Waterloo Engineering Strategic Plan 2011-2018

Building on Excellence

Progress Report 2014/15

WATERLOO
ENGINEERING

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I. Executive Summary

In November 2010, Waterloo Engineering initiated a comprehensive planning exercise that resulted in the second strategic plan for the Faculty of Engineering. Published in May 2012, *Vision 2015: Building on Excellence* presented a set of goals and strategies aimed at achieving our aspiration to be a truly world-class school of engineering.

With the publication of the University of Waterloo's strategic plan *A Distinguished Past – A Distinctive Future* in 2013, the Faculty of Engineering decided to extend the original Vision 2015 timeline to align with the university. With this report, we have extended our plan to 2018. Over the past year, the Engineering Planning Committee has reviewed and updated our original goals and strategies to ensure they are sufficient to meet our strategic needs to 2018. As a result of that review, some goals and strategies throughout this report have been updated to reflect our extended plan period. And while the Vision 2015 aspiration, key priorities and baseline remain at the foundation of our strategic plan, we have stopped using the Vision 2015 title with this report.

A key element of planning in the Faculty of Engineering is our commitment to an annual assessment of our current status and a progress report on our plan. This annual review process provides an opportunity to critically examine our plans and to make changes in direction if needed. This report is the formal outcome of the third such process for our current strategic plan: Sections III.A - K summarize our progress at the Faculty level and Section III.L includes a summary of each academic unit's progress report. Section IV presents high-level key metrics and performance indicators used to assess our progress, supported further by the detailed data in the appendices.

Over the past year, hiring has been in line with our **faculty and staff** plans. In total, 30 regular faculty positions (19 of which were new positions) and 28 regular staff positions (five of which were new) were filled between May 2, 2014 and May 1, 2015. The extent to which we are slightly below our established complement targets is largely due to positions that have been vacated and are in search. Faculty and staff complements are expected to increase further in the coming years in support of our planned undergraduate program expansion.

In our **undergraduate programs**, we continue to admit students of the highest calibre. Three-quarters of the fall 2014 entering class came to Waterloo with final high school averages over 90%. Fall 2014 also marked a new phase of undergraduate expansion with the launch of a new program in biomedical engineering and expansion of mechatronics engineering to add a second stream, as well as the introduction of an option in entrepreneurship for engineering students. At 7,186 our undergraduate enrolment is at an all-time high, as is the number of women undergraduate students (1,634). Strategies to enhance student success continue to make progress. In the coming years these will be further informed by the work of a first-year task force struck in 2015. Our co-operative education program remains extremely successful, with 7,850 work-term jobs filled in 2014, 1,270 of which were outside Canada.

Student enrolment in our **graduate programs** has remained relatively stable in recent years, with 1,822 students enrolled in fall 2014. Total graduate student intake increased by 2.3% between 2013 and 2014 and we anticipate another increase in fall 2015. From 2013 to 2014, Canadian and permanent resident student intake increased by 9% and research graduate student intake increased by 21%. Focussed efforts over the past year to improve our graduate operations and service have seen significant success: application processing times have been substantially reduced, the engineering graduate studies manual is now updated online, and an Engineering Graduate Operations Committee has been established to help improve communications.

Research funding earned by Faculty of Engineering researchers exceeded our established target in 2014/15, reaching $64.1 million. Funding from NSERC totalled $18.3 million and industry funding exceeded the $10 million mark for the first time ever. Other indicators of research excellence, including research chairs, faculty honours, and bibliometric measures of scholarly output all confirm our strong research performance. Of note in 2014/15, Canada Research Chair allocations to Engineering increased, six professors earned Early Researcher Awards, one faculty member was inducted to the Royal Society of Canada, and two others were named inaugural members of the Royal Society of Canada's College of New Scholars, Artists and Scientists. In 2015, Waterloo was ranked among the top 50 engineering schools in the world by the Academic Ranking of World Universities (Shanghai Ranking) and by *US News & World Report*.

September 2014 saw the successful launch of our innovative new undergraduate learning environment, the Engineering Ideas Clinic™, which has already grown to offer 15 activities for students across engineering programs. Our **teaching** portfolio, established as a Vision 2015 priority, continues to build a strong foundation of programming and to make strategic adjustments based on experience over the portfolio's first two years of operation. In 2014, engineering instructor participation in teaching development opportunities increased substantially over the previous year, significant enhancements were piloted for our annual TA training workshop, and further improvements were

made to the student course evaluation process. A priority for the coming year will be laying the foundation for a smooth transition to the university's new student course evaluation process, once implemented.

We continue to meet our established targets for **outreach** activities, reflecting our commitment to offering programming that meets the needs of schools and students. In the past year we have planned changes to our high school leadership program and have introduced more programming focused on software engineering. The impact of our women in engineering programming is reflected in increasing numbers of women students and faculty, perhaps most notably in the first-year class where the number of female students admitted has more than doubled in the past eight years, reaching a record high of 500 in fall 2014. We anticipate that the University of Waterloo's participation in the United Nations Women's HeForShe campaign will have additional positive impact on our efforts to increase the participation of women at all levels in the Faculty of Engineering.

Our **internationalization** plan has been significantly developed and refined over the past year under the leadership of our first associate dean, international. The Engineering International Office has been established and fully staffed, including transition of the existing international exchange operation to this new office. Significant effort has been invested to increase engineering student participation in international exchange, to develop effective support initiatives for international students that are complementary to existing programs on campus, and to enhance international graduate studies and research relationships. In the coming year a Faculty International Affairs Committee will be established to facilitate communication across the Faculty on all matters related to international programs and internationalization.

Our commitment to enhance the support we provide for **entrepreneurship** and innovation remains a central priority for the Faculty. In addition to continuing its existing suite of successful programs, the Conrad Business, Entrepreneurship and Technology Centre launched an entrepreneurship option for engineering students in fall 2014. In 2014/15, the second annual Normal Esch Entrepreneurial Awards for Capstone Design awarded $60,000 to engineering students and an additional $52,710 was distributed to 18 teams through the Engineer of the Future Trust. Thanks to a lead gift of $100,000, the Engineer of the Future Endowment was established to ensure this program exists in perpetuity.

Of course our strategic plan cannot be successfully implemented without the required resources. The Engineering Computing office continues to meet our **information technology** goals of maintaining a quality computing environment and providing excellent computing support, and is introducing new projects to improve operational efficiency every year. Our **advancement** team launched the public phase of the Educating the Engineer of the Future campaign in April 2015 with a goal of $70 million aimed at supporting our strategic priorities. The Faculty's visibility continues to grow nationally and internationally and targeted marketing efforts, including graduate student recruitment, have shown strong results. Our current **space** plan anticipates much-needed increases to our space holdings through the end of our extended strategic plan period, primarily through the acquisition of new campus space in the East Campus 4 building in the coming year and the construction of a new building, Engineering 7, which will break ground on November 12, 2015 to be occupied in 2018.

Overall, this progress report highlights another successful year's progress toward our strategic goals, achieved through the collective efforts of the entire Waterloo Engineering community: students, staff, faculty, alumni and partners. In particular this year, with the diligence shown in extending our existing plans to meet our strategic needs through 2018, this report also reflects a strong ongoing commitment on the part of the Faculty's leadership to continue planning for our future success.

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Aspiration

Waterloo Engineering aspires to be a truly world-class school of engineering. The programs we offer, the students we graduate, and the solutions we develop will be sought after by outstanding students, employers, employees and partners.

Waterloo Engineering will be:

- the top choice of outstanding high school students from Canada and abroad who are seeking a challenging academic program of the highest quality, fully integrated with real-world experience
- in demand by excellent students, both domestic and international, seeking high-calibre graduate education and by working engineers seeking professional upgrading opportunities
- the destination of choice among Canadian and global employers seeking co-op students or graduates at all levels for full-time employment
- sought after by outstanding engineering faculty looking for a rewarding career that supports teaching and research excellence
- the top choice of industry, government and community partners seeking to connect with outstanding researchers, students, entrepreneurs and innovators to solve local, national and global challenges

Key Priorities

- Attracting, engaging, and retaining outstanding people: undergraduate students, graduate students, faculty and staff
- Committing to excellence in academic programs and services
- Undertaking high-impact research, both within and across the disciplines and spanning the theoretical to the practical
- Building connections and promoting collaboration
- Fostering innovation and entrepreneurship
- Providing the world-class facilities required to support excellence in education and research

Waterloo Engineering Today

Table 1: Key Metrics: Current Values and Change from the Strategic Plan Baseline (2010/11)

Key Metric	2014/15	% Change from Base
Faculty	296	9.2%
Staff	220	13.4%
Undergraduate Students (FTE)	5781	15.0%
Undergraduate Students (head count)	7186	13.2%
International Undergraduate Students	883	91.1%
Female Undergraduate Students	1634	36.5%
Undergraduate Degrees Granted	1165	26.9%
Graduate Students (FTE)	1474	-3.7%
Graduate Students (head count)	1822	-1.2%
International Graduate Students	820	31.0%
Female Graduate Students	457	3.6%
Research Graduate Students	1371	9.7%
Graduate Degrees Granted	640	11.7%
PhD Degrees Granted	125	33.0%
Sponsored Research Funds ($Ms)	$64.1	6.2%
Alumni	39,493	19.6%
Main Campus Space Holdings (nasm)	55,613	17.5%
Permanent Recurring Budget ($Ms)	$81.5	26.7%

Table 2: Key Performance Indicators: Current Values and Change from the Strategic Plan Baseline (2010/11)

Key Performance Indicator	2014/15	% Change from Base
Female Faculty/Total Faculty	16.4%	17.1%
Faculty/Staff	1.3	-3.6%
Undergraduate Students/Faculty	19.0	7.3%
International Undergraduates/Total Undergraduates	12.3%	68.5%
Female Undergraduates/Total Undergraduates	22.7%	20.1%
Undergraduate Degrees Granted/Faculty	3.8	8.6%
Graduate Students/Faculty	5.5	-9.8%
Research Graduate Students/Faculty	4.5	0.7%
International Graduate Students/Total Graduate Students	45.0%	32.7%
Female Graduate Students/Total Graduate Students	25.1%	5.0%
Graduate Degrees Granted/Faculty	2.4	4.3%
PhD Degrees Granted/Faculty	0.5	25.0%
Graduate Students/Total Students	20.2%	-12.2%
Sponsored Research Funds/Faculty	$256,119	1.0%
Sponsored Research Funds/Permanent Recurring Budget	0.84	-16.8%
Main Campus Space Holdings/FTE Student (nasm)	8.2	5.2%
Permanent Recurring Budget/FTE Student	$11,244	14.4%

See Appendix V.I for explanatory notes on the data included in the tables above. For further details and an expanded set of metrics and indicators, please refer to Section IV of this report.

Waterloo Engineering in Context

Table 3: Waterloo Engineering in the Institutional Context, 2014/15

Metric	Share of University of Waterloo
Undergraduate Students	23.2%
International Undergraduate Students	20.4%
Female Undergraduate Students	11.6%
Undergraduate Degrees Granted	20.2%
Graduate Students	34.8%
PhD Students	38.4%
International Graduate Students	49.9%
Female Graduate Students	20.8%
Graduate Degrees Granted	31.6%
PhD Degrees Granted	41.3%
Regular Faculty Members	26.4%
Sponsored Research Funds	35.4%
Alumni	22.3%

Table 4: Waterloo Engineering in the Provincial and National Contexts, 2014

Metric	Share of Ontario	Share of Canada
Undergraduate Students	15.5%	6.9%
International Undergraduate Students	13.0%	5.5%
Female Undergraduate Students	16.0%	7.3%
Undergraduate Degrees Granted	18.6%	8.0%
Graduate Students	16.0%	6.5%
PhD Students	19.9%	7.6%
International Graduate Students	24.4%	7.2%
Female Graduate Students	15.1%	6.0%
Graduate Degrees Granted	17.8%	8.3%
PhD Degrees Granted	24.0%	9.0%
Total Faculty	16.1%	6.3%
Female Faculty	17.7%	7.3%

Table 5: University of Waterloo in International University Rankings of the Engineering Discipline, 2015

Ranking Agency	World Rank	Canadian Rank
Academic Ranking of World Universities (Shanghai Rankings)	47	2
QS World University Rankings	74	4
Taiwan Rankings	60	2
Times Higher Education World University Rankings[1]	68	4
US News and World Report Best Global Universities	47	2

In addition to the University of Waterloo's excellent standing in the major global university rankings specific to the engineering discipline (summarized above in Table 5), we have been recognized in global rankings of entrepreneurial excellence as well. The 2015/16 Pitchbook Universities Report ranked the University of Waterloo as the top Canadian university (21st in the world) for producing VC-backed undergraduate student entrepreneurs. The same report ranked Waterloo seventh in the world for producing undergraduate founders of unicorns (companies that have achieved private valuation of $1 billion or more).

[1] Times Higher Education rankings provided are from 2014 because the 2015 rankings were not yet released at the time of publication.

II. Alignment with the University of Waterloo Strategic Plan

The University of Waterloo published its strategic plan *A Distinguished Past – A Distinctive Future* in fall 2013. The Waterloo Engineering strategic plan aspiration, key priorities, goals and strategies are entirely consistent with the directions set out in the University of Waterloo strategic plan. Table 6 below summarizes how the Waterloo Engineering strategic plan goals, summarized on page 7 of this report, align with the University of Waterloo strategic plan goals.

With this report, Waterloo Engineering completes the extension of our strategic plan to 2018 to align with the University of Waterloo strategic plan. Over the past year, the Engineering Planning Committee has reviewed and updated our original goals and strategies to ensure they are sufficient to meet our strategic needs to 2018.The Vision 2015 aspiration, key priorities and baseline remain at the foundation of this extended strategic plan; however, some goals and strategies throughout this report have been updated or added to reflect our extended plan period.

Table 6: Alignment of Waterloo Engineering and University of Waterloo Strategic Plan Goals

University of Waterloo Strategic Plan Goal	**Supporting Waterloo Engineering Strategic Plan Goals**
Experiential education for all	B6, B7, B8, I2
Uniquely entrepreneurial university	H1, H2, H3, I2
Transformational research	A1, A7, D1, D2, D3, D4, D5, G4
Outstanding academic programming	A1, A7, B1, B2, B3, B5, B9, C1, C3, E1, E2, E3, E4, G1, G3, G4, H1, I2, J1
Global prominence & internationalization	G1, G2, G3, G4
Vibrant student experience	A1, A2, A3, B4, B5, C2, C4, F2, G3, H2, I2, I3, J1, J2, J3
Robust employer-employee relationship	A1, A2, A3, A4, A5, A6, D4, E2, F2, I2, I3, J1, J2, J3
Sound value system	F1, F2, F3, F4

III. Strategic Plan Progress Report

A. Faculty and Staff

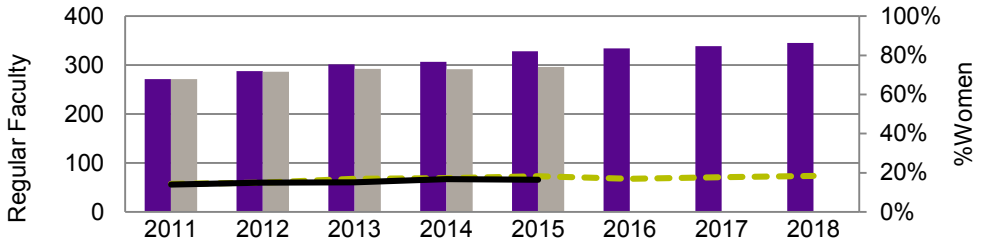
Over the course of this plan period, our regular faculty complement has grown by 9% and our staff complement has grown by 13%. Section IV. presents further information on our growth over the past 10 years along with a selection of other data about our faculty and staff.

We continue to make good progress on our strategic faculty and staff goals, though we remain below faculty and staff complement targets due to vacancies stemming from resignations and retirements. Hiring will continue to remain a priority through the extended plan period as we fill the new positions created in support of our new biomedical engineering program and the expansion of the mechatronics program, both of which were launched in fall 2014.

Goal A1: Increase the Faculty Complement Strategically

- As of May 1, 2015 our faculty complement was 90% of target. A number of new positions were filled during 2014/2015 but have start dates after May 1 so don't yet appear in the actual FTE counts in Figure 1 below.

Figure 1: Faculty Complement Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target Total	271.4	287.4	301.4	306.4	328.4	334.4	338.4	345.4
Actual Total	271.3	286.3	292.3	291.9	296.3			
Target % Women	14.4%	15.0%	16.9%	17.2%	18.2%	16.9%	17.8%	18.4%
Actual % Women	14.0%	15.0%	15.1%	16.8%	16.4%			

Fill all open faculty positions and establish new positions in strategic areas

- In 2014/2015, 30 regular faculty positions were filled and 10 positions were vacated due to retirements, resignations or the end of contracts. Of the positions filled, 19 were new and 11 were replacements. Of these 30 positions, 13 have start dates after May 1, 2015 and are therefore not reflected in Figure 1 above. Because the May 1, 2015 count is a full-time equivalent count, it also reflects temporary or continuing workload reductions (for example, when a faculty member chooses to reduce his or her workload in the years leading up to retirement).
- This year, our reported actual faculty complement has been reduced slightly due to a change in definition: as of 2014/2015, short-term definite term lecturer appointments (those with contracts lasting less than 2 years) are no longer included in our regular faculty counts.
- The following were the most active hiring areas for 2014/2015:

outcomes-based accreditation	→	6 lecturer positions
biomedical engineering program	→	2 TTS positions, 1 lecturer position
mechatronics engineering expansion	→	1 TTS position, 2 lecturer positions
entrepreneurship option	→	1 TTS position, 2 lecturer positons

- On May 1, 2015 there were 12 faculty searches in progress (six replacements and six new positons).
- The proportion of female faculty members dropped to 16.4% in 2014/2015, almost 2% below target. Due to year-to-year variances in the hiring plans related to our undergraduate expansion, our targeted proportion of women faculty decreases slightly in the next two years then increases to our highest target yet by the end of this plan period.
- In support of the university's commitment to increase the representation of female faculty through the United Nations HeforShe campaign, we will enhance our existing efforts to identify, recruit and retain excellent women faculty candidates. Details on these efforts are provided in Goal F3 of this report.

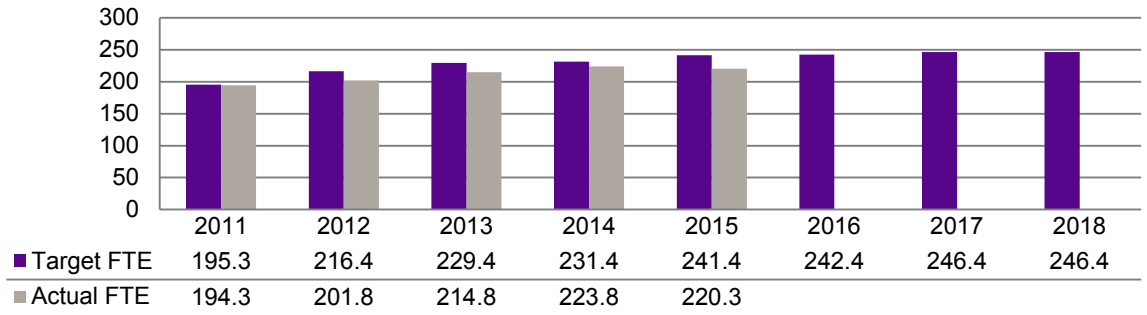
Recruit and hire outstanding faculty

- Faculty hiring will continue to remain an important focus for the Faculty of Engineering with the launch of the new biomedical engineering program and the expansion of the mechatronics engineering program. Additional hires are also expected in the upcoming years to fill positions vacated through retirements, given that 33% of our current faculty members are 55 years old or older (see Figure 85).
- We continue to commit to investing the time required to hire an excellent candidate for every faculty opening, as evidenced by the increasing diversity in the schools where our faculty members have earned their PhDs (see Figure 83).
- In 2014/2015 a number of new faculty hiring procedures were put in place to ensure compliance with changes to the federal government's temporary foreign worker program. Despite the increased stringency, our proportion of faculty members with PhDs from international schools increased by 5% in the past year.

Goal A2: Increase the Staff Complement to Appropriate Levels

- Our staff target increased by 10 positions in 2014/2015 due in large part to our undergraduate expansion and the addition of four accreditation assistant roles added to address new requirements for outcomes-based assessment (see Goal B9).
- As of May 1, 2015 our staff complement was at 91% of target. Of note, a number of the new positions added to our target in 2014/15 were in search but not yet filled on May 1. This slight underperformance on target also reflects positions vacated (due to retirements and resignations) that had not yet been replaced on May 1.

Figure 2: Staff Complement Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target FTE	195.3	216.4	229.4	231.4	241.4	242.4	246.4	246.4
Actual FTE	194.3	201.8	214.8	223.8	220.3			

Add staff positions at appropriate levels to manage workload and support strategic initiatives

- In 2014/2015, 28 regular staff positions were filled. Five of these positions were new and 23 were replacements. On May 1, three replacement positions were open but not filled.
- The following were the most active hiring areas for new positions 2014/2015:

strategic plan staff positions	→	3 positions
undergraduate expansion	→	2 positions

Facilitate reorganization for increased capacity, improved efficiency and enhanced service

- The revised senior administrative staff structure in the Dean of Engineering Office, established in response to an operational effectiveness and efficiency project, was rolled out in 2014/15.
- Over the past year the Engineering Graduate Studies Office has increased its staff complement by one position and reorganized responsibilities for improved workflow and more balanced workloads.

