drive initiatives within the four themes.

Many of Engineering's research pursuits touch upon at least one of the four themes. In addition, major initiatives, which will be expanded upon in departments' and institutes' own academic plans, contribute towards their unique research fields. Due to our interdisciplinary research community, these themes overlap; they enable the other foci, and are also advanced by the other research themes.

Bioengineering

This theme is broken down into two broad areas within Bioengineering: Biomedical Engineering Research that pertains to mammalian-based research initiatives, focused on innovations within the broad sector of health care research and technologies; and Bioprocess and Bioproduct Research. As it is with our four broad themes, these two sub-headings naturally – and necessarily – connect in innumerable ways.

Biomedical Engineering: The integration of engineering practices with medical sciences, as well as the collaboration among Engineering, the Faculties of Medicine and Dentistry, and the University affiliated hospitals, help us identify and study more efficient diagnostic strategies and better disease-monitoring leading to an enhanced quality of life. In particular, we have core research strengths in biomaterials, tissue engineering, biomechanics, molecular imaging, neuro-engineering, and medical devices.

Bioprocess and Bioproduct Engineering: This includes use of engineered microbiological (bacterial and algal) systems for treating waste air and water streams, for regeneration of polluted land and groundwater, and for generating biofuels, bio-electricity and new high-value bio-products. In addition researchers are exploring the use of Canadian forestry products in non-traditional applications, including industrial foams, flame-retardant materials, and paper surface science.

Sustainability

Natural Environment, Urban and Industrial Environments, Infrastructure, and Sustainable Energy are included in this over-arching research theme; these frequently intersect and are inter- and cross-disciplinary research subsets:

Natural Environment: Engineers have long been aware of the impact of their activities on the environment, including reducing the impact of aviation pollutions, extracting natural resources and minerals, monitoring the earth from micro and nano satellites, and distributing energy efficiently.

Urban and Industrial Environments: Our interdisciplinary approach to research provides an excellent position to address the increasingly complex issues associated with the urban and global environments: new transportation systems, energy efficient and healthy buildings, sustainable materials processing, industrial processes and manufacturing activities, drinking water, impact of air quality on human health and sustainable urban environments.

Infrastructure: Research in this sub-theme includes product life cycle, sustainable urban environment and green information technology, sustainable industrial processes and ecosystems, advanced recycling, structural engineering, concrete, and transportation planning.

Sustainable Energy: The Faculty's research strengths include energy distribution systems and renewable energy, particularly in the areas of solar, fuel cells, hydrogen production, bio-fuels, and wind. We also have foci in energy recovery, and in sustainable use of energy in aerospace, industrial processes, and energy transportation.

Information and Communication Technology (ICT)

This research area includes Internet use, mobile communications and online video drives demand for increased performance, information and identity security, and reliability of our ICT infrastructure. Computer networking, distributed systems, and middleware constitute a large part of ICT, as do computer architecture and parallel systems spans processor architecture, multiprocessors, multi-cores and on-chip interconnection networks. Sustainable ICT uses the Internet to reduce the environmental impact of our day-to-day lives. Exascale computing enhances medical imaging studies that deepen our understanding of brain function and improve therapies. ICT research foci also include microelectronics, systems control; analog and mixed-signal/RF electronics; integrated circuits simulation and modeling; and wireless, wired and optical communications.

Enabling Technologies

Enabling Technologies are fundamental research directions within the Faculty that under-pin and support the development of the three other strategic research themes. The Faculty's enabling technologies researchers develop a range of engineering innovations, including manufacturing, mathematical modeling, nanotechnology, biotechnology, photonics, and advanced materials.

Goals

We continue to advance engineering research excellence and innovation, and strengthen our Faculty's research community. The following goals will drive our Faculty's research activities over the next five years.

1. Create new and support current research centres around strategic research themes that make significant, relevant impacts on society.
2. Increase our Tri-council funding level to \$25M per annum by 2015.
3. By 2015, increase the number of Canadian Research Chairs by eight (to a total of 30), increase Industrial Research Chairs by six (to a total of 10), and increase Endowed Chairs and Limited Term Chairs by 13 (to a total of 40).
4. Develop additional funding sources through the Social Sciences and Humanities Research Council (SSHRC), the Canadian Institutes of Health Research (CIHR), corporations, industries and international granting agencies.
5. Support junior faculty members and emerging research leaders to ensure that they successfully secure external research funding from industry, federal and provincial sources.
6. Raise awareness and promote our research contributions and breakthroughs with peers, funding agencies, industry and the public.
7. Generate synergistic research partnerships with industry, peer institutions within Canada, and strategic international partners, while taking on leadership roles at the national and international levels.
8. Increase participation and provide leadership on external review committees in granting agencies such as the Natural Sciences and Engineering Research Council (NSERC), Ontario Centres of Excellence (OCE), and the Ontario Ministry of Research and Innovation (MRI).
9. Enhance multidisciplinary, collaborative research endeavours.
10. Engage more undergraduate and international graduate students in faculty research activities.