Goal A3: Establish a Culture of Service Excellence

Provide staff development opportunities related to client service

- This year's staff conference, run annually by the university's Organizational and Human Development (OHD) Office, included a keynote address on the "Magic of Exceptional Customer Service" at Disney. Sixty-two Engineering staff members attended the staff conference in 2015.
- Eight Waterloo Engineering staff members completed the "Exceptional Service" course through OHD.

Recognize and reward excellence in client service

- With a full-time executive officer now in place, there will be the opportunity in 2015/16 to discuss with the Dean's Staff Advisory Committee other mechanisms for recognizing excellent customer service.

Share best practices in client service among the faculty's various units

- In response to a recent survey of the administrative officers from each academic unit, more opportunity to share best practices or approaches to common tasks will be incorporated into future meetings of this group.

Goal A4: Improve Internal Communications

Establish an internal communications framework and tools to best meet faculty and staff needs

- In 2014/2015 the communications team in our advancement office continued to engage others with communication roles across the Faculty through the Engineering Communications Council and other venues to make sure our messaging is strategic and consistent and reaches our internal and external audiences.
- For 2015/2016 the communication team is planning to conduct an internal communications analysis to determine a more effective process to keep faculty and staff informed.

Goal A5: Recognize and Promote Faculty and Staff Excellence

Increase nominations to internal and external awards and honours

- Regularized efforts by the Engineering Awards and Honours Committee, supported by a staff writer, continue to result in many prestigious awards for our faculty members. These are reflected in the research section of this report (highlighting prestigious awards earned up to May 1, 2015) and in Table 6 of Appendix V.A (summarizing major awards earned throughout 2014).
- This year, the recipients of the 2013/2014 staff excellence awards were announced at the staff and faculty awards dinner held in January. In keeping with this timing moving forward, the recipients of the 2014/2015 staff excellence awards will be determined this fall and announced at the awards dinner in winter 2016.

Establish additional awards within Waterloo Engineering

- The Engineering Graduate Studies Office plans to develop and implement an award for graduate supervision in the coming year.

Goal A6: Support the Career-Long Development of Faculty and Staff

Identify and promote development opportunities for faculty and staff

- Staff in the Faculty of Engineering registered for 178 courses through OHD in 2014/2015.
    - The largest enrollment was for courses in OHD's Inclusivity series (67 registrations): 20 staff members completed the first course in the series while 7 staff members completed the capstone course to earn the program certificate.
    - Other well-attended courses include Principles of Leadership, which is now offered to all new Waterloo employees, as well as Integrity Matters and Personality Dimensions.

Identify and cultivate future leaders

- There will be three chair searches in 2015/2016. It is expected that these exercises will provide some learnings that can be leveraged in the identification and recruitment of future leaders.

Goal A7: Fully Engage All Faculty Members

Promote a holistic and integrated view of teaching and research

- In response to discussions at our June 2015 planning retreat, a plan is in place for 2015/16 to build an aggregated workload dataset based on data captured during the faculty merit process, which could then be used to guide further discussions about a framework for responsive workload distribution.

B. Undergraduate Studies

Professor Peter Douglas began a three-year term as associate dean, undergraduate studies on July 1, 2015. Professor Douglas succeeds Professor Wayne Loucks at the end of a 17-year term of outstanding service to the Faculty of Engineering and its undergraduate students.

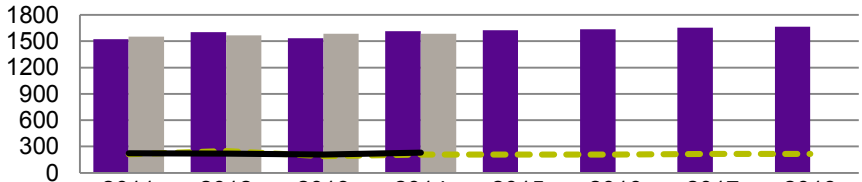
Over this plan period to date, our undergraduate enrolment has increased by 13% to a record total of 7,186 students as of November 1, 2014. Over the same time frame, the number of female students enrolled has increased by 37% to reach 1,634. Even with this significant increase in enrolment, the quality of our entering classes remains exceptionally high. Figure 99 depicts a steady increase over the past eight years in the proportion of undergraduate students who enter Waterloo Engineering with incoming final high school averages over 90%, to reach three-quarters of the entering class in fall 2014. This provides a clear affirmation that we continue to admit a strong cohort of excellent undergraduate students each year, which in fall 2014 included our first cohort of biomedical engineering students and the first year of the multi-year mechatronics engineering expansion. Section IV.B of this report provides further measures and key indicators about our undergraduate students and programs.

As recommended in last year's progress report, a new first-year task force was struck in 2015. The work of this group, along with other initiatives related to student success, services and communications will be key areas for focus in the coming year.

Goal B1: Make Moderate and Strategic Increases to Undergraduate Intake Targets

- With the extension of our strategic plan to 2018, this goal has been updated to reflect our plan to strategically expand our undergraduate capacity in high-demand interdisciplinary program areas.
- As seen in Figure 3, we exceeded our international student target and reached 98% of our overall intake target for 2014. This very small shortfall does not reflect any challenges with our application pool, which continues to grow in size and quality. Rather, such small variances above and below target typically result from normal minor fluctuations in student confirmation rates from year to year.
- The international student target decline from 2012 to 2013 resulted from the closure of Waterloo's campus in Dubai. The gradual growth from 2013 to 2018 reflects the international student proportion of our planned growth in the biomedical and mechatronics engineering programs.

Figure 3: Undergraduate Intake Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target	1522	1603	1534	1616	1626	1636	1656	1666
Actual	1552	1567	1584	1586				
Target Int'l	211	250	191	208	210	210	215	217
Actual Int'l	222	218	208	230				

Expand high-demand interdisciplinary undergraduate education

- Our new program in biomedical engineering launched in fall 2014 with extremely strong applicant response, both in terms of numbers and quality, placing it as our most competitive program.
- Fall 2014 was the first in a multi-year expansion of mechatronics engineering, and even with the additional spaces resulting from this expansion, applicant numbers to the program increased significantly such that it remained one of the top three competitive programs for admission.

Enhance the international student applicant pool

- As described in the internationalization section of this plan (see Goal G2) we will continue to strategically focus our international undergraduate student recruiting efforts.

Review and revise mechanisms to identify the best possible future students from our strong applicant pool

- The Admissions Information Form scoring rubric has been updated to emphasize four general attributes: sense of purpose, commitment and engagement, employability, and excellence.

Goal B2: Enhance the Undergraduate Academic Program

Redesign and modernize the lab experience

- Since launching in October 2014, the mechanical & mechatronics engineering (MME) clinic has developed a scalable model for delivery of hands-on activities for MME students, focused on small numbers of students at one time (15-20) with close contact from course teaching assistants, clinic staff, and co-op students. Students explore open-ended tasks including hardware exploration activities and maker-space prototyping for designs. Detailed descriptions of MME clinic experiences are provided in the department's report (see Section III.0).
- Systems design engineering has introduced an undergraduate lab kit with digital and analogue components, designed around an Arduino microcontroller system, with the goal of having course labs and projects consistently built around this framework.
- As detailed in Goal E4, the Engineering Ideas Clinic™ committee continues to develop hands-on projects for all first-year students.

Ensure a modern, high-quality learning environment

- In 2014/15, $1.65M was invested to improve undergraduate student lab equipment and environments in Engineering through the Vision 2015 Undergraduate Lab Enhancement Initiative. To date, total investments to improve undergraduate learning facilities during this plan period total over $7M.
- In 2014/15, additional student workshop facilities were established in space allocated to the Faculty of Engineering in East Campus Hall, which is very conveniently located near Engineering 5 and the future site of Engineering 7.

Introduce a unique learning environment to Waterloo Engineering

- Progress continues to be made toward full implementation of the Engineering Ideas Clinic™ across all undergraduate programs (see Goal E4).

Goal B3: Support the Retention of Undergraduate Students

Enhance first-year student success

- A new first-year taskforce has been established to assess current opportunities and challenges. The taskforce, including members from each engineering department and the engineering undergraduate, first-year and admissions offices, held its first meeting in July 2015. The taskforce mandate includes review of outstanding items from the *Engineering Education for Enduring Success* report as well as consideration of various issues identified in our strategic plan and previous progress reports such as student loading in first year and resource use in first-year programs.
- A reduced-load program has been introduced for students struggling academically in 1A and a spring make-up term has been established to support the students who opt to use this program. We anticipate a more detailed analysis of the reduced-load program as an outcome from the new first-year taskforce. Enhancements will be considered to increase the reach of the make-up term to single-stream programs.
- The university skills course (GENE 101) has been delivered by our First Year Office and the university's Student Success Office each spring term since 2010. Ongoing development may be needed to increase its reach to all programs.
- A tutor centre has been successfully established by the First Year Office to provide academic support to more first-year students. Continued effort to improve usage may be needed.
- The Faculty of Engineering's engagement with the English language competency initiative at the university level is under development.
- To support first-year students at the department level, management sciences has established a teaching and undergraduate student liaison officer and electrical & computer engineering has hired a second lecturer to support its 1A retention initiatives.

Support student success at all levels

- The new associate dean is continuing to build on efforts between the Engineering Undergraduate Office and the university's Student Success Office to establish an effective collaborative working relationship.
- Civil & environmental engineering has completed a comprehensive curriculum and course content review that included goals to improve student engagement and success and to provide better integration with course material from first to second year and beyond. The new curricula for all three of the department's programs, including a number of new courses and revision of numerous existing courses, are being implemented starting with the first-year class in September 2015.
- Beginning in winter 2014, electrical & computer engineering has introduced regular town hall meetings with upper-year students. These meetings have already provided excellent feedback that will trigger a round of curriculum revisions.
- Progress continues to be made toward establishing measures of undergraduate student retention that are accurate, timely and sufficiently detailed to support action-planning at the faculty, department and program level. Efforts over the past year have focused on reviewing and testing data tools being developed by Institutional Analysis and Planning.

Goal B4: Improve the Undergraduate Student Experience

Improve service and communications

- Service-improvement initiatives completed to date include extending the Engineering Undergraduate Office hours to provide service over the lunch hour and establishing generic email addresses tailored to specific student needs for more efficient and timely response to student questions. It remains a priority to establish public service standards for the office's main functions.
- Work is ongoing with the Registrar's Office to source the information required to improve student access to data such as rankings and course averages. The associate dean will work with engineering computing staff to provide secure student access to the data, once available.
- Possible mechanisms to improve and strengthen communications with undergraduate students, including consideration of potential opportunities in the University of Waterloo Student Portal and through social media, are under consideration.
- An Advisor Committee has been established to enhance support for student advisors in our departments.

Develop an annual student engagement survey

- The Faculty of Engineering undergraduate student engagement survey was last run in June-July 2014. 514 responses were received, with responses from every program. Further work is required to review ongoing undergraduate student surveys at the faculty and department level and to determine if any co-ordination or collaboration is possible related to survey administration or analysis.

Enhance first-year student transition experience

- The student relations officer (SRO), serving as the orientation advisor for engineering and architecture, through consultation with the Orientation Advising Team, Student Success Office and Federation of Students, reviews orientation programming to ensure the needs of our incoming class are met and the principles of orientation are supported by our events and student leaders. The upcoming Senate decision regarding the implementation of a fall reading break will impact orientation planning and provide an opportunity to evaluate existing programming and content.
- In the coming year, a priority for the SRO will be contribution to the evaluation of the Engineering 101 summer transition program for first-year engineering students and their families.

Provide support for students engaged in campus life and co-curricular experiences

- The SRO acts as liaison between the Dean of Engineering and the student body, working closely with student leadership groups including the Engineering Society and the Engineering Federation Orientation Committee.
- In 2014/15, $165,000 was allocated by the Dean of Engineering Office, through a formal adjudication process, to support engineering student design teams and to sponsor other undergraduate co-curricular initiatives.

Goal B5: Improve Undergraduate Studies Operations and Processes

Develop enhanced opportunities for undergraduate students

- The Conrad Business, Entrepreneurship and Technology Centre launched an option in entrepreneurship for engineering students in fall 2014.
- A mechanism has been developed to facilitate interdisciplinary fourth-year design projects, and the new course (GENE 403) was offered for the first time in spring 2014. Further work is required to facilitate co-ordination between the collaborating departments' capstone courses and design symposia.
- Work toward the development of increased flexibility in promotion rules, including creation of partial load promotion rules, is ongoing.
- To focus further efforts to broaden and deepen our academic degrees, the options taskforce has developed a survey of undergraduate students to be run in fall 2015 with potential for a follow-up survey in winter 2015.

Enhance undergraduate processes

- The decentralization of work term reports has been approved at the calendar level and awaits departmental changes and calendar submissions. The associate dean will work with the Faculty Operations Committee to determine if other program aspects might be appropriate to decentralize in order to move forward effectively.
- The associate dean is working with staff in the Engineering Undergraduate Office and members of the Engineering Undergraduate Advisors Committee to identify processes or systems requiring labour-intensive tasks that might be simplified. Two items have already been identified for further review.
- It remains a priority for the coming year to examine the processes and committees within the Faculty with an aim to foster a stronger team-oriented environment.

Co-operative Education

This report marks the final report by Professor Wayne Parker, who has accomplished a great deal for the Faculty over two terms as associate dean, co-operative education and professional affairs. His successor, Professor Christine Moresoli, began a three-year term as associate dean on September 1, 2015.

The co-op program continues to be a highly successful defining feature of Waterloo Engineering and employment rates continue to be high. This success can be partially attributed to growth in the number of international jobs. Continued efforts are required to develop jobs for first work term students and to accommodate growth in the Faculty due to the introduction of biomedical engineering and the expansion of mechatronics engineering. The WatPD-Engineering program continues to have high completion rates and receive positive evaluations by students.

Goal B6: Increase the Number of Co-op Jobs

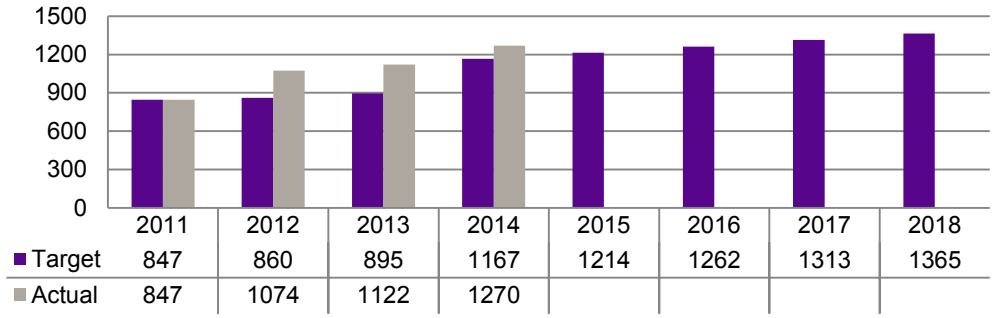
Implement a program-focused initiative to assist in job development

- Co-operative Education and Career Action (CECA) has identified programs that have a low job-to-student ratio. A target number of new jobs has been identified for these programs and employer relations staff are being directed to prioritize these programs.

Develop additional international work term opportunities

- As shown in Figure 4, the number of international jobs exceeded our target in 2014 for the third consecutive year. Targets for the remaining years of the extended plan period were revised upwards last year.
- The majority of new international jobs developed were in the United States. Efforts to develop jobs outside North America continue but these initiatives have proven to be challenging.

Figure 4: International Co-op Work Terms Performance to Target



Goal B7: Provide Unemployed First Work Term Students a Meaningful Experience

Develop a program to enhance the employability of unemployed first work term students during their next work term

- The Bridging Entrepreneurs to Students (BETS) program was delivered in spring 2014 and winter 2015, with a total of 38 students from 10 different engineering programs participating between the two terms.
- Participating students receive one week of workplace skills training and then work in three five-week placements with startups in the Waterloo Region and the Greater Toronto Area.

Goal B8: Support the Successful Implementation of WatPD-Engineering

Ensure sufficient selection of current WatPD courses for engineering students

- Currently, there are nine elective WatPD courses including one WatPD-Engineering course (PD22) on Professionalism and Ethics in Engineering Practice, which aims to prepare students for Professional Engineers Ontario's Professional Practice Exam. Enrolment in PD22, relatively low in the past, has increased as a result of increased promotion to engineering undergraduates by WatPD staff. PD10 (Professional Responsibility in Computing), aimed at software engineering students but open to all engineering students, was offered for the first time in winter 2015 with broad uptake from all engineering departments. PD20 (Developing Reasoned Conclusions), one of the two core WatPD-Engineering courses, underwent redevelopment as part of WatPD's regular renewal cycle and PD21 (Developing Effective Plans), the second core WatPD-Engineering courses, has recently started its redevelopment and revitalization.
- Current satisfaction levels with WatPD electives has reduced the need for engineering-specific electives; however, the WatPD-Engineering Curriculum Committee, which meets on average once per term, works to ensure that we do not miss any specific professional development opportunities for our engineering students.

Establish a framework to assess the WatPD-Engineering program's effectiveness

- Current assessment practices for WatPD-Engineering include pre- and post-test scores, end-of-course surveys, grades, and pass rates. These metrics are reviewed internally within WatPD and with the WatPD-Engineering Curriculum Committee and are routinely presented at the annual Engineering Faculty Assembly.
- WatPD recently created a new associate director, improvement position responsible for managing the WatPD program evaluation process and overseeing WatPD program enhancement projects.

Accreditation

The Faculty continues to develop an outcomes-based process for program improvement, which is mandated by the Canadian Engineering Accreditation Board (CEAB). Six lecturer positions and four administrative staff have been provided to support the outcomes assessment process. A recent pilot project sought to address the assessment of the life-long learning outcome within the co-op context.

Goal B9: Ensure the Ongoing Accreditation of all Engineering Programs

Implement a system of outcomes assessment for all programs

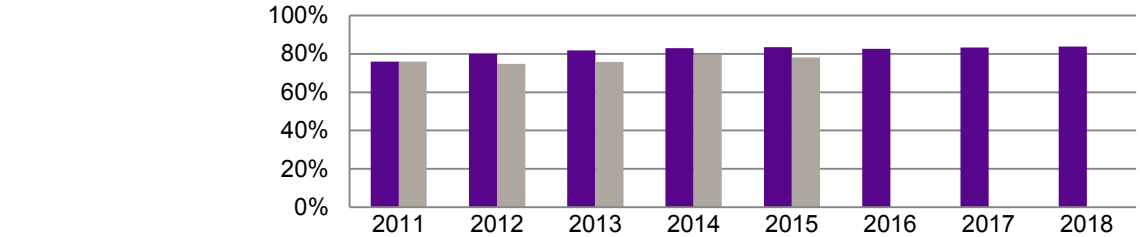
- All 12 programs continue to develop their outcomes assessment process. A set of guidelines for conducting assessments and reporting was partially successful, with eight programs submitting annual reports.
- Additional resources in the form of six lecturer positions and four administrative staff have been provided by the university, faculty and departments to support the outcomes assessment process.

- A pilot project that addressed the assessment of the life-long learning outcome within the co-op context was led by the associate dean with support from the chemical and mechanical engineering programs, CECA and the Centre for Teaching Excellence. A survey was sent to students and employers in winter 2015; however, the completion rate was deemed to be unsatisfactory. The use of on-campus surveys and work term reports as assessment tools is being evaluated.

Increase the proportion of eligible faculty members who are licensed professional engineers

- The fraction of faculty who are either registered or have applied for professional registration decreased over the past year, increasing the gap between the actual and target values shown in Figure 5. This decline can be attributed to the departure of some registered faculty and the hiring of new faculty who are not yet registered. Efforts to encourage faculty to register continue.
- Modifications to the limited licence in Ontario are being monitored, as they may impact our future registration success.

Figure 5: Regular Faculty PEng Status Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target % Registered&Applied	76.0%	79.9%	81.7%	83.0%	83.5%	82.7%	83.2%	83.8%
Actual % Registered&Applied	76.0%	74.7%	75.7%	79.7%	78.0%			

C. Graduate Studies

Over this plan period to date, our total enrolment of graduate students has remained quite stable while the enrolment of research graduate students (that is, excluding those pursuing a professional master's degree) has increased by 10%. The share of graduate students who are international has increased by 33%. Between 2013 and 2014, total graduate intake increased by 2% and the intake of Canadian and permanent resident (CPR) students increased by 9%. Details on these and many other graduate student metrics are presented in Section IV.C of this report.

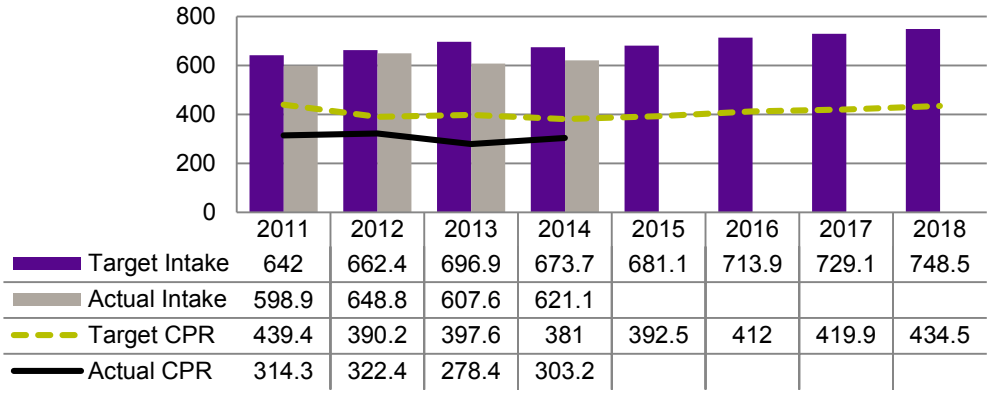
Focussed efforts over the past year to improve our graduate operations and service have seen significant success. Application processing times have been substantially reduced, the engineering graduate studies manual content has been revised and made available online, and a new Engineering Graduate Operations Committee has been established to help improve communications and dialogue. Early experience suggests that the Domestic Doctoral Student Award, introduced in winter 2015 to help increase the enrolment of top domestic PhD students, is having a positive effect.

Goal C1: Strategically Increase Graduate Enrolment

- In 2014 total graduate student (FTE) intake increased by 2.2% and CPR graduate intake increased by 8.9% relative to 2013. However, this still fell below target (92% of target overall but only 80% of CPR target).
- The intake performance to target varied by program type: the research master met target while the professional master reached only 83% of target and the PhD achieved 93% of target. Intake into doctoral and research master's programs increased by 7% and 31% respectively over the previous year. Intake into professional master's programs declined by 28%.
- Though final intake numbers are not yet available, preliminary numbers for the fall 2015 admission cycle indicate that applications, offers, and offers accepted are all higher than they were in fall 2014.
- There are likely a number of factors that help to explain our current intake performance:
    - Job action by Government of Canada staff working on visa and immigration processing during this past year delayed the provision of visas for a number of international applicants. These students were either delayed in starting their programs or chose not to come to Waterloo.
    - The implementation of the Engineering Domestic Doctoral Student Award for new students beginning in winter 2015 appears to be having a positive effect on domestic doctoral student enrolment.

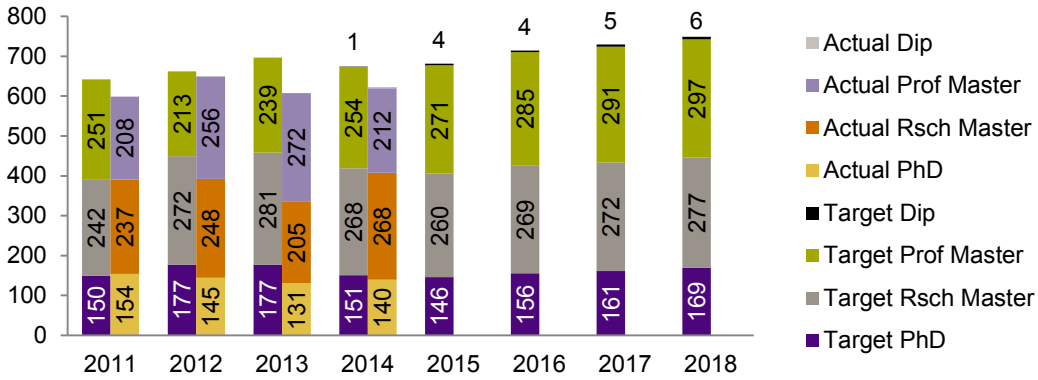
- Our enhanced recruitment initiatives and continued focus on domestic research students appears to be resulting in increased graduate student intake.
- It is clear that increased efforts must be made to enhance our professional master's programs.

Figure 6: Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	642	662.4	696.9	673.7	681.1	713.9	729.1	748.5
Actual Intake	598.9	648.8	607.6	621.1				
Target CPR	439.4	390.2	397.6	381	392.5	412	419.9	434.5
Actual CPR	314.3	322.4	278.4	303.2				

Figure 7: Graduate Intake Plan Performance to Target by Program Type



Introduce new graduate programs in areas of strength

- The anticipated introduction of a professional master in mechatronics engineering has not yet occurred. The Department of Mechanical and Mechatronics Engineering continues to work to secure final agreement on the program structure and associated financial plan from all participating units.
- Given the high application levels for the new biomedical engineering undergraduate program and the strong interest for a corresponding graduate program expressed by potential applicants at various graduate recruiting events, there appears to be an opportunity to develop a new collaborative graduate program in this area.

Enhance the professional master's program

- Management sciences has developed a diploma in data analytics, which is currently entering the Faculty of Engineering approval process.
- Going forward, it is recommended that academic units review their professional master's programs with consideration to making course scheduling and program features (e.g. diplomas, course availability) more attractive to part-time students.

Develop and implement a strategic recruitment plan for graduate studies

- The Graduate Recruitment Working Group, comprised of staff and faculty representatives from each department, was initiated in fall 2014 and has been meeting monthly to develop, implement, and co-ordinate recruitment activities across the Faculty of Engineering.

- The Engineering Domestic Doctoral Student Award was introduced for new domestic doctoral students admitted beginning in the winter 2015 term, providing $8,500/year for eligible students to reduce the financial burden on faculty members to support domestic doctoral students. Reports from departments and preliminary fall 2015 admissions data suggest that the award is successfully achieving the goal of increasing the number of domestic doctoral students.
- Recent changes made to the way in which NSERC Undergraduate Student Research Awards are made available to students has significantly improved their use in the Faculty of Engineering. Additional monitoring is necessary to determine how effective these awards are at engaging undergraduate students in research and subsequently attracting them to graduate studies.
- In 2014/15 the Engineering Graduate Studies Office (EGSO) implemented a customer relationship management system. The graduate recruitment officer will continue to work with the EGSO to explore how to best use this system and the data it provides to develop and implement targeted communication strategies to encourage applications from qualified prospective students.

Explore the opportunity to incorporate co-op into new or existing graduate programs

- As competition increases for high quality graduate students, in particular domestic students, we must improve the attractiveness of our graduate programs. One potential way to do this is to leverage Waterloo's renowned co-op brand, experience, and infrastructure and incorporate this into a subset of our graduate programs. Over the next year the EGSO will lead discussions to explore the potential of expanding co-op into one or more graduate programs in a more effective manner.

Evaluate opportunities to increase the number of direct admissions to PhD programs

- Though present polices and regulations permit direct entry to the PhD program, this occurs very infrequently within the Faculty of Engineering. We will explore the opportunities and challenges associated with changing existing practice within the Faculty with the goal of making a decision in time for the fall 2016 admission cycle.

Goal C2: Improve Graduate Operations and Service

Provide excellent service to all clients

- Significant staffing changes occurred in the EGSO during 2014/15. The manager position was filled in summer 2014, a new staff position was created and filled in spring 2015, and a vacancy resulting from a staff member secondment was filled. The EGSO then reorganized its duties and responsibilities, resulting in improved workflow, more balanced workloads and more timely completion of tasks.

Improve the quality and delivery of information

- The engineering graduate studies manual has been replaced with updated information on the EGSO website.
- Existing forms and workflows are under review. A number of forms have been revised to make them more user friendly, to reduce workload, and to be available in appropriate electronic formats.
- The EGSO is increasing the use of SharePoint as a means of providing information to departments rather than relying on emails.
- The EGSO has focussed on communicating with stakeholders more effectively by providing clear instructions, firm deadlines, and sufficient lead times. For example, one strategy already implemented has substantially reduced the number of requests to drop or add a course after the deadline.

Ensure timely processing of applications and admission correspondence

- This has been an area of focus over this past year and significant progress has been made for the fall 2015 admission cycle. Despite an increase (of approximately 3%) in the number of applications received, a much larger fraction of these applications were processed earlier than in the previous year: approximately 85% of applications were processed by June 1, 2015 compared to only 15% processed by that date the year prior.
- The EGSO, along with the graduate recruitment officer, have worked with departments to provide effective and consistent communications for offer letters and related correspondence.

Develop an effective and efficient strategy for managing cases of academic discipline and grievances

- Because discussions are underway at the university level to consider a different model for handling these cases, efforts within the Faculty are on hold pending any university-level changes.

Goal C3: Improve the Graduate Program

Foster consistently high quality graduate student supervision

- Recent revisions to university regulations concerning Approved Doctoral Dissertation Supervisors have resulted in the development of a series of workshops related to graduate supervision at Waterloo conducted by the university's Graduate Studies Office and Centre for Extended Learning. All new faculty will have the opportunity to attend these workshops, which should provide an effective and efficient way for new faculty to understand Waterloo policies relative to graduate supervision and to learn ways of providing high quality supervision. The first offering of these workshops is scheduled for October 2015.
- The EGSO will review the content of these new workshops to determine what additional Faculty-specific information is needed. This information will be provided, along with Faculty-specific regulations and practices, to all faculty through the EGSO SharePoint site. The goal is to have this completed by end of summer 2016.
- To recognize our excellent supervisors, a Waterloo Engineering Award of Excellence in Graduate Student Supervision will be implemented by the end of summer 2016.

Improve graduate course offerings

- Most departments report that the number of graduate courses offered has remained relatively stable over this plan period to date. Of note, civil & environmental engineering has introduced a research methods course for all new research graduate students and electrical & computer engineering has increased its list of core courses for graduate research programs, which are all taught on a yearly basis.
- While a process has been identified to quantify, assess and improve (where necessary) the number of course offerings in our many programs, the implementation of this strategy will require staffing resources not currently available to the EGSO.

Increase the academic rigour of graduate programs

- Electrical & computer engineering has changed the format of its PhD comprehensive exam effective for the fall 2015 term. We will monitor that experience to determine strengths and weakness of the new format before making a decision about expanding it to other departments.
- The EGSO has begun to more strictly enforce existing requirements for program limit extensions and comprehensive exam time-limit extensions. These efforts appear to be having the desired effect in reducing the number of students who go well beyond the limit for their comprehensive exams.

Improve the quality of students admitted to graduate programs

- Our current focus is on identifying top-quality applicants as soon as possible to get them timely and competitive offers of admissions. This is being done by encouraging departments to change admission processes and through Faculty-level recruitment initiatives such as the consortium tour and the graduate applicant weekend.
- We must also work to ensure departments are closely monitoring the progress of their graduate students and conducting a formal review when students perform poorly. This will result in more consistent and higher expectations with respect to academic performance and more effective support for struggling students.
- The EGSO has increased its monitoring of non-standard admissions and has increased the level of justification required from departments before approving non-standard or probationary admission.

Goal C4: Enhance the Graduate Student Experience

Evaluate current graduate student funding

- We now use the actual level of funding that research graduate students in the Faculty receive (typically much higher than the guaranteed minimum level) in our marketing and recruitment efforts.
- As described above, the Domestic Doctoral Student Award was launched in 2015. An evaluation of the assumptions in its financial plan will be conducted in spring 2016.

D. Research

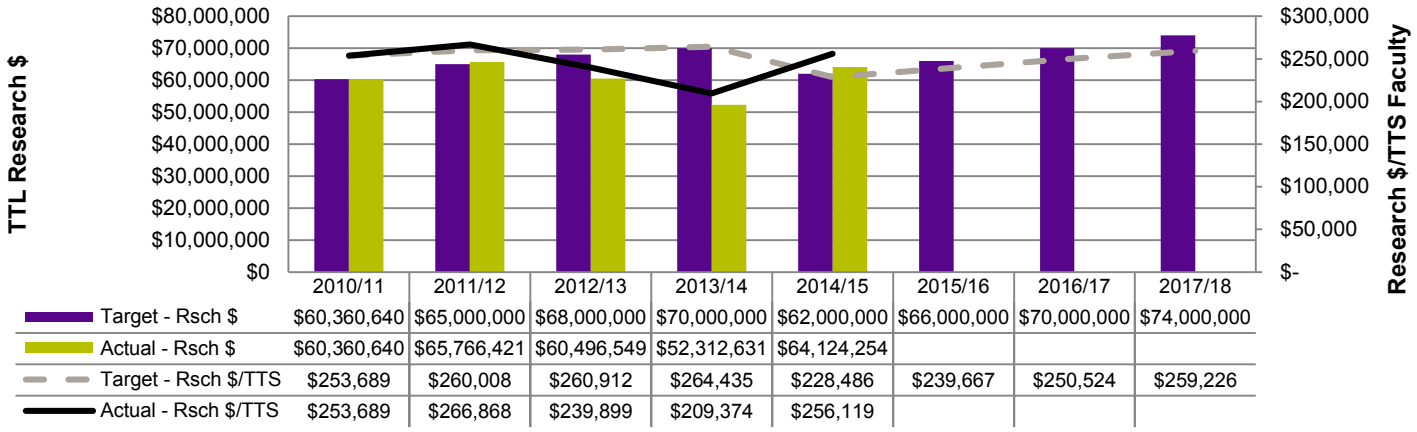
In 2014/15, the Faculty of Engineering earned $64.1 million in research funding, a 6% increase over research funding at the beginning of this plan period. About half of this funding was from federal government sponsors. Funding from NSERC alone was $18.3 million, the highest in the Faculty's history. This was due in large part to significant increases in strategic project and collaborative research and development grants. Although funding from provincial government sources remained at the previous year's level, industry funding exceeded the $10 million mark for the first time ever. Further details on our research funding and other related metrics are provided in Section IV.D of this report.

Another highlight of 2014/15 was an increase in Canada Research Chair (CRC) allocations to the Faculty of Engineering, to a total of 26 chairs. Efforts are currently underway to nominate outstanding researchers for our open CRC positions. Last year six junior faculty members earned Early Researcher Awards and Professor Chris Eliasmith, who is jointly appointed in the Faculties of Arts and Engineering, received the prestigious NSERC John Polanyi Award. A state-of-the-art $10M research facility for green and intelligent automotive research was launched in 2015 with funding from industry, federal and provincial governments.

Goal D1: Increase Research Funding

- Our research funding in 2014/15 exceeded target by 3.2% (see Figure 8) at $64.1M, a 23% increase over 2013/14 funding levels.
- Average research funding per tenured/tenure-stream faculty member increased by 22% over last year, indicating that our improved funding is not solely the result of a larger faculty complement doing research.
- In terms of tri-agency funding in 2014/15, our NSERC funding reached a record high, but funding from SSHRC saw a decline and there was no funding from CIHR. With the recent recruitment of a number of faculty members in the area of biomedical engineering, one of our priorities for the coming years is to heighten efforts to attract funding from CIHR.

Figure 8: Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$60,360,640	$65,000,000	$68,000,000	$70,000,000	$62,000,000	$66,000,000	$70,000,000	$74,000,000
Actual - Rsch $	$60,360,640	$65,766,421	$60,496,549	$52,312,631	$64,124,254			
Target - Rsch $/TTS	$253,689	$260,008	$260,912	$264,435	$228,486	$239,667	$250,524	$259,226
Actual - Rsch $/TTS	$253,689	$266,868	$239,899	$209,374	$256,119			

Encourage and support researchers to pursue multi-year partnership programs

- Eight NSERC strategic project grants were awarded in 2014/15, marking the Faculty's best-ever performance and contributing to a 96% increase in our funding from this program over the previous year. Our funding for NSERC collaborative research and development grants also increased considerably.
- To encourage and support researchers in applying for large partnership programs like the NSERC strategic network grant, the Faculty of Engineering routinely commits cash support that is matched by the university.
- The Engineering Research Office (ERO) actively offers support for proposal development, application review and industry liaison for all sizes of partnership grants and provides logistics support for visits by on-site review committees and industry partners.

Support and motivate faculty to pursue special large funding programs

- An NSERC Collaborative Research and Training Experience (NSERC-CREATE) grant, the first for the Faculty, was awarded in 2014/15 in the area of cyber-physical systems.

- A state-of-the-art $10M facility for green and intelligent automotive research was launched this year with $1M from Toyota and $2.1M each from the Canada Foundation for Innovation (CFI) and the Ontario Research Fund (ORF). Two infrastructure projects in the areas of RF circuits and robotics have been awarded more than $4M by CFI and ORF.
- To strengthen applications for programs like the CFI Innovation Fund (CFI-IF) and NSERC-CREATE, the Faculty contributes cash that is matched by the university. When appropriate, the Faculty also contributes to the renovation and construction cost.
- The ERO offers support to co-ordinate proposal development and liaise with industry partners and funding agencies for large programs such as FedDev.

Encourage and support academic units to recruit the best faculty in strategic areas

- The Faculty of Engineering has set aside most of its current CFI John R. Evans Leaders Fund (CFI-JELF) allocation to help academic units recruit the best faculty in strategic areas of research.
- The ERO offers support to academic units on CRC planning to attract and retain the best faculty.

Goal D2: Establish a Shared Commitment to Research Excellence

Support and motivate increased research activity

- The ERO proactively builds relationships with funding agencies, potential sponsors and other stakeholders to maximize the possibility of increasing research partnerships.
- Faculty members are sent calls for research proposals on a bi-weekly basis to ensure they are aware of relevant opportunities.

Support the development of faculty members as researchers

- The ERO provides new faculty members guidance on planning and launching their research programs at Waterloo.
- Researchers are provided the opportunity to have their grant applications reviewed by ERO staff. To help prepare applications for large grants, faculty members are provided with dedicated writers on contract basis.
- Workshops provide guidance to faculty on grant application preparation for NSERC Discovery Grants, and an internal review committee provides feedback on NSERC Research Tools and Instruments applications.

Develop stronger ties with industry

- The ERO routinely holds meetings with large and small companies to discuss industrial challenges that can be addressed through research, and actively collaborates with the university's industry liaison officers and Centre for Career Action to raise awareness and visibility of our research strengths.
- Waterloo Engineering research is shared with broader audiences through conferences such as OCE Discovery and the Waterloo Innovation Summit.
- A database of faculty members' research applications has significantly improved staff ability to identify researcher expertise that is relevant to a company's needs. The ERO is working toward linking external-facing websites to the appropriate internal database in order to further improve potential industry partners' ability to find relevant researchers.

Partner with a targeted set of leading global universities

- Implementation of this strategy is reported in Goal G4 of the internationalization section of this report.

Goal D3: Eliminate Barriers to Research Success

Enable a culture of collaboration and co-operation

- Waterloo Engineering is home to a number of research institutes and centres, such as the Waterloo Centre for Automotive Research, where researchers from various disciplines collaborate.
- The ERO is working to foster strong interdisciplinary research in our identified areas of strength, collaborating with academic units to seek external partnerships and identify funding opportunities.

Improve client service

- The ERO and Engineering Computing have provided assistance and services to engineering researchers completing the new Common CV system required for applications to some tri-agency programs.

- Staff in the ERO provide service directly to researchers through grant application review, technical writing support for large initiatives, and assistance organizing site visits for major funding programs.
- We track attendance at research-focused workshops and events and solicit participant feedback to gauge how the format, frequency or content can be improved overtime.

Improve access to resources

- To help faculty members develop proposals for large grants, the ERO arranges technical writers on a contract basis through the university's Office of Research and shares the cost.
- The Faculty of Engineering is allocating all of its CFI Infrastructure Operating and Maintenance fund to those who help generate such funds through successful CFI-IF and CFI-JELF grants.
- The university recently announced new financial support for three technical positions to operate and maintain shared research labs and facilities. The ERO has solicited proposals and is co-ordinating an internal review process to select proposals to compete for the fund at the university level.
- The committee that reviews the Faculty's internal applications for the NSERC Research Tools and Instruments program strives to identify equipment that can potentially be shared by several researchers.

Improve the efficacy of communications

- Through bi-weekly emails, faculty members are notified of potential funding opportunities, information session, webinars, etc. The ERO is working toward creating a SharePoint site where faculty can find relevant information, important forms and notices of upcoming funding opportunities.

Goal D4: Celebrate Research Excellence

Recognize research excellence

- Highlights of major external research chairs and awards earned by engineering faculty in 2014/15 include:
    - Royal Society of Canada induction: Prof. Mohammed Kamel
    - NSERC John C. Polanyi Award: Prof. Chris Eliasmith
    - Fellow of the Canadian Academy of Engineering: Prof. Pu Chen
    - Fellows of the Engineering Institute of Canada: Profs. Amir Khajepour, Manoj Sachdev and John Yeow
    - Tier 2 Canada Research Chairs: Profs. Zhongwei Chen and Lukasz Golab
    - Professional Engineers of Ontario Research and Development Award: Prof. Raafat Mansour
    - Ontario government Early Researcher Awards: Profs. Robert Gracie, Hyock Ju Kwon, Nasser Lashgarian Azad, Luis Ricardez-Sandoval, Lin Tan and John Wen
- The Faculty of Engineering continues to award the Engineering Research Excellence Awards and the En-hui Yang Engineering Research Innovation Award each year in recognition of outstanding research accomplishments. Due to a change in timing of the presentation of these awards in 2014, the 2015 award winners will not be made public until after this report publishes. They will be provided in the 2015/16 progress report.

Increase public awareness of research strengths and achievements

- Waterloo Engineering research stories are being featured on institutional social media channels, including Facebook and Twitter. Our researchers have been featured in internal and external media more than 50 times in the past year. Additionally, the Faculty was contacted numerous times by national media to request comment from research experts on topical news stories.
- Last year, a number of events served an important role in communicating our research:
    - The annual WE Innovate event provided an opportunity for graduate students and faculty to display their research through posters and demonstrations to the university community and companies. Participation by researchers and attendance by external partners exceeded expectations.
    - The Waterloo Innovation Summit continues to include engineering faculty speakers and several startup companies founded by our alumni.
    - The ERO participates in the monthly Engineering Communications Council meeting which facilitates information sharing about events and marketing initiatives and provides an opportunity to encourage academic units and centres to promote their research.

Goal D5: Strategically Identify and Assess Research Strengths

Identify and assess Waterloo Engineering's areas of distinguishing research excellence

- In the past year, a number of broad research themes and specific technology areas were identified. These areas are anticipated to have significant global impact and offer many opportunities for our faculty members to collaborate with industry and seek funding. The majority of these areas align well with Waterloo Engineering's strengths when assessed by the number of research chairs and amount of external funding.