Chapter 7: Outreach, Collaboration and Influence

Introduction

U of T Engineering is an international leader in engineering education and research. Our creative, interdisciplinary nature firmly situates us as a highly valued, sought-after, innovative partner. We make significant contributions towards U of T's research-intensive and educational excellence priorities. Our reach and influence extend beyond the Faculty and University. From Toronto communities to peer international institutions, from Canadian high schools to industry, from professional journals to alumni and donors, Engineering continues to develop broad collaborative circles.

In the chapter on *Research Foci*, we outline our research-focussed industrial partnership goals that develop these collaborations. Here, these partnerships are further expanded upon as unique opportunities to increase student work placements, collaborate across disciplines and to share expertise between industry and academia.

This chapter outlines our goals regarding external outreach and collaboration activities and resulting influences. Those activities within the Faculty and those conducted throughout U of T with other Faculties such as Arts & Science, Medicine, Dentistry, and Architecture, Landscape & Design, are included in previous chapters. External outreach, collaboration and influence further strengthen our ability to attract top scholars, to recruit academically strong students and creative, collaborative, professional staff, to create dynamic learning environments, and to support engineering knowledge generation. Outreach, collaboration and influence activities also develop and sustain relationships with alumni, donors and volunteers who contribute to our Faculty.

Outreach promotes the Faculty and the engineering discipline to targeted groups outside the Faculty by:

- Inspiring pre-high school and pre-university future engineers;
- Contacting prospective undergraduate and graduate students;
- Connecting current students with prospective students;
- Encouraging alumni and volunteers to return and inspire prospective students;
- Connecting with local and international industry to increase student job placements, build research partnerships, and promote knowledge-sharing; and,
- Seeking-out and deepening our relationships with our alumni, donors and volunteers.

Collaboration occurs when:

- Two or more researchers, research groups, student groups or staff groups innovate together;
- Students work with international or local industries and companies;
- Students and professors study, teach or research within U of T, across disciplines, and with Canadian universities and international peer institutions; and,
- Staff meet or participate in Working Groups/Task Forces.

Influence arises from both outreach and collaboration, and is an important result of our Faculty's efforts. We influence when we:

- Engage with others to bring expertise and an engineering perspective to policy and industrial standards, and to government and media;
- Participate in professional academic or administrative organizations and groups;

- Educate the next generation of global engineers who will be influential leaders in their chosen careers and in society;
- Transfer our knowledge and expertise to industry through the creation of technologies that influence local and global economies, create jobs, build wealth, and advance Canada's research agenda;
- Contribute to engineering as a discipline through participation in conferences; and,
- Publish in top journals and discipline publications that widen our external contact base, increase our visibility, and further engineering as a discipline.

Goals

To strengthen our outreach, collaboration and influence, we have set the following goals to understand what we already do, and to direct our Faculty's efforts in these areas for the next five years.

1. Better understand the breadth of the Faculty's current outreach, collaborative and influencing efforts, then efficiently manage, support, develop and communicate these activities.
2. Continue building meaningful involvement and relations with Engineering alumni.
3. Strengthen relationships with other University of Toronto Faculties.
4. Further develop sustainable collaborations with industry partners, and expand established partnerships with affiliated hospitals and research institutes.
5. Further develop connections with local communities, businesses and the City of Toronto.
6. Build upon high school outreach and continue to assess our pre-university activities with the goal of optimizing faculty and student involvement.
7. Increase staff, faculty and student awareness of and involvement in professional societies and organizations and governing bodies.
8. Develop strategic relationships with desirable peer, national and international Engineering schools.
9. Increase influence in government and public policy decisions.
10. Develop a culture of stewardship and gratitude to the alumni and donors who provide philanthropic support to the Faculty.
11. Encourage the participation of administrative staff in professional associations related to their area of expertise, and in the mentoring programs offered by the University.

Chapter 8: Resource Allocation

Introduction

Adequate resources are an integral part of the Faculty's ability to advance our Academic Plan goals as outlined in the previous chapters. These goals, in turn, impact our academic time, physical space, administrative and technical staff, and budget, either by drawing upon these resources or by creating efficiencies. In all cases, our resource allocation must support our academic goals and vice versa; they are inextricably linked.

The Academic Plan and plans from all academic units contain three common themes related to resources: academics need more time for high-value activities; physical space requires upgrading; and budget funds are constrained. We have examined our goals as they relate to these three themes and how we might improve our resource levels *to pursue*, and *by pursuing*, our Academic Plan goals.