Pursue targeted partnerships and funding aligned with identified strength areas

- In 2014/15, the Faculty focused on two strategic areas of research for major funding opportunities, the Internet of Things and Advanced Manufacturing.

E. Teaching

The associate dean, teaching (ADT) portfolio completed its second complete calendar year of operation in 2014 and has successfully established regular operation of clearly identified activities for the strategies associated with each of our four teaching goals.

Based on experience and the assessed impact of activities throughout 2014, some adjustments to existing teaching portfolio strategies are underway in 2015. These are highlighted, along with identified priorities for 2015, below.

Goal E1: Enhance Support for Teaching at the Faculty Level

Develop and foster a community comprised of department representatives dedicated to teaching

- Throughout 2014 teaching champions were maintained from each academic unit except Architecture: Profs. Christine Moresoli (CHE), Wei-Chau Xie (CEE), Marc Hurwitz (Conrad), David Wang (ECE teaching quality officer), Ada Hurst (MSCI, substituting for Ken McKay, department teaching and undergraduate liaison officer, who was on sabbatical in 2014), Roydon Fraser (MME) and Glenn Heppler (SDE).
- The Engineering Teaching Development Committee (ETDC) met monthly throughout 2014, sharing experiences in fulfilling the teaching champion mandate in each unit and promoting activities and resources for teaching development in engineering and the university.
- The ETDC developed a template for capturing peer observations of classroom teaching, and a set of guidelines for the effective use of peer review to inform teaching assessment and development.
- Implementation of this strategy is expected to change in 2015:
    - Due to difficulties in maintaining a quorum and in building a shared sense of leadership and values in the ETDC membership, regular monthly meetings were stopped in 2015.
    - Unit chairs/directors and teaching champions will be consulted on how the ADT portfolio can best connect to and support the efforts of teaching champions and teaching development in each unit.

Goal E2: Contribute to the Development of Faculty Members and TAs as Teachers

Establish minimum teaching development expectations for all new faculty members

- Since March 2012 all appointment letters for regular faculty positions contain an explicit statement on the importance of our teaching mandate and the expectation that all new faculty will develop a plan for learning about teaching. Those without equivalent experience must complete a set of four workshops offered by the university's Centre for Teaching Excellence (CTE).
- The ADT meets with all new faculty members to review incoming teaching background, plans for teaching development, resources for teaching development and the mandatory workshop requirement. This included meetings with 12 new faculty in 2014.
- A web-based interface to the student course evaluation database to generate summaries of faculty members' results is under development in beta status. It is capable of producing a transcript of an instructor's teaching record that would be useful for tenure and promotion submissions.
- In collaboration with the Faculty's Academic Policy Committee, the ADT modified the faculty annual activity report to include a section for reporting teaching development activities.
- In 2015, the ADT will review student course evaluation results for all probationary and definite-term faculty at the end of each teaching term and offer advice for further development as appropriate. For graduate courses this review will be done in collaboration with the associate dean, graduate studies.

Promote opportunities for all instructors to learn more about teaching over their career

- A number of development opportunities were provided for our instructors in 2014:
  - Sixteen instructors participated in the Instructional Skills Workshop, an increase of 100% over the previous year. The ADT facilitated two sessions for Engineering and two others were offered by CTE.
  - Sixteen participants attended a workshop on student motivation for learning, facilitated by the ADT.
  - Forty-five instructors participated in the university's annual teaching conference (Opportunities and New Directions), an increase of 50% over 2013 participation.
  - Four participants and two faculty mentors from engineering took part in the 2014 Teaching Excellence Academy workshop.
- An Engineering Teaching SharePoint site was established to provide all engineering faculty and staff access to teaching resources, including workshop materials.
- Thirteen pre-tenure faculty members participated in an information session to learn about new materials on the teaching criteria for tenure and promotion and how they can be documented.
- 335 participants attended the annual TA training workshop, ExpecTAtions, which is under review.
  - In co-operation with the university offices of Academic Integrity, Safety, and Conflict Management and Human Rights, and under project leadership of the Centre for Extended Learning, we began development of online training modules for TA roles in supporting and maintaining academic integrity, ethical behaviour and safety.
  - A prototype model for a revised workshop was tested by the First Year Office for WEEF TA training in September 2014.
  - In 2015, a high priority will be placed on moving ExpecTAtions to a blended delivery model with full-time staff support. The workshop manual and mentor resources will also be updated.
- A priority for 2015 is to seek and promote opportunities for the ADT to deliver mini-sessions that will bring the ADT materials and knowledge base to groups within our academic units.

Provide mentorship in teaching

- Since each unit has the resources of a teaching champion, this has been a lower priority activity for the ADT.
- Going forward, in 2015 the ADT will seek to increase this activity in relation to providing feedback to probationary-term faculty following review of their student course evaluation results each term.

Goal E3: Affirm the Importance of Teaching

Include an assessment of teaching potential when hiring new faculty

- As noted in Goal E1 above, the ETDC has developed resources to support the peer review of teaching.
- In 2014, the ADT facilitated a live training session with a hiring committee from the Department of Mechanical & Mechatronics Engineering. The promotion of these live training sessions to all academic units is expected to continue as a priority in 2015.
- In 2015, units will be surveyed to determine current practices in assessing teaching potential across the Faculty.

Measure teaching quality and outcomes for individual and institutional improvement

- The ADT is working with academic unit heads toward implementing and maintaining a Faculty-wide exit survey. The first set of Faculty-wide common questions was implemented in 2014. While inconsistencies in the operation of exit surveys preclude publication of the data, preliminary results of overall student satisfaction and of students' next career steps were shared with chairs and directors for information.
- The student course evaluation processes was maintained and enhancements were made in 2014:
  - The web portal to the database was revised to ensure that users of data are aware of aggregate properties (means, 85th percentile and 15th percentile) of the accumulated data.
  - A standard reporting for course evaluation scores in tenure and promotions presentations was facilitated, including standard aggregate properties for all courses in each unit.
  - As a member of the University Course Evaluation Project Team, the ADT began research, planning, and communications to implement a more flexible and universally applicable student course evaluation instrument and an online survey process.

- Significant priorities for 2015 exist within this strategy, including: implementing the second phase of a Faculty-wide exit survey with a set of common questions and consistent data collection; ongoing participation on the University Course Evaluation Project Team with the goal of implementation beginning in 2016; and developing a plan for an effective transition to the university's new student course evaluation process, once implemented, including consideration of fair evaluation of teaching in tenure and promotion decisions and annual performance considerations.

Recognize and reward excellence in teaching

- The ADT continues to administer the Sandford Fleming Foundation Teaching Excellence Awards; however, due to a change in timing of the presentation of these awards in 2014, the current winners will not be made public until after this report publishes. They will be provided in the 2015/16 progress report.
- To enhance its support for the university's Distinguished Teaching Award nominations, the ADT has developed a set of links and useful materials including a sample nomination package. To further encourage nominations, in 2015 the ADT will use a mass email prompt to draw student attention to the teaching excellence recognition web portal each term.
- The ADT supported the undergraduate student society (EngSoc) in the development of a new teaching award to be sponsored and adjudicated by EngSoc. The inaugural winner of the new EngSoc Teaching Excellence Award, David Brush from the Department of Civil & Environmental Engineering, was named in fall 2014.

Communicate commitment to the Faculty's teaching mandate

- We continue to develop a public page on teaching within the Faculty of Engineering web site.
- In co-operation with the University Teaching Fellows, the ADT supports CTE initiatives to document and promote stories of excellent teaching.

Goal E4: Support Teaching Innovations and Strategies for Integrating Learning

Introduce an innovative undergraduate learning environment for all engineering students

- Launched in fall 2014, the Engineering Ideas Clinic™ directly addresses the needs of today's engineering students, giving them a space to create, test, refine and succeed. Hands-on clinic activities help students develop key skills in engineering, teamwork, safety, sustainability, problem-solving and collaboration.
- In September 2014, 1,300 first-year students from 12 programs took part in the first Engineering Ideas Clinic™ activity, the coffee maker dissection.
- Currently, 15 activities are being actively used in 14 engineering programs, with many programs using multiple activities. Activities include constructing a brushless DC motor, teamwork training, engine dissection and an open-ended robotics project. Over 30 clinic activities are currently being developed.
- Over 40 faculty and staff are actively involved in developing and using clinic activities and 15 co-op students have been hired to work on and develop activities.
- Over the past year, nine publications describing clinic activities were presented in international conferences related to engineering education and integrated learning and two workshops were organized to expose international conference participants to this initiative.

Support teaching innovations and curriculum renewal

- The dean of engineering continues to provide lunch for the CTE seminar series on integrative learning in engineering.
- In 2015 the ADT will work explicitly with the ideas clinic team to develop common understanding of the theoretical foundations of learning and teaching knowledge that underpins the proposed learning activities.

F. Outreach

Our outreach office, under the leadership of the associate dean, outreach, continues to develop and enhance youth outreach programming to meet our strategic goals. We continue to evolve our successful programming in response to the needs of schools and students in order to reach a larger and more diverse audience. In the past year we have planned changes to our high school leadership program and have introduced more programming focused on software engineering (e.g. code development and basic computer science skills) that tie into the Waterloo Region Year of Code initiative.

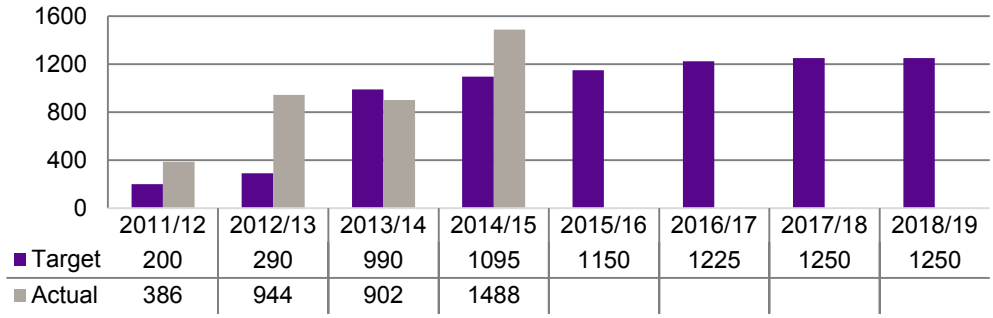
We anticipate that the University of Waterloo's participation in the United Nations Women's HeForShe campaign, described more fully in the diversity section below, will have positive impacts on our outreach efforts over the duration of this plan period.

Goal F1: Expand the Scope of Waterloo Engineering Outreach Programs

Expand outreach activities to include high school programming

- With the extension of our strategic plan to 2018, outreach targets have been extended at a relatively stable rate. This reflects our plans to establish a series of key events by 2016/17 with participation caps for each (e.g. we will run three leadership programs annually, with a maximum of 50 participants in each).
- Campus visits for high schools were lower than expected in 2014/15, following a decision to increase that program's target last year as a result of two years of higher-than-projected participation. We are working toward establishing a series of destination events to attract students and classes to the main campus.
- Off-campus and weekend programs continue to grow as more unique women in engineering programs are established aimed at the high school audience (e.g. the grade 10 Codemakers program) and more local schools are accessing our high school workshop program.
- The summer program structure is changing in 2015/16, separating in-class hands-on engagement with STEM from the leadership portion. This change aims to allow us to reach more than 50 youth a year through summer programs, make better use of resources, and cater more to the specific interests of students.
- The outreach office has started working more closely with the undergraduate recruitment group with a goal to create an outreach program to complement recruitment trips at targeted schools.

Figure 9: High School Outreach Program Participation Performance to Target

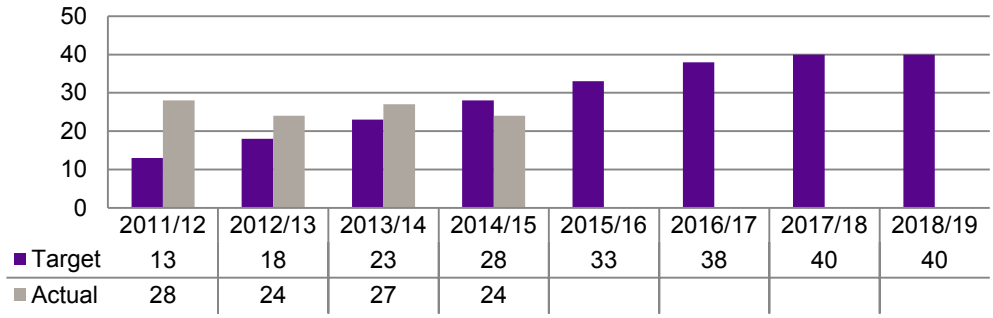


	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Target	200	290	990	1095	1150	1225	1250	1250
Actual	386	944	902	1488				

Increase the breadth of Kitchener-Waterloo school engagement

- In general the number of workshops have been declining over the past years. While possible reasons for this decline have been identified, research is needed to confirm the causes and adapt our programming to address them.
- In the coming year, the outreach team will focus on promotion to schools that we have not delivered programming at in the past three to five years.

Figure 10: ESQ Workshop Participation Performance to Target



Goal F2: Enhance the Waterloo Engineering Community through Participation in Outreach

Engage current Waterloo Engineering community members in outreach activities

- The outreach office has identified the need to develop a clear, effective communications strategy from the outreach office to faculty and staff. Consideration must also be given to how we can best address the challenge of alignment between the timing of outreach opportunities and faculty and staff availability.
- In the coming years more focus will be placed on connecting with new staff and faculty as they join the Waterloo Engineering community.

Diversity

The outreach office continues its focus on increasing the number of women at all levels in the Faculty of Engineering (undergraduate to faculty). In addition to annual events, the associate dean, outreach has taken an active role in related initiatives within the university, across the province and for the engineering profession. Among such contributions, Associate Dean Mary Wells is chair of the Ontario Network of Women in Engineering and recently co-authored *Women of Impact*, profiling 18 female engineers and scientists who work in mining, metallurgy and materials in Canada.

The University of Waterloo was recently selected to be part of the United Nations Women's HeForShe campaign, a global effort that invites men and boys to work with women and girls, as equal partners, in achieving gender equity. As part of the campaign, the University of Waterloo has been invited to be the only Canadian university participating in the 10x10x10 IMPACT framework, which involves 10 corporations, 10 governments, and 10 universities. The University of Waterloo has made three specific commitments to address gender equity on campus, which the Faculty of Engineering hopes to leverage fully to reach our women in engineering goals in the coming years:

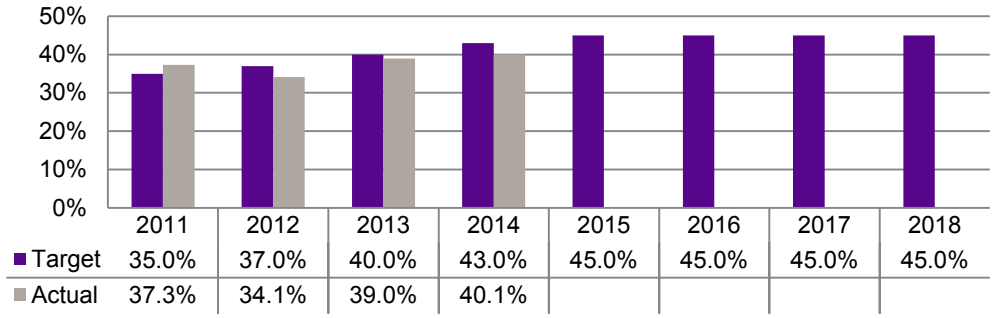
- Commitment 1: Boost girls' participation in STEM experiences to build future female leaders
- Commitment 2: Enhance female faculty representation to drive toward parity in the future
- Commitment 3: Advance women into positions that lead the university

Goal F3: Increase the Participation of Women in Engineering at Waterloo

Increase the confirmation rates of offers made to female undergraduate engineering applicants

- Confirmation targets for 2016 to 2018 have been kept steady at 45%. Once we reach this target, we will shift focus to initiatives that contribute to maintaining this level.
- The outreach office works with the undergraduate recruitment group to run two annual women in engineering applicant events, offered in March and May for women who have received an offer of admission to Waterloo Engineering. In May 2015, an overnight event was held for all non-confirmed female applicants who had received an admission offer. Early results from this event look promising.

Figure 11: Female Engineering Undergraduate Confirmation Rate Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target	35.0%	37.0%	40.0%	43.0%	45.0%	45.0%	45.0%	45.0%
Actual	37.3%	34.1%	39.0%	40.1%				

Establish best practices related to the recruitment of women faculty

- The University of Waterloo is taking a much more active role in ensuring diversity is explicitly considered during faculty hiring. This has included the need to advertise faculty positions on websites considered appropriate to attract diverse applicants and the development of training modules to highlight unconscious bias during the hiring process.
- The associate dean, outreach has offered to meet with each Department Advisory Committee on Appointments (DACA) to discuss diversity in the applicant pool and best hiring practices. Because very few DACAs have taken advantage of this opportunity to date, consideration will be given in the coming year to the possibility of making this a requirement.
- In the coming year the executive officer will work with the associate dean, outreach and hiring departments to compare the female representation in our faculty position pools to female representation amongst recent doctoral graduates to understand where there may be gaps.

Develop a better understanding of the experience of women in engineering at Waterloo

- A large independently-led research project of the current population is underway for 2015/2016. Focus groups were held in May 2015. A second series of focus groups and a survey of the student body will commence in fall 2015. Results should be available within the next academic year.

Goal F4: Build an Inclusive Atmosphere within Waterloo Engineering

Establish a framework to report and respond to issues of diversity and inclusivity

- Waterloo's director of equity. Mahejabeen Ibrahim, has worked with first-year mechanical engineering students in their concepts course to discuss diversity. This pilot will remain in development in the coming year.
- We continue to let students know that part of the role of the associate dean, outreach is to provide support to discuss issues around diversity and inclusivity. Depending on the nature of the concern, students might be directed to the university's Conflict Management and Human Rights Office.

G. Internationalization

The past year has been one of major foundational development in our international portfolio. The first associate dean, international in the Faculty of Engineering has begun his first term and the Engineering International Office has been established. This report includes many enhancements resulting from significant efforts and planning over this first year of operation.

Goal G1: Consolidate and Expand Internationalization Efforts within the Faculty of Engineering

Establish an associate dean, international and an international office in the Faculty of Engineering

- The Engineering International Office was established with the appointment of Professor Rick Culham as the first associate dean, international in the Faculty of Engineering on July 1, 2014.
- As of December 1, 2014 responsibility for Engineering exchange activities and the related staff was transferred to the Engineering International Office and in February 2015 the office reached its full staff complement with the appointment of an assistant to the associate dean.

Enhance co-ordination and collaboration on internationalization across the Faculty

- In the coming year the associate dean, international will establish a Faculty International Affairs Committee (FIAC) that includes representatives from each of the academic units. It is recommended that each academic unit have two members, namely the exchange co-ordinator and the graduate officer. The FIAC is expected to meet once or twice per term to provide an open line of communication between the Engineering International Office and the academic units on all matters related to international programs and internationalization.

Further develop the Faculty's strategic plan for internationalization to reflect the new office and consolidated portfolio

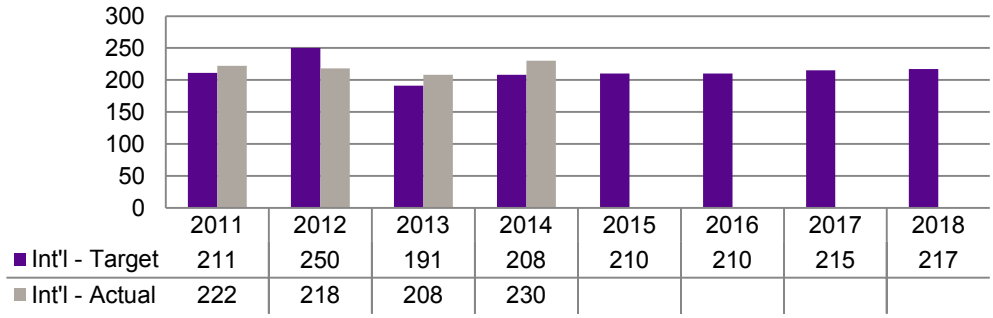
- Focus to the end of the extended plan period will be on areas of internationalization that did not receive adequate attention in prior planning exercises, including:
  - co-ordinated internationalization of research initiatives
  - more transparent exchange program for graduate students
  - mentorship programs targeted for international students (in collaboration with the Student Success Office and the Engineering Society to avoid duplication of efforts)
  - identification of priority areas that are not being met with current programs

Goal G2: Increase International Undergraduate Enrolments

Enhance international recruitment efforts

- As shown in Figure 12, international student admissions have typically exceeded targets throughout this plan period. It is anticipated that we will again surpass our established target in fall 2015.
- The decline in our international student target from 2012 to 2013 resulted from the closure of Waterloo's campus in Dubai. The gradual growth from 2013 to 2018 reflects the international student proportion of planned growth in our biomedical and mechatronics engineering programs.
- Overall, undergraduate year one admissions for international students are projected to remain in the range of 14-15% for the remainder of this plan period.

Figure 12: International Undergraduate Student Intake Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Int'l - Target	211	250	191	208	210	210	215	217
Int'l - Actual	222	218	208	230				

- Recruitment initiatives in key engineering markets have increased visa student applications over the past year's admission cycle.
- Waterloo Engineering's admissions and recruitment teams continue to collaborate with and augment the activities of campus partners to deliver recruitment activities in key markets, promoting a Canadian undergraduate education and Waterloo Engineering's world class education. We target and engage the highest quality applicant pool through hands-on activities and outreach presentations that demonstrate key Waterloo attributes.
- The visa student pool has a lower yield on applications than the domestic pool, with attrition occurring even after offers are accepted. Further, there are higher rates of ineligible (typically due to insufficient English language skills) and incomplete applications in the visa pool. New initiatives to enhance this pool include:
  - Expansion of the Bridge to Academic Success in English (BASE) program to include all engineering programs except systems design engineering and biomedical engineering.

- Introduction of the Intensive Bridge to Academic Success in English program (iBASE), an accelerated seven-week English language program for Waterloo Engineering admissible applicants being offered by the English Language Institute at Renison University College beginning in summer 2015. iBASE allows us to admit applicants who meet our academic admission requirements but are just below the minimum English language score requirements, thereby increasing the depth of our visa applicant pool. iBASE students will complete the ELI program in the summer in order to meet the conditions of their offer and join the rest of the incoming class in September.
- Development, with the Engineering Outreach Office, of new high school programming to target visa students studying in Ontario.

Provide additional support to Waterloo Engineering international students

- A priority for the Engineering International Office is to ensure a support system is in place for visa students who need assistance in adapting to the rigours of the Waterloo Engineering program.
- Both the university's Student Success Office (SSO) and the Engineering Society (EngSoc) have pre-established mentorship programs. EngSoc will introduce a new focus group targeted specifically for international students and the SSO will have focused help sessions for international students during orientation week. The Engineering International Office will develop group sessions and guest speakers to help augment the effective programs that already exist.
- In fall 2015, the Engineering International Office will survey and interview international students following their 1B term to establish a better understanding of the issues that are of most concern to them. This will help determine what needs are currently going unmet so we ensure a framework of programs is in place to fully meet the needs of visa students, ranging from academic needs to societal needs in adapting to Waterloo.

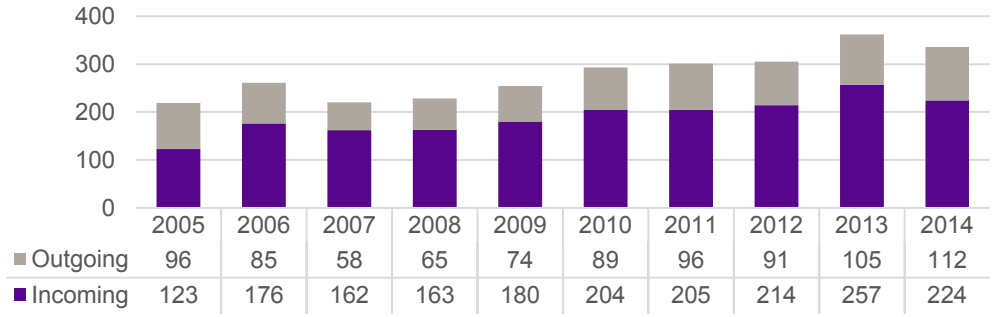
Goal G3: Increase International Experience Opportunities for Undergraduates

- The University of Waterloo has established a goal to have at least 30% of the student population participating in an international experience (co-op work term, academic exchange program, study-abroad term or volunteer position) during their tenure at Waterloo. As seen in Figure 13 and Figure 14, Waterloo Engineering is contributing significantly toward this goal. In addition to the co-op and exchange participation depicted in these two figures, approximately 70 students had other experiences (e.g. study abroad terms or volunteer work experiences with agencies such as Engineers Without Borders) in 2014 alone.

Increase participation in international exchange

- The Engineering International Office has planned a number of initiatives to enhance awareness and increase participation in undergraduate and graduate exchange. The office will:
  - promote opportunities to combine exchange with co-operative work term jobs at partner universities and industries local to our partner universities;
  - encourage early application to avoid last-minute time constraints;
  - visit all 1B, 2A and 2B classes each term (as appropriate) to present exchange opportunities and requirements;
  - in collaboration with EngSoc, hold multiple information sessions throughout the term;
  - develop a program to supplement existing available awards, offering up to five $1,000 needs-based awards annually to help offset the cost of travel and accommodation while on exchange;
  - design, print and display posters to better advertise the exchange program throughout the engineering buildings; and
  - keep department exchange co-ordinators informed of all exchange matters, through FIAC.
- Waterloo International has taken steps to impose a forced balance between inbound and outbound exchange students at the institutional level. The Engineering International Office will monitor the effect of this policy on student mobility, including: our student's ability to choose exchange opportunities; the number of students taking advantage of exchange; the number of students enrolled in the International Studies Elective program; and the number of inbound students to Waterloo Engineering. We will also seek to assess the impact of this policy on potential graduate recruitment and our relationships with international partners.

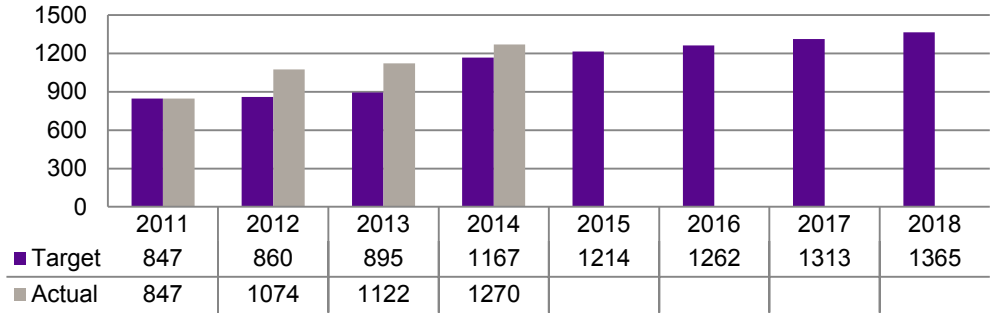
Figure 13: Undergraduate International Exchange Terms



Develop additional international co-op work term opportunities

- As shown in Figure 14, the number of international jobs exceeded our target in 2014 for the third consecutive year. Targets for the remaining years of the plan were revised upwards last year.
- A majority of new international jobs developed were in the United States. Efforts to develop jobs outside North America continue but these initiatives have proven to be challenging.
- Going forward, opportunities will be actively sought to leverage co-op job development with exchange agreements. The associate dean, international will work with new and existing partner universities to develop co-op jobs, either at the university (research labs, research centres, etc.) or with nearby industries where the partner university may have an ongoing connection or a working relationship. This will provide our students an opportunity to combine an academic term and a co-op term in the same region of the world.

Figure 14: International Co-op Work Terms Performance to Target



Goal G4: Increase International Graduate Studies and Research Collaborations

Develop an international research strategy

- In the coming year, the associate dean, international will work with the Engineering Research Office to develop an international research strategy for the Faculty that allows for targeted growth in collaborative research partnerships with universities, research labs and industrial partners.
- Anticipated tactics within such a strategy include identifying sources of research funding for international research collaborations, increasing the number and the quality of joint publications with international partners and encouraging shared graduate supervision with international partners and collaborators.

Pursue strategic internationalization in graduate studies

- One focus area in graduate studies internationalization is the development of dual degree (Cotutelle) programs with a limited number of leading universities. Agreements will be prepared that detail the terms and conditions of the dual degree program including residence time, degree requirements, committee membership, etc. Initially a fixed number of candidates per year per university will be established but can be modified in subsequent years based on demand and success of the program.
- Most new or renewed international exchange agreements include a provision for access to international exchange programs for graduate students. Unfortunately, the procedures for applying to these programs and the framework for administering both inbound and outbound graduate students is currently the responsibility of the academic units and there is little uniformity or clarity in the process. The associate dean, international will work with FIAC to review existing procedures for graduate exchange, develop a uniform, transparent

procedure for applying to international exchange, and establish a viable mechanism for administering the new program. It is anticipated that the graduate exchange program will be modeled after our successful undergraduate program, which has been operating continuously for more than 30 years.

- We will examine the potential for introducing graduate exchange programs as part of our professional master's programs, through which students could take a limited number of courses at partner universities.

H. Entrepreneurship

We continue to implement our strategic plan for entrepreneurship in order to support and nurture the entrepreneurial members of our community. As one indicator of the success of these initiatives, Waterloo Engineering startups dominated all three terms of Velocity Fund Finals in the past year, capturing the majority of awards and the top prize each time. As of May 2015, over 600 companies had been identified as having Waterloo Engineering students, faculty, staff or alumni as founders.

Goal H1: Provide Academic Programming to Support Student Interest and Development in Entrepreneurship

Maintain our flagship graduate programming

- 2014 saw a significant increase in intake into the Master of Business, Entrepreneurship and Technology (MBET) offered by the Conrad Business, Entrepreneurship and Technology Centre (Conrad).
- In the coming year, Conrad will be piloting changes resulting from a complete programmatic review of the program over the past year. Planned enhancements include greater integration among courses.

Develop additional academic programs for students interested in entrepreneurship

- Conrad launched its option in entrepreneurship for undergraduate students in Engineering in fall 2014 and received all required approvals for its campus-wide minor in entrepreneurship, available September 2015.
- The Diploma in Business and Entrepreneurship is now being offered to students in MEng degree programs. A program review will take place in the coming year.

Expand and enhance the Enterprise Co-op (E Co-op) program

- Conrad will make a proposal to the university's senior leadership in fall 2015 to secure a permanent mandate to run E co-op.
- Over the last five years, the number of E Co-op terms filled across the university has increased by 325%, reaching 55 in 2014. From 2005-2014, 118 Faculty of Engineering students completed an E Co-op term.

Develop a formal opportunity to expose select engineering students to entrepreneurship during their first work term

- Through the Bridging Entrepreneurs to Students (BETS) program, students receive one week of workplace skills training and then work in three five-week placements with startups in the Waterloo Region and the Greater Toronto Area. This highly successful program was delivered in two terms of 2014/15, with 38 students from 10 different engineering programs participating.

Goal H2: Develop Extra-curricular Initiatives to Support and Encourage Entrepreneurial Students and Projects

Develop a mechanism to help generate funding for student startups

- The Engineer of the Future Trust was initiated, with donor support, to provide financial support for our entrepreneurial students. In fiscal year 2014/15, $52,710 was distributed to 18 teams and projects.
- The Engineer of the Future Endowment has more recently been established with a lead gift of $100,000 in order for the program to last in perpetuity. An effort is being made to raise funds for the endowment and move recurring donors of the trust to the endowment. The endowment fund will be used once the funds from the trust have been disbursed.

Establish competitive business plan awards for capstone projects

- $60,000 was awarded at the second annual Norman Esch Entrepreneurship Awards for Capstone Design competition for engineering students. In 2014/15, 38 unique teams applied to this award program.

Provide access to tools and facilities to support young entrepreneurs during their studies and after graduation

- In spring 2015 we held a one-day workshop for our graduate students that focused on entrepreneurship and research commercialization. Over 80 graduate students participated and our program sponsor, iNovia Capital, contributed significantly by providing financial and program support and an excellent roster of guest speakers.
- Waterloo Engineering continues to provide access to the machine shop and various lab environments to entrepreneurial students and recent alumni from across campus, through our Entrepreneurship Support Program.

Goal H3: Develop New Spaces and Infrastructure to Support Entrepreneurship and Innovation

Embed the facilitation of entrepreneurship in the design of Engineering 7(E7)

- As described below, our top space priority is to construct a new building, E7, the design of which incorporates a number of features and facilities aimed at supporting entrepreneurship. Among these are:
  - space on a main campus for the Conrad Business, Entrepreneurship and Technology Centre, where students can take advantage of programs including E Co-op, MBET and the undergraduate option in entrepreneurship;
  - a multimedia pitch area for honing presentations and pitching new ventures;
  - departmental garages, which will provide enhanced facilities for students to work on capstone design projects; and
  - the Engineering Ideas Clinic™, which aims to inspire creativity, inquiry, ideas generation and interest in entrepreneurship (see Goal E4).

Strengthen campus opportunities to build-test hardware devices and prototypes

- As noted above, student garage spaces will be included on multiple floors of E7.
- Additional student workshop facilities have been established in East Campus Hall, in space provided by the university to help meet this specific engineering student need. This building is conveniently located on the east side of the engineering campus, near E5 and the site of E7.

I. Space

Over the current plan period to date, Waterloo Engineering's main campus space holdings have increased by 18% to a total of 55,613 net assignable square metres (nasm) in 2015. While this increase is substantial, space constraints remain a significant impediment to the Faculty's strategic development. Our current space plan anticipates significant increases to our space holdings through the end of our extended strategic plan period, primarily through the acquisition of new campus space in East Campus 4 (EC4) and the construction of a new building, Engineering 7 (E7).

Goal I1: Maintain a Current Comprehensive Space Plan for the Faculty

- With the extension of our strategic plan to 2018, our original goal to update the Faculty's space plan has been revised to more accurately reflect our current practice in space planning, which is to track and report on space acquisitions, allocations and reallocations within the Faculty at the unit level in an ongoing manner.
- Engineering's space and facilities team is working closely with the university offices involved in the management of institutional space records to resolve inconsistencies in the institutional database and to realize more efficient updates in the revised university system going forward.

Goal I2: Create the Space Required to Meet Operational and Strategic Needs

Renovate and construct new space as required

- Significant progress has been made in the past year toward our top space priority, the construction of E7. The architectural firm Perkins & Will were hired in 2014 to address the E7 design. The detailed design of E7 is essentially complete, branding elements have been clarified, and all drawings are nearing completion. Tendering of the project will be initiated in August 2015, with final university approvals anticipated in late October 2015. Ground-breaking will follow in November 2015 and opening is anticipated in September 2018.
- The renovation of the Douglas Wright Engineering (DWE) building C-Wing is complete and occupied primarily by civil & environmental engineering (CEE). A number of offices in DWE currently being used by the Faculty's advancement team will be transferred to CEE once E7 is opened.

- Work is ongoing to upgrade the second and third floors of DWE A-Wing. This space, relinquished by chemical engineering (CHE) in 2014/15, is being updated to accommodate our expansion with undergraduate labs, research labs and work spaces for the biomedical and mechatronics engineering programs. Space is also being upgraded as a temporary home for the Engineering Graduate Studies Office until the opening of E7 and to provide a new location for Engineering Computing. Plant Operations is currently working with users to finalize floor plans and design.
- Workshop facilities have been established in East Campus Hall to address student need for such services and to strengthen campus opportunities for students to build-test hardware devices and prototypes.
- The university is expected to formally approve the transfer of the EC4 building to the Faculty of Engineering this fall. This space will be occupied by mechanical & mechatronics engineering and systems design engineering, to establish and consolidate research facilities to directly and indirectly support new faculty hired for the biomedical and mechatronics engineering programs in advance of E7 being completed. Floor plan layouts are completed and it is anticipated that EC4 will be available, following minimal but required upgrades, by November 2015.
- A number of longer-term space projects, beyond this plan period, should be maintained for consideration in future planning:
    - feasibility assessment of erecting a single-floor lightweight steel structure addition above suitable sections of E3
    - development of a storage solution for large field vehicles and research specimens
    - construction of Engineering 8 and consolidation of CHE on east campus
    - construction of Engineering 9

Goal I3: Harmonize all Aspects of Safety within the Faculty of Engineering

Establish an Engineering Safety Planning Committee

- The Engineering Safety Planning Committee continues to meet each term with safety representatives from all departments including the machine shops. This enables open dialogue regarding any new requirements from the university's Safety Office, sharing of any safety incidents that have "lessons learned" or corrective action value, and discussion of new safety ideas to consider for implementation.

Identify and pursue the three highest priority projects that would improve safety and risk management in the Faculty

- In the context of the committee's efforts to harmonize new building security with current best practice recommendations, the committee will request a review of the planned E7 door locks system (interior and exterior) to provide feedback where applicable.
- A key focus area over the past year has been working with the university's Information Systems and Technology Office to complete a safety training database interface that will enable employees and graduate students to confirm their own safety training records and those of any co-worker. Unfortunately, given the departure of the university's chief information officer (the senior lead on this project), the committee is concerned that this project may not be completed with full specifications met this year.
- All committee members are currently involved with updating their department equipment hazard analyses in their labs and workplaces, performing safety audits of all labs and workplaces, and confirming the safety training of their researchers and graduate students. Of particular significance is to have full compliance in the Faculty of Engineering with the new Safety Office mandate that all supervisors complete the online safety training module and three-hour classroom training.
- A priority for the coming year will be re-establishing the QNC Safety Committee to help oversee the safe operation of the labs in this building.

J. Information Technology

Engineering Computing continues to make significant annual progress toward its goals in support of the Faculty of Engineering strategic plan. The renovation and upgrading of undergraduate computer labs is on schedule and strategies to enhance client support are fully implemented. The identification and implementation of tools and innovations to enhance operational efficiency and improve service delivery remains an ongoing priority.

Goal J1: Ensure a Quality Computing Environment

Upgrade and/or renovate undergraduate computer labs and terminal servers on a rotating basis

- The Helix lab was upgraded in December 2014 and Gear lab was upgraded in August 2015.
- Solid state drives were added to the Helix and Multimedia labs, which reduces log-in time and speeds application starting. This improvement will benefit all of the courses that use these labs by making class time more efficient.
- A priority for 2015 is to install a permanent projector and podium with a computer in Helix, which will allow instructors to use this room for teaching.

Upgrade digital signage used to communicate computing environment operating status

- Improvements to allow more cost-effective operation of a larger number of units were completed in 2014.

Goal J2: Enhance Support to Computing Clients

Increase availability of the IT Service Desk

- The increased support levels established with an increase of two additional part-time staff members in 2013 has been maintained.

Simplify/expedite access to computer support for faculty and staff

- The IT service phone line continues to provide a single point of contact through which faculty and staff support requests are routed to the individual(s) best placed to respond.

Goal J3: Support Improvements to Operational Efficiency and Innovation in Service Delivery

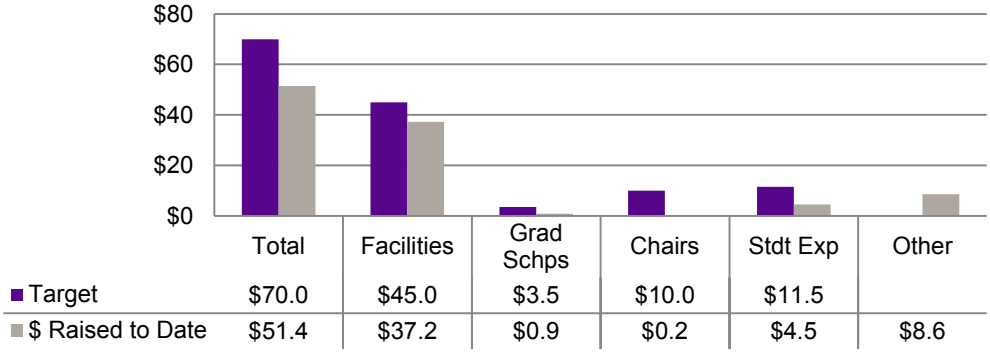
- The associate dean, computing continues to implement a process by which inefficient or ineffective operations and duplication of efforts are identified and solutions developed, either by adapting and sharing existing systems or by implementing new systems. Projects initiated or refined in 2014/15 include:
    - A functionality was added to the ECResearch fileserver (which provides space for researchers to back up their data), allowing researchers to request either shared or individual accounts for their students.
    - The Surveyor online survey tool was upgraded to include support for different types of questions.
    - Enhancements to the Faculty Appointments SharePoint tool included an extension to facilitate the tracking of the employment visa status of regular faculty members and an extension to automate some information-sharing with the EGSO.
    - A new backup server was put online on April 2015 for hosting bare metal recovery of all SharePoint servers.
    - Background work was completed to enable and test new versions of the server operating system with SharePoint Server 2013. Testing determined that migration to the new platform could happen shortly, with sufficient advance notice.
    - New sites and subsites were added to the Engineering SharePoint server in support of information-sharing across the Faculty.
    - The Trak/AUDIT asset management system developed by Engineering Computing staff to facilitate the tracking and management of computing equipment across campus has been adopted by several other faculties and is expected to be in use campus-wide in 2015/16.
    - The possible development of a graduate student data management system has been discussed by the Engineering Computing Committee. This fall, the existing systems in management sciences and electrical & computer engineering will be demonstrated and the committee will discuss how Engineering Computing might design a solution for other departments, if there is interest.

K. Advancement

The Faculty of Engineering advancement team has made significant contributions over the past year in support of our strategic plan by continuing to enhance the Faculty's reputation as a world-class leader in engineering and education and by securing further philanthropic support for our priority initiatives.

Goal K1: Secure the Philanthropic Support Required for our Priority Initiatives

Figure 15: Educating the Engineer of the Future Campaign Progress to Target (May 1, 2013 - May 1, 2015)



	Total	Facilities	Grad Schps	Chairs	Stdt Exp	Other
Target	$70.0	$45.0	$3.5	$10.0	$11.5	
$ Raised to Date	$51.4	$37.2	$0.9	$0.2	$4.5	$8.6

Develop and execute a fundraising strategy for our strategic priorities, in particular as they relate to capital needs and graduate fellowships

- We branded and introduced the Educating the Engineer of the Future campaign, moving from quiet phase to public phase in April 2015 with the launch of the website engineerthefuture.ca. The fundraising goal was set at $70 million and the expected completion date is 2017. As shown in Figure 15, a total of $51.4 million had been raised as of May 1, 2015 (73% of goal).