The Faculty attracts top scholars whose research and teaching add greatly to our engineering education and research goals. In turn, we attract some of the world's best and brightest engineering students. Our faculty members continually strive to establish a balance between teaching and research. On the one hand, teaching activities share leading-edge knowledge and inspire future generations of engineering leaders. On the other, our scholars' research brings in funding, strengthens our Faculty's intensive, collaborative research community, enhances our student education, and responds to Canada's and the world's most pressing concerns. Both activities are equally important and are necessarily linked.

The Divisional Space Review in 2008-2009 determined that our Faculty's space no longer met our needs as a world-class engineering research and education institution. The Faculty has limited access to classroom space for instructional methods other than lecturing or traditional tutorials. Resources to support our space goals come from either external funding – philanthropic and government – or redeployment of operating funds. External granting agencies often have short windows of opportunity to submit infrastructure funding proposals. Some academic units have trust funds built up over time that are dedicated to improving space.

To strengthen our fiscal stability and processes, we reviewed and revised our internal budget allocation model between 2006 and 2009. The Faculty's new budget model includes the concept of attributing revenues and expenses and the principle of transparency. It also gives departments and institutes incentives to manage their budget funding based on their academic priorities to increase revenues and contain costs.

Opportunities exist to release some of the Faculty's operating budget by finding alternative sources for some expenses, such as fully funding PhD and MSc students through research grants and graduate fellowships during the recognized government time-to-completion. Graduate student support is only partially funded by endowments and research grants. A significant portion (36% in 2010) of this expense is currently financed from the operating budget.

The Faculty's renewed fundraising goals serve as an additional source to finance our academic efforts. As we move into the campaign, we will focus on raising funds to support the Faculty's key priorities identified in the Catalogue of Priorities in May 2009. The next stage of this process is to develop the Campaign Case for Support – an articulation of how philanthropic resources will assist faculty and students in our aim to innovate, share and advance engineering knowledge.

The campaign affords opportunities to involve alumni and friends of the Faculty in a manner that will improve available resources to support our Faculty's goals.

Our approach to resource management will be a mix of setting appropriate priorities, transferring costs to alternative sources of funding, building on our collaborations with centrally provided services, and increasing the efficiency of our operations. This will allow us to free up existing resources for redeployment and investment in forward-looking, compelling initiatives.

Goals

We will pursue resource stability by aiming for the following goals, many of which align with goals previously outlined in the Academic Plan. These will impact academic time, physical space and operating budget resources to support our Faculty's priorities for the next five years.

1. Maximize quality academic time and effectiveness by increasing engagement in high-value activities that support students' academic experience, contribute to knowledge-creation, and advance engineering research frontiers.
2. Place emphasis on Engineering's strategic research areas when considering faculty hires.
3. Provide a supportive environment for faculty members through mechanisms such as start-up funding, teaching skills workshops, and assistance via Associate Chairs, Research to create successful research proposals.
4. Improve our chances of being awarded funding for capital projects by pre-planning for various opportunities consistent with our goals and suitable for external funding sources such as CFI, Ontario Ministry of Training, Colleges and Universities (MTCU) and other capital grants. Increase the quality and quantity of space particularly through fundraising for new and revitalized buildings.
5. Enhance teaching and design facilities, upgrade undergraduate laboratory space, and make flexible space available for extra-curricular activities
6. Provide reliable, accessible, effective computing services; create study spaces within and outside computer laboratories, library and classrooms so as to enhance interactive learning and socialization where today's student 'lives'.
7. Encourage timely degree completion among doctoral stream students; increase research funding and graduate fellowships to support graduate students.
8. Establish a strong Case for Support that addresses the Faculty's resource requirements and aligns the Faculty's critical need for improved space in the context of addressing educational and research priorities.
9. Increase long-term philanthropic support by strengthening the culture of advancement within the Faculty.

Closing Thoughts

Engineering's Academic Plan is the first phase of a cycle that builds on our Faculty's rich history and proud traditions of engineering innovation and excellence. With our five-year goals established, we enter Phase Two, planning our actions, establishing timelines and metrics, by which we will measure our progress. The vast majority of our actions will be accomplished collaboratively, across functions, growing from our varied expertise, and involving faculty, staff, students and alumni. This demonstrates the interdisciplinary, team-oriented nature of our community. As an appendix, we include a list of actions and metrics that will be used as a guide towards achieving our goals.

Phase Three will see us continue to measure and critically assess our progress, adjusting our direction or actions as required.

Over the next five years, U of T Engineering will pursue the goals of this Academic Plan with passion and commitment. By focusing on educating future engineering leaders and advancing the research agenda, we will continue to collaborate with the Engineering community to address challenges and work towards solving some of the world's most pressing concerns.