Maintain Faculty-level fundraising while supporting department priorities through enhanced annual fund initiatives and goals

- Waterloo Engineering is donor-centric in its fundraising approach, working with our donors to match their philanthropic interests in engineering with our broad range of programs, student needs and projects. As shown in Figure 142, $17.7M in cash, pledges and in-kind support was raised in 2014/15 to support the Faculty's needs, including undesignated donations to program support and equipment as well as targeted donor gifts to, for example: a number of faculty-wide undergraduate and graduate scholarships, including the Cross Link Technology scholarship and Jon Mark graduate scholarship in electrical & computer engineering; memorial fundraising initiatives in architecture and in systems design engineering; and additional support of $225,000 for the Chair in Sustainable Pavement in civil & environmental engineering.

Engage our alumni at a higher level by offering strategic engagement opportunities based on their interests and capacity

- In 2014/15 we hosted 15 events in priority geographic areas (Waterloo, GTA, Calgary, Vancouver, and San Francisco Bay Area) and had 5,701 attendees. The focus of the alumni officer has shifted away from events and to higher-level engagement activities with an increase in face-to-face visits and greater attention to our reunion class representatives program.

Goal K2: Enhance the Faculty's Reputation as a World-class Leader in Engineering Research and Education

Strengthen the faculty brand through consistent messaging and visual identity

- During the past year, a significant marketing initiative was undertaken to communicate and share the Waterloo Engineering brand. With the launch of the campaign site in April 2015 we are both strengthening the Faculty brand while sharing details of the Educating the Engineer of the Future fundraising campaign. The site has been designed to highlight Waterloo Engineering stories related to research, entrepreneurship and our unique education model. A consistent visual design was created for the campaign based on the strategy "the future is in our hands." This messaging and new look will be rolled out through a series of ongoing communications over the next couple of years.

Support strategic development and alumni objectives with best-in-class marketing communications

- Media interest and coverage of Waterloo Engineering continues to grow based on the success of our alumni, particularly our startup founders. Waterloo Engineering is also a part of the positive economic growth story of the Waterloo Region, making our Faculty a key stop for media touring the region. For example, Waterloo Engineering was profiled in the show *Small Empires* hosted by Alexis Ohanian on Verge, a widely followed technology online publisher. A high-profile interview in The New York Times with Sam Altman put a positive spotlight on Waterloo Engineering in mainstream U.S. media outlets. And a campus visit by Kevin O'Leary resulted in the creation and promotion of an effective testimonial video.
- In September 2014, Waterloo Engineering was a host partner for Canada's largest hackathon, HacktheNorth. This 36-hour event attracted an elite gathering of some 1,000 talented student hackers and well known venture capitalists, donors and industry partners from Silicon Valley.

Improve all web sites and introduce new electronic and social media strategies

- The vast majority of our Faculty website pages have now been migrated to the University of Waterloo Drupal platform. Migration will continue for a number of outstanding sites and pages.
- Over the past year, Waterloo Engineering continued to establish a strong following on Facebook, Twitter, and YouTube and received administrative access to the UWaterloo Engineering Alumni LinkedIn group (managed by an alumnus), with membership of over 5,000. In addition, research and analysis was conducted in collaboration with the university's Marketing and Strategic Communications Office and LinkedIn to determine the best approach for reaching our target audiences.

Develop and implement a strategic graduate student recruitment program.

- Based on a focused effort and commitment to engineering graduate student recruitment, we have seen incremental growth in student applications and enrollment numbers. We believe we can attribute this year's growth to four factors:
    - Focused commitment to recruitment. Waterloo Engineering continues to be the only Faculty at Waterloo with a full-time graduate recruitment specialist, who has created a Graduate Recruitment Working Group to assist with cross-faculty collaboration, participation in recruitment initiatives, and adoption of customer service tools.
    - Change in application timing to earlier in the year, aligned with other Canadian institutions.
    - Dean's funding to faculty to support graduate students.
    - Improved communications with applicants to encourage offer acceptance.
- A graduate studies customer relationship management system was introduced in spring 2015 with full support from all engineering departments.

L. Academic Unit Progress Report Summaries

This section presents a summary of each of the annual strategic plan progress reports provided by our academic units. These reflect progress on the goals and targets outlined in their implementation plans, which were included as an appendix to the original Vision 2015 strategic plan.

School of Architecture

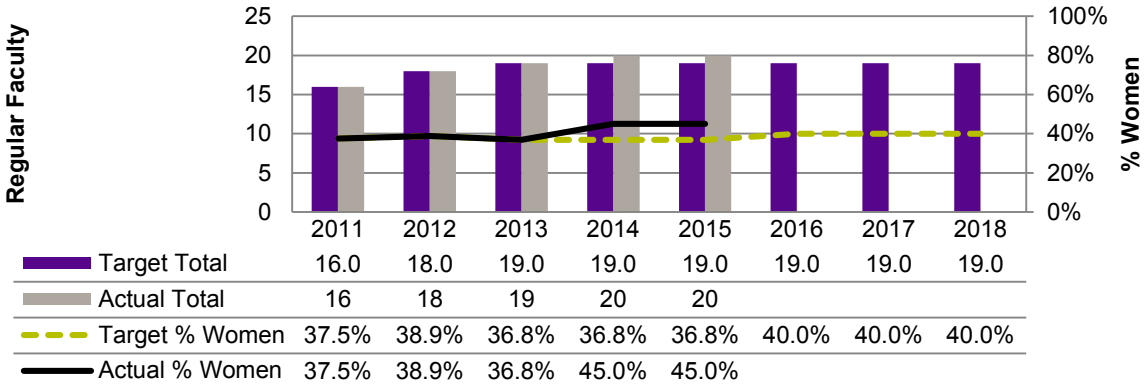
Lola Sheppard, Interim Director

At the time of this report's publication, a search committee was being struck to begin the process of seeking the next director for the School of Architecture.

A. FACULTY AND STAFF PLAN

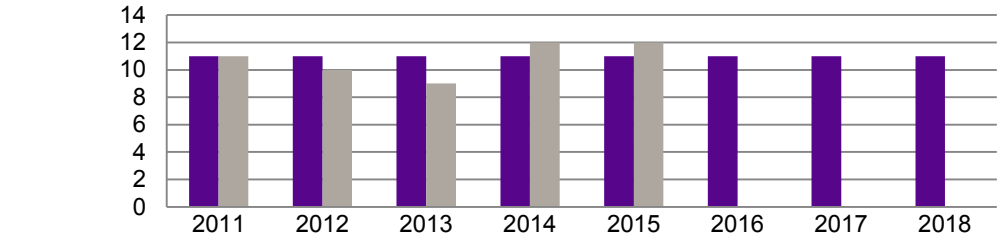
- We remain above target on our faculty and staff complements.
- Subject to approval of a new program to be proposed in integrated design (see Section G), faculty and staff growth will be planned beyond the complement targets outlined in Figure 16 and Figure 17 below.

Figure 16: ARCH Regular Faculty Complement Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target Total	16.0	18.0	19.0	19.0	19.0	19.0	19.0	19.0
Actual Total	16	18	19	20	20			
Target % Women	37.5%	38.9%	36.8%	36.8%	36.8%	40.0%	40.0%	40.0%
Actual % Women	37.5%	38.9%	36.8%	45.0%	45.0%			

Figure 17: ARCH Regular Staff Complement Plan Performance to Target

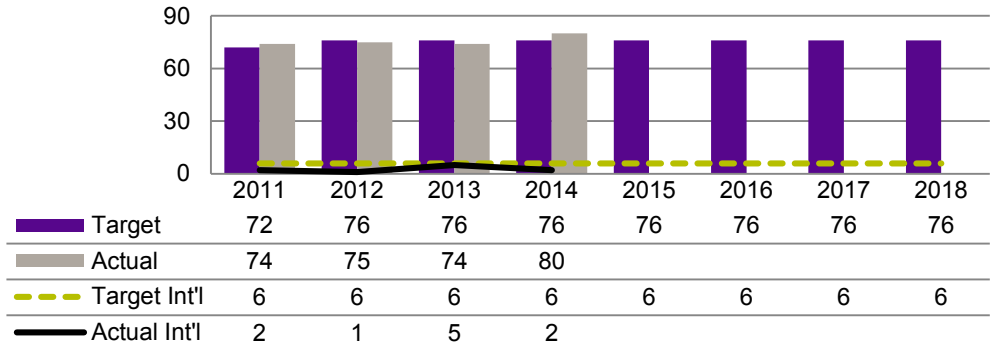


	2011	2012	2013	2014	2015	2016	2017	2018
Target FTE	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Actual FTE	11.0	10.0	9.0	12.0	12.0			

B. UNDERGRADUATE STUDIES PLAN

- We surpassed our established undergraduate student intake target in 2014, but had to hire additional adjuncts to accommodate accreditation limits for studio.

Figure 18: ARCH Undergraduate Intake Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target	72	76	76	76	76	76	76	76
Actual	74	75	74	80				
Target Int'l	6	6	6	6	6	6	6	6
Actual Int'l	2	1	5	2				

B1: Maintain the strength of the undergraduate core curriculum

- Our new curriculum, aimed at eliminating redundancies or disconnects within the curriculum and enabling more flexibility, is beginning in September 2015.
- An expanded choice of electives allow various offerings based on areas of interest.

B2: Supplement the existing curriculum in areas that have been less developed within the core curriculum, and expand our capacity

- Specialized electives are already in place for some areas in which we aim to expand our capacity, such as digital design technologies.

B3: Provide expanded opportunities for global study abroad in addition to the Rome program both for undergraduate and graduate students

- We continue to support existing programs that allow for exchange programs.
- Our fall fourth-year students live in Rome and travel extensively throughout Italy.

B4: Ensure that the undergraduate program is geared toward retaining our students and encouraging them to continue to the graduate program so that they are completing their first professional degree (MArch) at Waterloo

- We guarantee the top 75% of the undergraduate program a place in our MArch program.

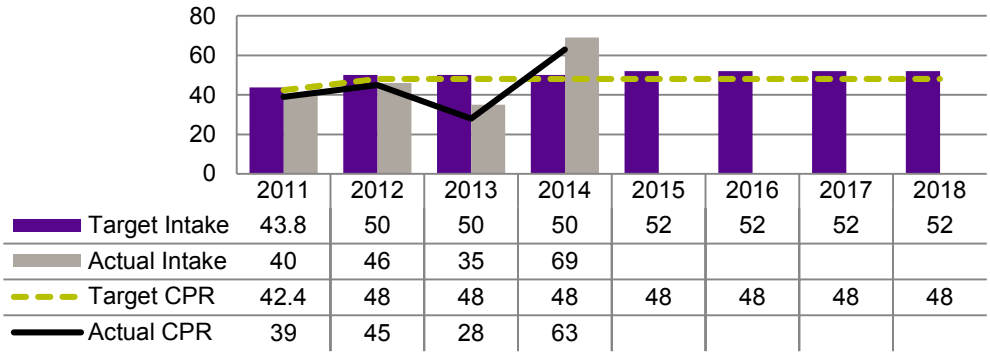
B5: Consolidate the core curriculum and expand 500-level research electives

- Work is in progress to introduce a required 500-level elective in each of the streams of cultural history and theory and building technology and environmental systems, in preparation for thesis research. These are expected to start full-time in 2018/19.
- There are currently 500-level courses running to ensure better integration of coursework given within a single semester.
- A new visual and design media sequence is beginning in fall 2015.
- Changes are expected to be ready for spring 2015 that will reposition existing courses in urbanism and landscape in order to better align this coursework within each semester as a coherent curricular sequence.

C. GRADUATE STUDIES PLAN

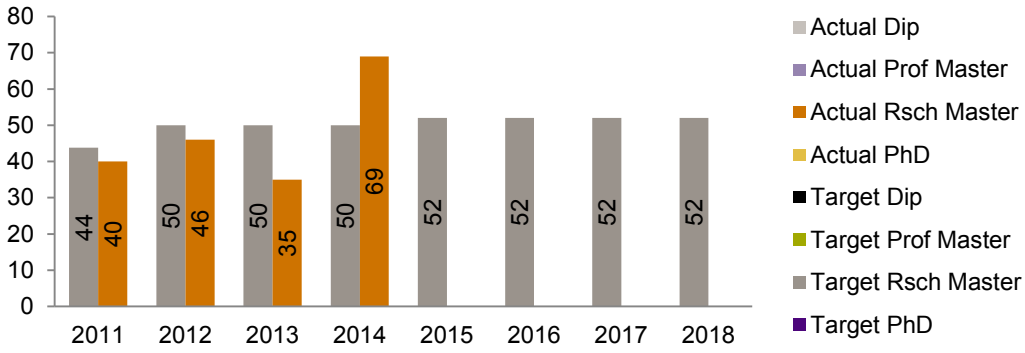
- Concerted recruitment efforts to attract more students to the MArch resulted in a significant increase to graduate student intake in 2014, primarily in domestic students (see Figure 19).

Figure 19: ARCH Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	43.8	50	50	50	52	52	52	52
Actual Intake	40	46	35	69				
Target CPR	42.4	48	48	48	48	48	48	48
Actual CPR	39	45	28	63				

Figure 20: ARCH Graduate Intake Plan Performance to Target by Program Type



C1: Eliminate the "qualifying" terms for external applicants to the MArch program

- The required changes to implement this goal have been fully implemented. External applicants now have an additional year of coursework at the graduate level (rather than having to complete "qualifying" terms).
- UW BAS graduates go directly to thesis work.

C2: MArch curricular and thesis structure revisions

- Efforts to establish an opportunity for external MArch students to participate in the Rome Program are in progress with possible implementation in winter 2016.
- Revisions have been made to the MArch thesis structure. The existing one-semester Arch 692 studio has been transformed into a more highly structured and co-ordinated two-semester thesis research and design sequence, comprised of Arch 692 in the fall and Arch 693 in winter. This new two-course structure will be first offered in fall 2015 and winter 2016.
- A new course has been established in architectural analysis and methodologies (Arch 610).

C3: Develop a proposal for a new program in Integrated Design

- See Section G.

C4: Funding Support for Graduate Students

- There has been an increase in professors applying for MITACS grants.

C5: Promote the Program Internationally Through Publication, Exhibition and Outreach

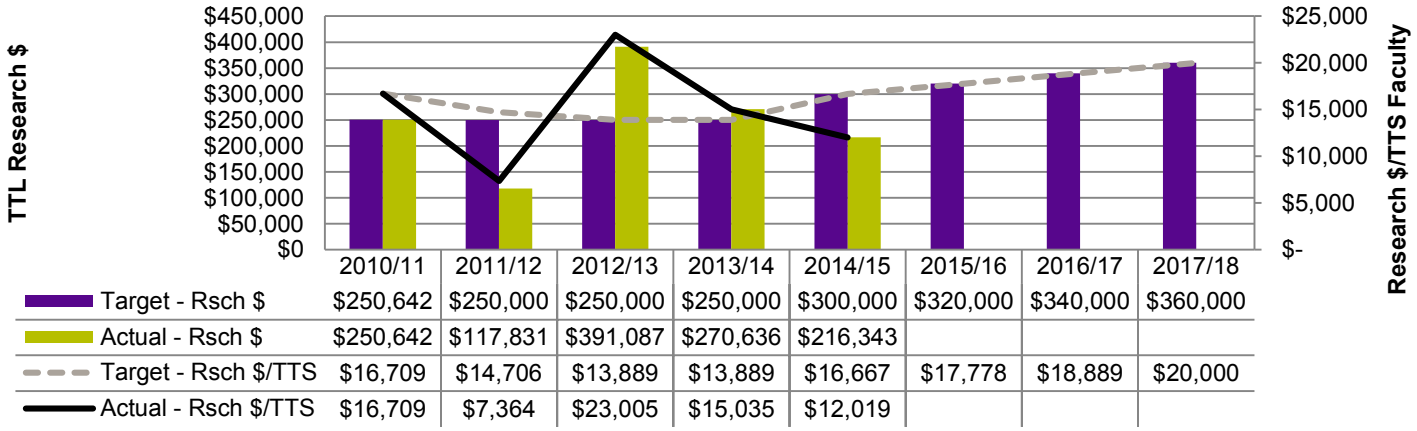
- Efforts to enhance communications vehicles and further build the school's international reputation are in progress.

- Opportunities for presenting papers and seeking publication of research and design work are currently disseminated to graduate students through the Learn group. Some support is provided for travel to conferences to present their work.

D. RESEARCH PLAN

- Research funding to faculty in the School of Architecture remains quite variable.
- The School of Architecture plans to expand the implementation time for its original research funding plan.
- A focus during the extended plan period will be to improve our communication with university offices and services to increase recognition of our faculty members' accomplishments.

Figure 21: ARCH Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$250,642	$250,000	$250,000	$250,000	$300,000	$320,000	$340,000	$360,000
Actual - Rsch $	$250,642	$117,831	$391,087	$270,636	$216,343			
Target - Rsch $/TTS	$16,709	$14,706	$13,889	$13,889	$16,667	$17,778	$18,889	$20,000
Actual - Rsch $/TTS	$16,709	$7,364	$23,005	$15,035	$12,019			

E. SPACE PLAN

E1: Upgrade and Expand the Satellite Facility in Rome

- An additional studio was added to the original Rome studio, and the original studio was upgraded and new furniture installed. This allows for access for all Waterloo Faculties to use this very modern air-conditioned and heated unit in winter and spring terms. The Faculty of Mathematics has already used the expanded facilities and will continue to do so. The Faculty of Environment will use the facility this year.

E2: Subject to introduction of the new program to be proposed in Integrated Design, expand the Cambridge campus

- Work toward this goal is currently in progress.

F. ADVANCEMENT PLAN

F1: Expand alumni-related activities

- The Arriscraft Lecture series continues.

F2: Substantially increase advancement activities for Architecture

- Much of this work will be influenced by the program to be proposed in integrated design (see Goal G).

G. PROPOSED NEW PROGRAM PLAN: INTEGRATED DESIGN

G1: Propose, acquire approval for, and launch an undergraduate degree program in Integrated Design

- Work continues toward the development of a proposal and other material required for the financial and curriculum approvals of this new program.

G2: Propose, acquire approval for, and launch a non-professional Master in Integrated Design degree program

- Work continues toward the development of a proposal and other material required for the financial and curriculum approvals of this new program.

Department of Chemical Engineering

Eric Croiset, Chair

Chemical engineering continues to make steady progress toward its strategic goals. Our priorities for the remainder of the extended plan period include: hiring top candidates to fill at least five faculty positions to reach our full faculty complement; increasing the quantity and quality of graduate students through improved visibility, recruiting activities and increased research support; improving co-op placement in industry, in particular for junior students, through closer collaboration with CECA, extensive use of social media to reach our alumni and increased industrial liaison efforts; and improving the efficiency of our research lab use and allocation.

A. FACULTY AND STAFF PLAN

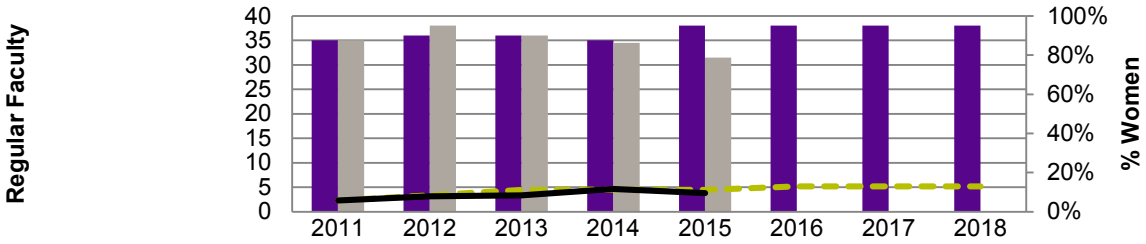
A1: Recruit New Faculty According to the Schedule in the Faculty Complement Table

- While we continue to make progress on our hiring plans, we are falling short of our established targets because of departures which also need to be replaced. Due to a relatively high number of resignations and retirements in the past two years and a number of retirements projected before the end of this extended plan period, a more appropriate target by 2018 would be a faculty complement of 36.5 with 11% women.
- Between May 1, 2014 and May 1, 2015 two new chemical engineering faculty members started and two others resigned or retired. Additionally, two definite-term contracts came to an end. One existing definite-term appointment has been excluded from our regular faculty counts going forward, due to a change in definitions.
- Two new faculty members have been hired with start dates between May 1, 2015 and May 1, 2016. We anticipate hiring a third to start during this time.
- In the coming year we will launch an intensive recruiting campaign to fill four replacement positions.
- New faculty members receive teaching mentorship from the CHE teaching champion and research mentorship from a colleague selected by the department chair.

A2: Increase Number of Female Faculty Members

- One new female faculty member was hired this year, with a start date after May 1, 2015. We are targeting at least one of the four positions we plan to fill in the coming year to be a woman.
- We are investigating the possibility of mounting a seminar series focused on women senior PhD students and postdoctoral fellows across Canada in order to help proactively identify promising future faculty candidates.

Figure 22: CHE Regular Faculty Complement Plan Performance to Target

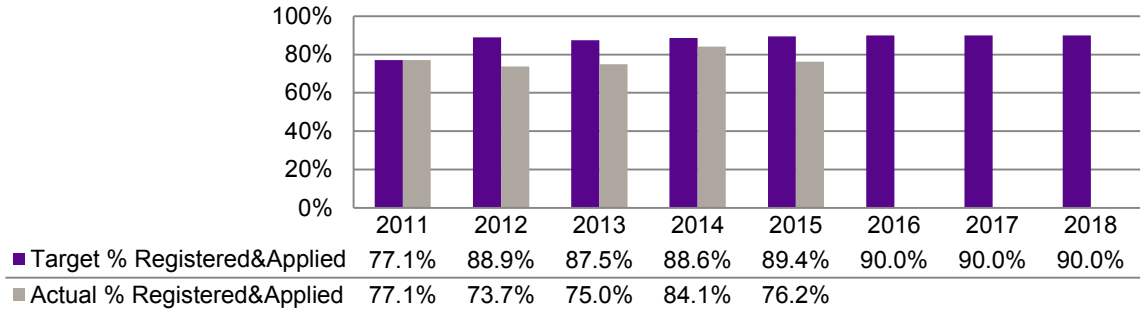


	2011	2012	2013	2014	2015	2016	2017	2018
Target Total	35.0	36.0	36.0	35.0	38.0	38.0	38.0	38.0
Actual Total	35	38	36	34.5	31.5			
Target % Women	5.7%	8.3%	11.1%	11.4%	11.2%	13.0%	13.0%	13.0%
Actual % Women	5.7%	7.9%	8.3%	11.6%	9.5%			

A3: Increase the Number of Faculty Holding Professional Engineering License

- The reduction in the proportion of chemical engineering faculty who are registered or applied for PEng status seen in Figure 23 results from the departure of a number of established faculty. We anticipate this level to increase in the coming years as new faculty members apply and become registered. By the end of this extended plan period we should be performing above the established target on this measure.

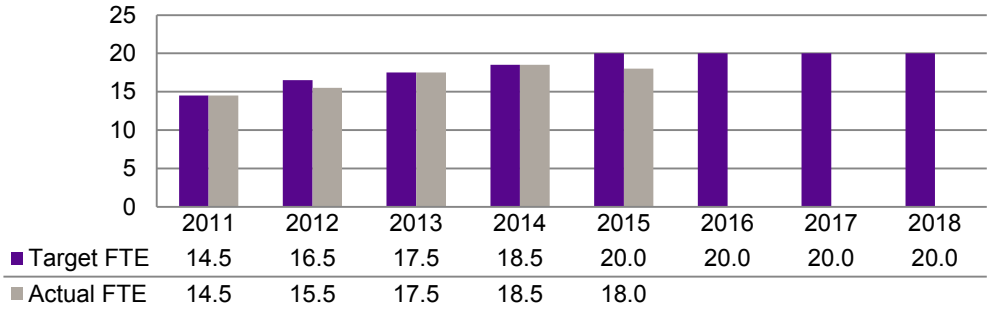
Figure 23: CHE Regular Faculty PEng Status Performance to Target



A4: Recruit New Staff as Shown in the Staff Complement Table

- The apparent reduction in FTE staff shown in Figure 24 results from a correction to the FTE distribution of an existing joint staff member and does not reflect a departure from the department.
- During consideration of this extension of our plan to 2018, we observed the need for additional staff to support our graduate programs and to enhance our website content, and for an additional laboratory technician. We have also identified unrealized opportunities that require an industrial relations officer to capitalize on (see Goal D3). Efforts are ongoing to identify funding sources for these potential positions.

Figure 24: CHE Regular Staff Complement Plan Performance to Target



A5: Introduce Strategies for Inter-departmental Social and Professional Interactions

- In 2016 we will establish a committee to co-ordinate the department's flagship seminar series and we will better advertise it. Opportunities are being sought to increase the resources available to this key initiative.
- A number of social events are in place to connect faculty, staff and students (e.g. Meet the Profs, CEGSA BBQ, graduation reception), and we encourage faculty and staff to take their lunch break in the E6 lounge. We will analyze which initiatives are working best and make adjustments as required.

B. UNDERGRADUATE STUDIES PLAN

Figure 25: CHE Undergraduate Intake Plan Performance to Target

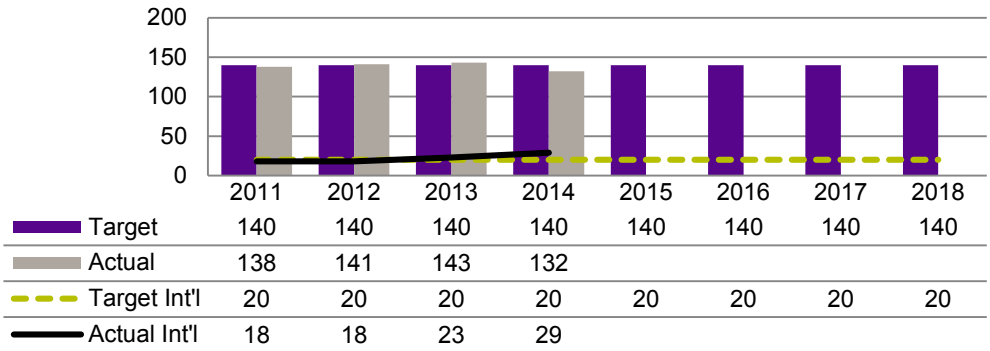


Figure 26: NANTE Undergraduate Intake Plan Performance to Target

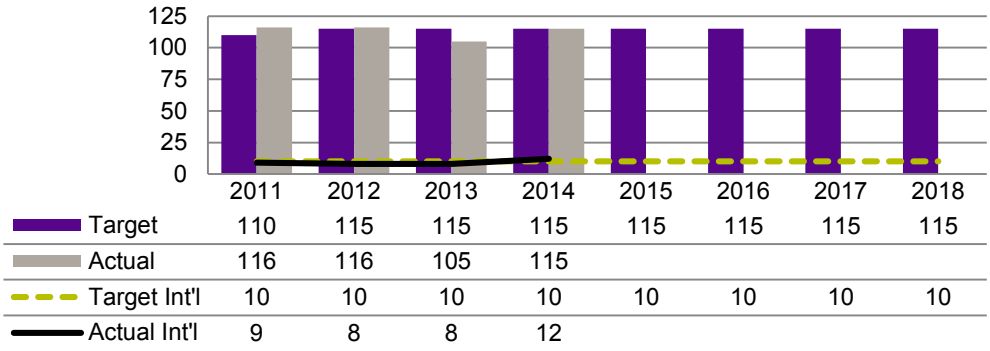
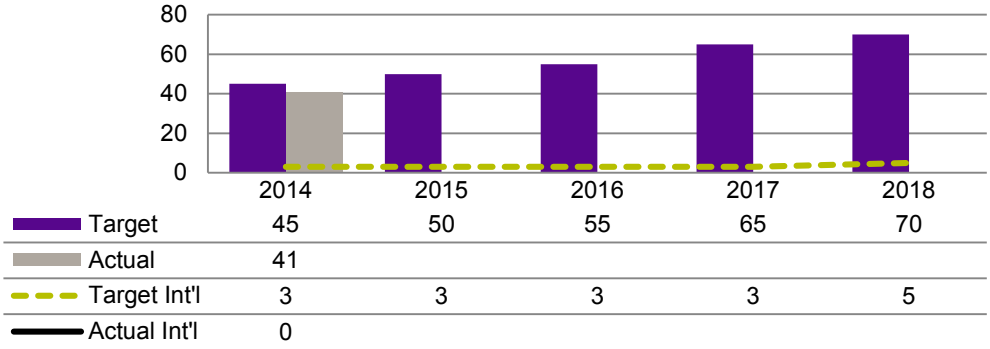


Figure 27: BIOE Undergraduate Intake Plan Performance to Target



B1: Improve the Laboratory Experience in the Curriculum

- Implementation of the $2.3 million investment to CHE through the Vision 2015 Undergraduate Laboratory Enhancement Initiative is almost complete. The new major equipment purchased are pilot-scale processes which can be used to illustrate complex chemical processes to junior students and as operational/design tools for senior students.
- CHE lab instructors have started developing more open-ended laboratories with a view toward providing students with more creative studies. More input is needed from faculty members toward this initiative.
- We have recently conducted surveys to assess our undergraduate students' view of the undergraduate laboratories, which have identified a need to make improvements in this area. We are focused now on understanding what specifically students are not content with so that we can remedy any concerns.

B2: Improve the Undergraduate Curriculum

- The recently-hired graduate attributes lecturer for CHE, working closely with the Undergraduate Review Committee, will take the lead on identifying curriculum changes required to satisfy the new outcomes-based accreditation process.
- Efforts are ongoing to achieve better course integration within the curriculum and to increase technical electives in topics considered important to chemical engineering.

B3: Improve the Co-op Experience

- CHE continues to work with Co-operative Education and Career Action (CECA), through the Co-op Working Group, to increase opportunities for chemical engineering students, in particular those on their first work term.
- The Undergraduate Review Committee is investigating the possibility of having eight-month senior co-op work terms and the potential implications of such a change on the curriculum.
- A collaboration between first-year instructors and the Undergraduate Review Committee is focused on determining what curriculum modifications are required to add more "sellable" skills (notably communication and computing tools) to the first-year curriculum.
- We have identified the need to add an industrial liaison officer to our staff complement, which could potentially be a cross-appointment with CECA. More details are provided in Goal D3.

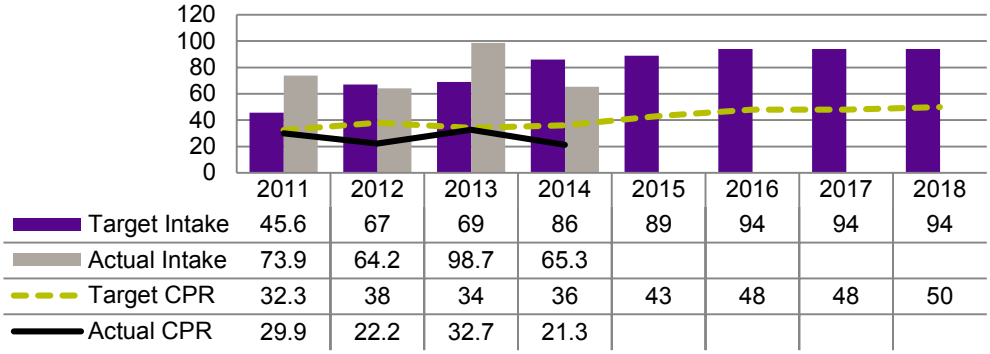
B4: Improve Links with Alumni and Industry

- An exit survey for the 4B class has been developed and implemented. The instrument will be refined during this extended plan period.
- We must make better use of social media to connect with our alumni. Thanks to the initiative of a CHE faculty member, a chemical engineering alumni group of almost 700 members exists on LinkedIn. A focus for the coming year will be to grow this group and use it as a resource to communicate with alumni.
- A priority for the remainder of the extended plan period will be to establish a database of volunteer guest speakers for undergraduate courses, formalizing and expanding on what is currently an ad-hoc practice in some courses.

C. GRADUATE STUDIES PLAN

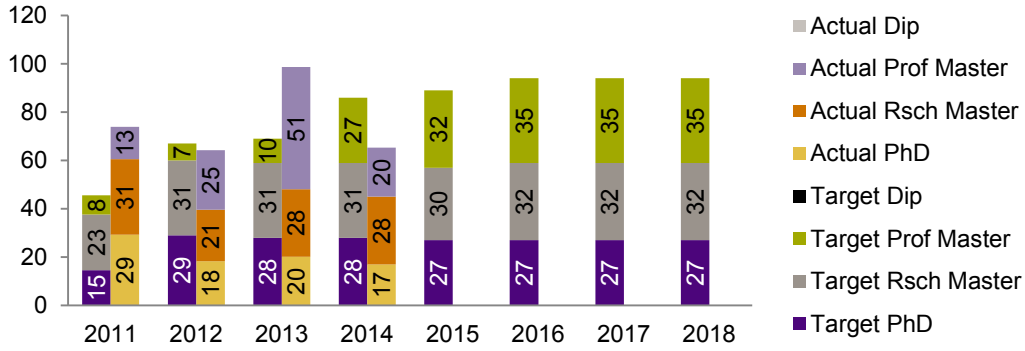
- Given the recent trends in the number of applications from graduate students, in particular CPR students, a more appropriate intake target for the end of the extended plan period would be 90 students overall, with 40 CPR students.
- Graduate intake in 2014 returned to 2012 levels, after a significant increase in 2013 that was largely due to a high number of international students joining the professional master program.
- Preliminary data suggests we will see a significant increase in intake for 2015, with over 80 new students.

Figure 28: CHE Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	45.6	67	69	86	89	94	94	94
Actual Intake	73.9	64.2	98.7	65.3				
Target CPR	32.3	38	34	36	43	48	48	50
Actual CPR	29.9	22.2	32.7	21.3				

Figure 29: CHE Graduate Intake Plan Performance to Target by Program Type



C1: Improve recruitment of High Quality Graduate Students

- CHE participates in the Faculty of Engineering on-campus recruitment event for high-quality CPR students. We are investigating potential resource models for hosting an event specific to chemical engineering, aimed at bringing a dozen high-quality students from across Canada to Waterloo for two days.
- Our web site is the face of the department for most, if not all, prospective students. Improvement of this key communications tool is a high priority. Once sufficient staff resources are available, we will focus on establishing a dynamic, up-to-date web presence (including stories, videos, etc.) to support our graduate recruitment efforts.

C2: Improve the Graduate Course Offering and Quality

- We have developed a single list of 600-level core courses and are working to establish a fixed schedule for offering these courses in given terms.
- In 2016, the Graduate Review Committee will review the current core course model and recommend possible changes to the department for consideration.
- Beginning in 2016, CHE has committed to allocate new sessional resources to allow three additional graduate courses per year. Additional graduate courses will also be added, from 2017 forward, as we increase our faculty complement.

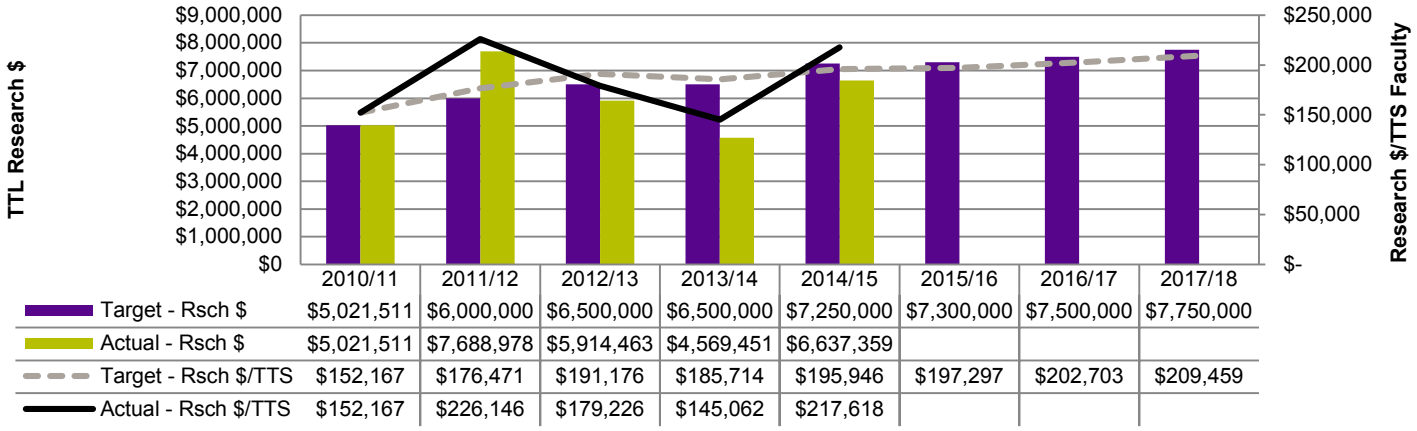
C3: Determine the Feasibility of an On-line MEng Program

- This goal has been postposed in the CHE plan, as it is currently not a department priority.

D. RESEARCH PLAN

- CHE research funding in 2014/15 increased significantly over performance in the past two years, marking our second-highest year of research funding during this plan period to date.

Figure 30: CHE Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$5,021,511	$6,000,000	$6,500,000	$6,500,000	$7,250,000	$7,300,000	$7,500,000	$7,750,000
Actual - Rsch $	$5,021,511	$7,688,978	$5,914,463	$4,569,451	$6,637,359			
Target - Rsch $/TTS	$152,167	$176,471	$191,176	$185,714	$195,946	$197,297	$202,703	$209,459
Actual - Rsch $/TTS	$152,167	$226,146	$179,226	$145,062	$217,618			

D1: Develop Research Theme Planning Documents

- Priorities for 2016 include establishing a comprehensive list of equipment within CHE and appointing a theme co-ordinator for each research theme who will be responsible for co-ordinating the development of a research planning document.

D2: Improve Research Funding

- We continue to provide teaching load reductions and writing support for faculty members leading a large research grant application.
- As noted in the co-operative education strategy above and more fully examined in Goal D3, we have identified the need for an industrial relations officer. This role would negate the need to appoint an associate chair, research and would be responsible for developing a plan for increasing industrial grant funding to CHE faculty members.

D3: Improve Research Support

- Over the plan period to date, we have significantly enhanced our research support through the hiring of a research administrator and a technical operations director. Hiring an additional technical staff member for the central analytical lab is a high priority, but is also resource dependent.
- We are investigating the possibility of hiring an industrial relations officer who would be responsible for increasing partnerships with industry and developing additional co-op job opportunities. The ideal candidate would be someone with industrial experience who is very familiar with chemical engineering and well-connected with relevant industry. Resources must yet be secured to establish such a position.

D4: Foster Multidisciplinary Research and Collegiality

- Starting in 2016, we will increase awareness of research activities carried out within the department through monthly get-togethers in the faculty and staff lounge. These will include short high-level presentations of research activities by faculty members, followed by time to socialize.

E. SPACE PLAN

E1: Improve Effectiveness of Research Lab Space Allocation

- The current lab allocation is not sustainable and is highly inefficient, with variable levels of use across labs. In the coming year, we will investigate different lab space allocations models. The Space Committee will make recommendations for changes in lab space allocation. These will be discussed and refined within the department before implementation.
- We need to increase the amount of communal lab space in CHE, starting with consolidating central analytical laboratories. This will require an additional lab technician, a proposal for which is currently under consideration.

F. TECHNICAL SERVICES PLAN

F1: Develop and Implement a Technical Services Plan for the Department

- The director of technical operations maintains a technical services plan that defines all technical service areas, the tasks to be accomplished in each, and how services will be deployed to the different facilities.

Department of Civil & Environmental Engineering

Neil Thomson, Chair

The Department of Civil & Environmental Engineering (CEE) continues to make substantial progress toward our strategic goals. CEE faculty and staff will participate in a visioning retreat on September 28, 2015 to capture new goals, initiatives, and strategies that will be folded into our original Vision 2015 plan to accommodate the extension of the Faculty of Engineering strategic plan timeframe to 2018.

A significant focus for the department during this plan period to date has been the completion and approval of a comprehensive curriculum and course content review. Implementation of the new curricula in all three of our undergraduate programs begins in September 2015. We have also increased undergraduate student engagement and enhanced the undergraduate student laboratory environment, updating equipment and providing additional hands-on experiences. Program development efforts toward a new architectural engineering program are underway.

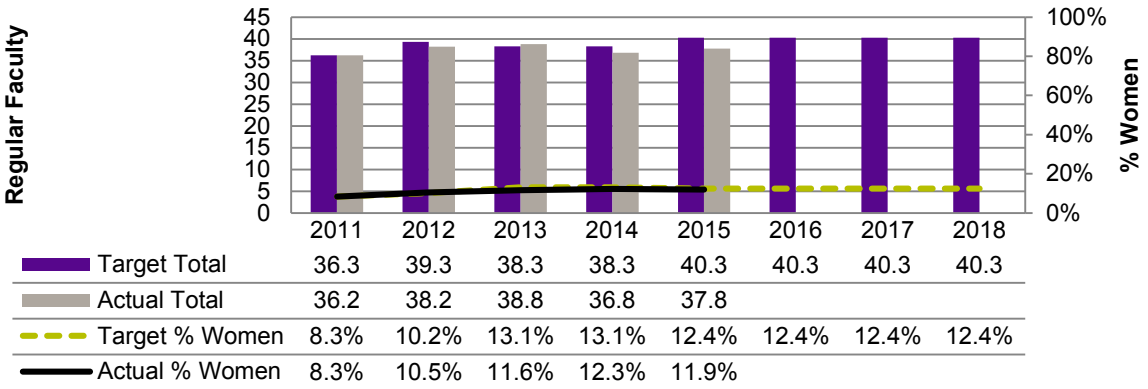
Within our graduate programs, we are pleased to note an increase in Canadian and permanent resident graduate student enrolment. Many initiatives have been implemented with the goal of improving the graduate student experience.

Priorities for the remainder of the extended plan period include improvements to undergraduate student retention and graduate student progression as well as the identification of emerging research areas.

A. FACULTY AND STAFF PLAN

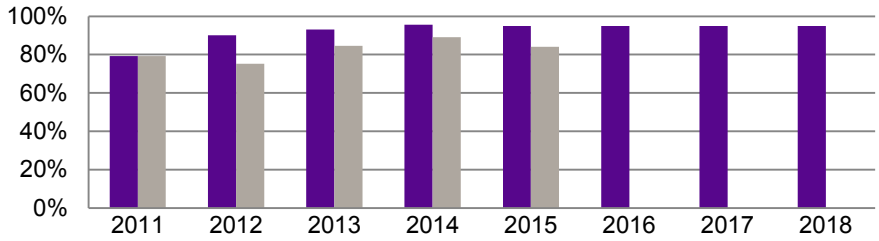
- The current faculty complement in CEE is 37.75 (FTE) comprised of 17.25 FTE professors, 11 FTE associate professors, 7.5 FTE assistant professors, and 2 lecturers. This FTE total includes joint faculty positions with the School of Architecture (0.5 FTE), the School of Planning (0.5 FTE), the Department of Earth & Environmental Sciences (0.5 FTE) and an Ontario Research Chair position shared with the Faculty of Environment and the Department of Management Sciences, Faculty of Engineering (0.25 FTE).
- As of May 1, 2015 CEE had three positions to be filled: one which corresponds to a retirement (Prof. J. Sykes), one to replace Prof. K. Soudki who passed away in September 2013, and the graduate attributes lecturer, which will provide long-term support for the outcome-based accreditation process and to the new ideas clinic.
- The revised target for May 2016 is 40.75 FTE (36.75 + 4.0). This includes a 0.5 FTE exceptional hire that was not included in the original Vision 2015 hiring plan.

Figure 31: CEE Regular Faculty Complement Plan Performance to Target



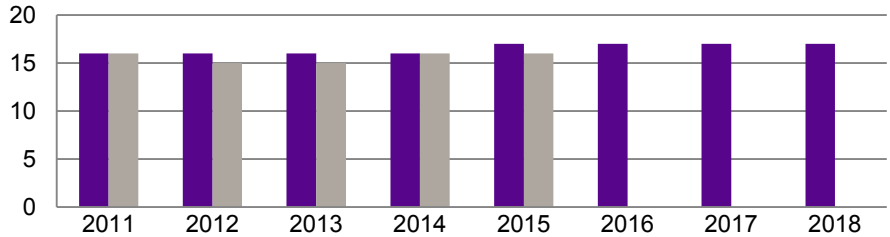
	2011	2012	2013	2014	2015	2016	2017	2018
Target Total	36.3	39.3	38.3	38.3	40.3	40.3	40.3	40.3
Actual Total	36.2	38.2	38.8	36.8	37.8			
Target % Women	8.3%	10.2%	13.1%	13.1%	12.4%	12.4%	12.4%	12.4%
Actual % Women	8.3%	10.5%	11.6%	12.3%	11.9%			

Figure 32: CEE Regular Faculty PEng Status Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target % Registered&Applied	79.3%	90.1%	93.1%	95.6%	95.0%	95.0%	95.0%	95.0%
Actual % Registered&Applied	79.3%	75.2%	84.5%	89.1%	84.1%			

Figure 33: CEE Regular Staff Complement Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target FTE	16.0	16.0	16.0	16.0	17.0	17.0	17.0	17.0
Actual FTE	16.0	15.0	15.0	16.0	16.0			

A1: Implement Faculty Complement Plan

- Chris Bachmann joined CEE as assistant professor on May 1, 2015 (Saccomanno replacement).
- Rania Al-Hammoud joined CEE in the new graduate attributes lecturer role on June 1, 2015.
- Rebecca Saari will join CEE as assistant professor on September 1, 2015 (Sykes replacement).

A2: Implement Staff Complement Plan

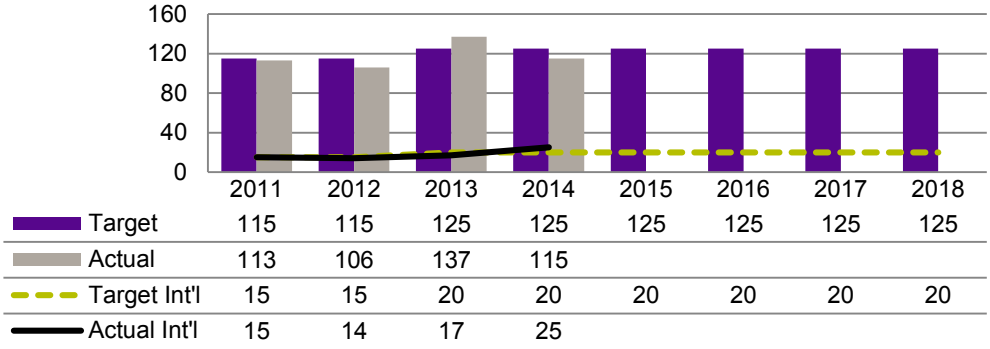
- On May 7, 2015 Gwen Bender, financial assistant for research and contracts, assumed a 14-month secondment to the Office of Research; Gail Bender was hired to fulfil these duties over this period.
- Samanthi Sooriyabandara joins CEE as accreditation assistant on August 1, 2015.
- A new technical resources manager position was approved in 2014/15 and advertising began in July 2015.
- Significant changes to our original staff plan resulted from the reconsolidation of the UAE program:
    - The additional administrative staff position to support the graduate office is no longer available. Rather, responsibilities of the department secretary were reworked to provide back-up coverage and the administrative co-ordinator, graduate studies' responsibilities were reviewed to improve efficiency and client service.

- Notwithstanding the loss of funding for a new senior technician with management responsibilities, CEE went ahead with an in-depth review of our technical staff structure. We concluded that an amended structure be adopted through the appointment of a technical resources manager who will assume responsibility, under the supervision and direction of the administrative officer, for strategic planning related to technical needs, management of the CEE health & safety program, management and leadership of the technical staff, and management of the labs.
- The envisioned technician to support the transport/structures area is no longer available. While CEE has taken steps to support the needs of the structures area through the implementation of a work management scheduling system and periodic hiring of a lab assistant, work flow continues to remain a challenge. We will continue to work with researchers in the transport area on their technical needs.
- The technical staff position to support growth in field research activities is no longer available.
- The envisioned IT support role is no longer available. We continue to examine our needs in the area of website/database support.

B. UNDERGRADUATE STUDIES PLAN

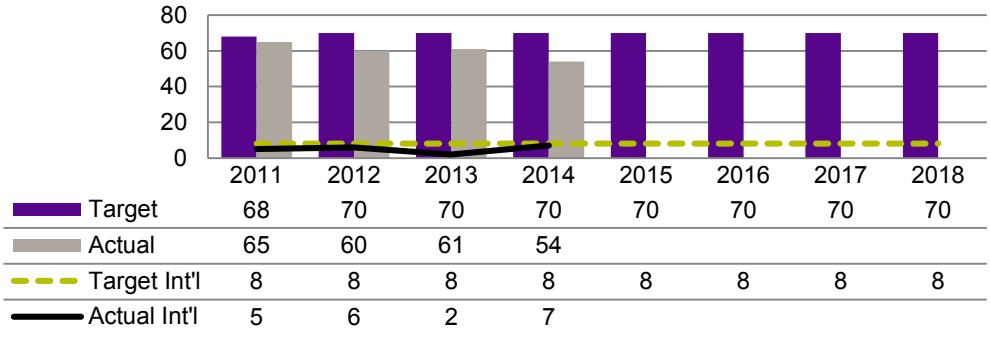
- Intake into the civil engineering program in 2014 was below target for reasons unknown; this is an academically strong cohort.
- Intake into the environmental engineering program remains strong but slightly under target. This appears to be a consistent trend. Focussed efforts by the engineering undergraduate recruitment staff, with input from CEE, are required for this program to increase the pool of strong applicants from across Canada.
- Intake into the geological engineering program was above target in 2014.

Figure 34: CIVE Undergraduate Intake Plan Performance to Target



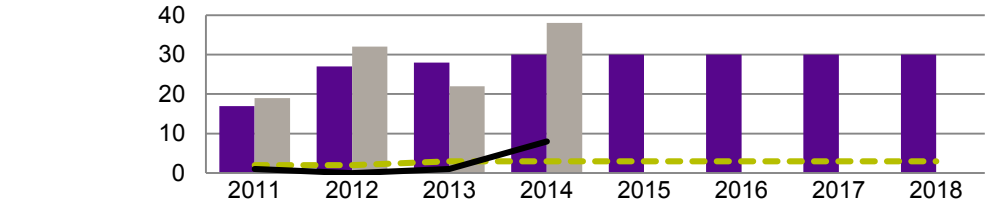
	2011	2012	2013	2014	2015	2016	2017	2018
Target	115	115	125	125	125	125	125	125
Actual	113	106	137	115				
Target Int'l	15	15	20	20	20	20	20	20
Actual Int'l	15	14	17	25				

Figure 35: ENVE Undergraduate Intake Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target	68	70	70	70	70	70	70	70
Actual	65	60	61	54				
Target Int'l	8	8	8	8	8	8	8	8
Actual Int'l	5	6	2	7				

Figure 36: GEOE Undergraduate Intake Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target	17	27	28	30	30	30	30	30
Actual	19	32	22	38				
Target Int'l	2	2	3	3	3	3	3	3
Actual Int'l	1	0	1	8				

B1: Comprehensive Curriculum and Course Content Review

- The last major changes to the civil, environmental and geological engineering curricula were made in 2000. A comprehensive curriculum and course content review was identified as a priority in our Vision 2015 plan.
- All the curriculum changes have been approved and are being implemented starting with the first-year class in September 2015.
- The new curricula include a number of new courses, as well as revision of numerous existing courses. A common first year has been maintained for all three programs. The first-year changes are intended to improve student engagement and success, to provide better integration with course material in second-year courses and above, and to increase student exposure to engineering faculty in the classroom.

B2: Laboratory Equipment Upgrades and Enhancements

- Upgrading and expanding laboratory equipment in undergraduate teaching laboratories is an ongoing activity. CEE is committed to using the funds available for laboratory enhancement to enrich the hands-on experience of its undergraduate students and, as such, has selected initiatives that are tied to improving that experience and that will impact a significant number of undergraduate students in all three of our programs.
- During 2014/15 the following purchases were made:
  - $83,000 on soils testing equipment to support GEOE 153, CIVE 353 and CIVE 354;
  - $33,000 on material testing equipment to support CIVE 265 and CIVE 414;
  - $43,000 on environmental water quality testing equipment to support ENVE 275, ENVE 330, ENVE 375, ENVE 376, ENVE 472 and CIVE 375; and
  - $41,000 on traffic flow equipment to support CIVE 241 and CIVE 341.

B3: Student Retention

- With our major curriculum review project completed, action toward this object is planned for early 2016.

B4: Student Engagement/Experience

- In fall 2014 the GEOE students were given study/social space on a temporary basis in addition to the study/social space already provided to fourth-year students.
- Faculty attendance at convocation and other student events has increased. Beginning in June 2014, CEE holds a reception immediately following convocation for students, their families, faculty and staff.
- Undergraduate project teams have been encouraged to compete in national and international design competitions. Two new teams (concrete canoe and ASCE steel bridge) were formalized in 2013/2014, with the concrete canoe team participating in its first national competition in May 2014. The combined efforts of these two teams have expanded the team numbers, activities and sponsorship success to the degree where they have recently been allocated a large work bay space in the Sedra Student Design Centre.
- Following revision to the process for marking work-term reports completed in spring 2013, further minor changes have been made to streamline processing.

- In winter 2014 we initiated a review of our capstone design project courses with the objectives of enhancing the engineering design content in our programs, promoting creative problem solving and innovation, and ensuring that the course curriculum is appropriate for the graduate attributes to be measured. While this effort is ongoing, in December 2014 we held our first "pitch competition" at the end of 4A for ENVE 430 and GEOE 400, and in March 2015 we held our first capstone design symposium for all three of our programs. These changes are expected to enhance the student learning and design experience significantly.

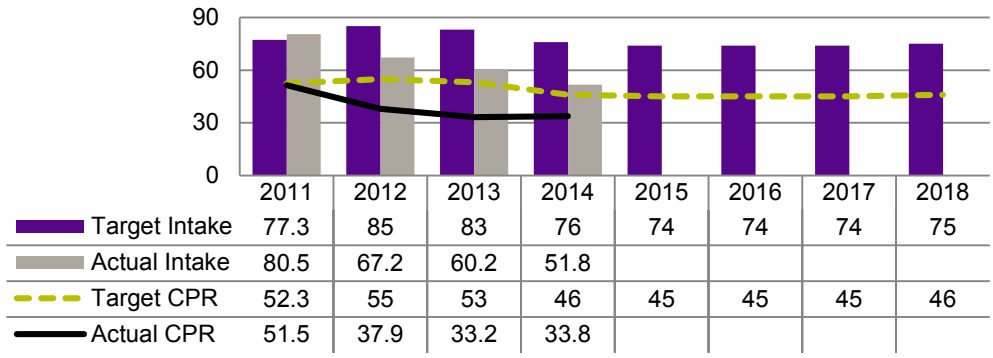
B5: Architectural Engineering (AE) Program

- The AE Program Committee has been meeting regularly and is working toward the completion of a draft proposed brief for an architectural engineering undergraduate program. We expect the initial draft to be available for internal review by CEE in September 2015.

C. GRADUATE STUDIES PLAN

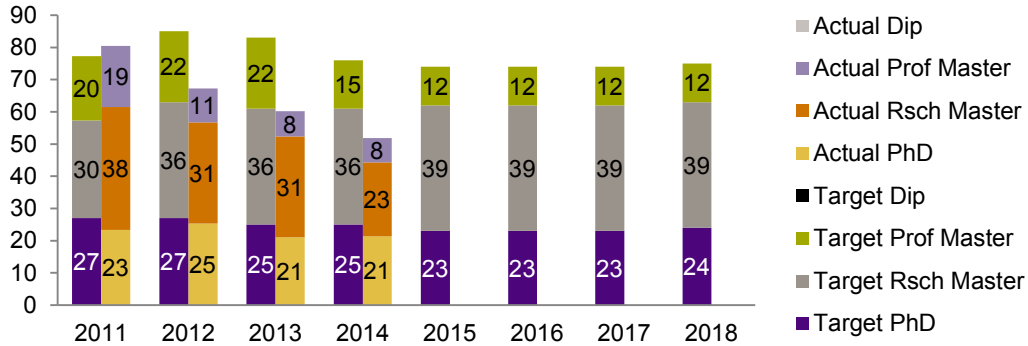
- Intake into the graduate program in 2014 was below target, with a decline in research master intake from the previous year.
- Looking forward, graduate enrolment for 2015 is on target for CPR students and slightly under target for international students as a result of research funding limitations.
- For fall 2015, the numbers for offers made and offers accepted by CPR applicants have increased by 100% and 200% respectively.

Figure 37: CEE Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	77.3	85	83	76	74	74	74	75
Actual Intake	80.5	67.2	60.2	51.8				
Target CPR	52.3	55	53	46	45	45	45	46
Actual CPR	51.5	37.9	33.2	33.8				

Figure 38: CEE Graduate Intake Plan Performance to Target by Program Type



C1: Graduate Growth and Quality

- Overall graduate intake growth has been slower than expected despite the fact that the CEE FTE research graduate student supervised per faculty has increased significantly from 4.5 to 5.2 (as seen in Figure 110, the Faculty of Engineering average is 4.5). This graduate student load is likely the maximum possible, due to a number of factors which include: (i) research funding required to support students; (ii) supervisory capacity of faculty members; (iii) transition between retirements and hiring; and (iv) insufficient good quality applicants. Item (iv) is particularly relevant to the decreased intake of CPR students. For these reasons additional enrolment will be limited to new hires.

- Additional growth in the professional master's (MEng) program needs to be promoted through strategic changes to the structure of the MEng program and the adoption of improved recruitment practices, which are currently co-ordinated by the Faculty of Engineering.
- The noted increase in CPR applications for fall 2015 is perhaps related to our efforts in promoting graduate studies to our upper-year students as well as the Faculty of Engineering recruitment initiatives.

C2: Graduate Course Offerings

- The number of graduate courses offered has remained the same at ~24 courses (600 and 700 level) each year. Given the resources available this number of graduate courses cannot be significantly increased.
- CEE has added a note to its web site clearly indicating that not all of the courses listed in the calendar are offered each academic year. In addition, CEE has established a core set of graduate courses that are normally offered at least once in each fall-winter-spring cycle.

C3: MEng Program(s)

- Strategic changes to the structure of the MEng program are required. Action is anticipated for late 2015.

C4: Graduate Student Experience

- A research methods course is now a compulsory milestone for all new research graduate students.
- In 2014/15 approximately seven CEE doctoral students who had completed the CTE Certificate in University Teaching program were provided the experience to be a sessional lecturer.
- To encourage excellence in teaching assistantship, an outstanding CEE TA is selected each term. Recipients in 2014/15 were Georgios Balomenos, Colin VanNiejenhuis and Kevin Goorts. A special recognition certificate has also been created to recognize various sustained achievements. The recognition was first awarded in spring 2015, to Georgios Balomenos and Nicole O'Brien.
- We are working through a series of renovations to graduate student office space and have purchased 126 state-of-the-art study carrels (at a cost of $2000 each) for graduate student use. The majority of the 69 offices assigned to graduate students are in Engineering 2, with others in CPH and Engineering 3. Some of the rooms are partitioned into cubicles that provide some privacy; others are open rooms.
- Various opportunities for socialization among graduate students, faculty and staff are organized each year.

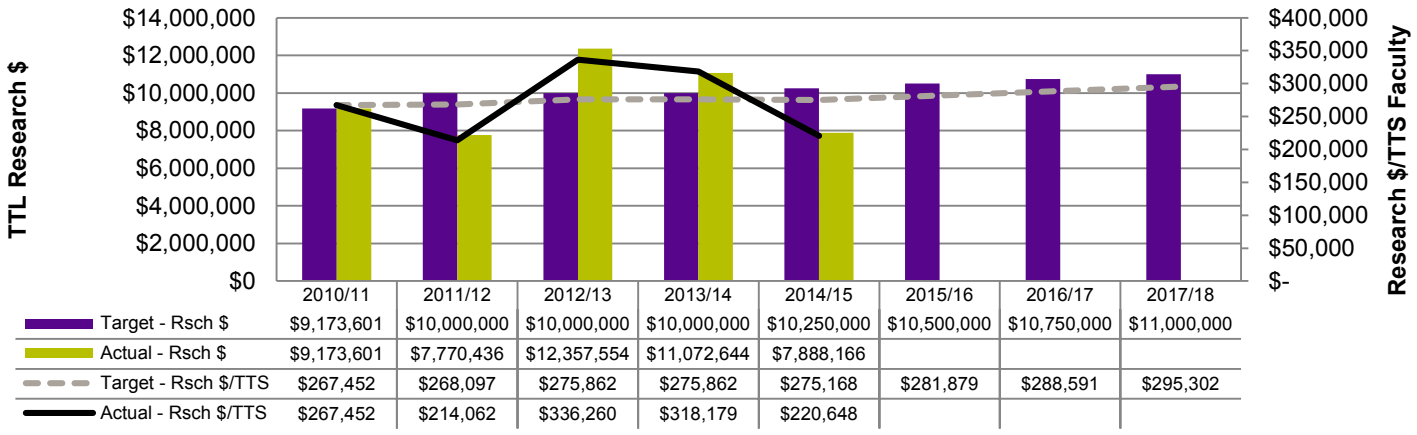
C5: Graduate Student Progression

- This objective remains a priority for the remainder of the extended plan period. Additional diligence will be applied to ensure students submit term progress/activity reports on a regular basis so that issues with progression are identified and addressed promptly.

D. RESEARCH PLAN

- As shown in Figure 39, CEE total research funding and funding per tenured/tenure-stream faculty member both in 2014/15 after several strong years. While all the reasons for this decline are unclear, it may be partially due to the research activity transition between retiring and new faculty.

Figure 39: CEE Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$9,173,601	$10,000,000	$10,000,000	$10,000,000	$10,250,000	$10,500,000	$10,750,000	$11,000,000
Actual - Rsch $	$9,173,601	$7,770,436	$12,357,554	$11,072,644	$7,888,166			
Target - Rsch $/TTS	$267,452	$268,097	$275,862	$275,862	$275,168	$281,879	$288,591	$295,302
Actual - Rsch $/TTS	$267,452	$214,062	$336,260	$318,179	$220,648			

D1: Identification of Emerging Research Areas

- While the department has made some minor progress on this objective, we must make it a priority for 2015/16.

Conrad Business, Entrepreneurship & Technology Centre

Mark Weber, Director

The past year has been an exciting and busy one for the Conrad Business, Entrepreneurship & Technology Centre (Conrad), but not without its challenges. We have added two new full-time lecturers and made successful offers to two new tenure-stream faculty members who will be joining us shortly. Staff changes and hiring occurred to support our growth plan. We have significantly grown our portfolio of programs related to entrepreneurship education, significantly increasing our ability to support the strategic objectives of the University of Waterloo and the Faculty of Engineering.

At the undergraduate level, we launched the option in entrepreneurship for undergraduate students in Engineering and received all required approvals for the campus-wide minor in entrepreneurship, available September 2015.

At the graduate level, Conrad's MBET program enjoyed a meaningful increase in enrolment, which we believe to be the result of our marketing efforts in 2013/2014. Market and logistical research continue related to launching a part-time MBET domestically. Talks also began over the past year to potentially partner with the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) on a special offering of MBET for Mexican students.

A. FACULTY AND STAFF PLAN

- As shown in Figure 40, Conrad's faculty complement increased in 2014/15 by two lecturer positions to support undergraduate entrepreneurship offerings.
- In mid-2015, Conrad successfully recruited two new tenure-stream faculty members. The first joined the faculty in July 2015, and the second will join in January 2016. The arrival of these two hires will bring us to 77% of plan. These individuals are not included in Figure 40 because their start dates fall after May 1, 2015.
- It is difficult to assess the appropriateness of the original projections for faculty numbers. Clarity will hopefully emerge in the coming year as we pursue a part-time MBET launch, possible partnerships globally, and greater certainty around undergraduate program demand.

Figure 40: CONRAD Regular Faculty Complement Plan Performance to Target

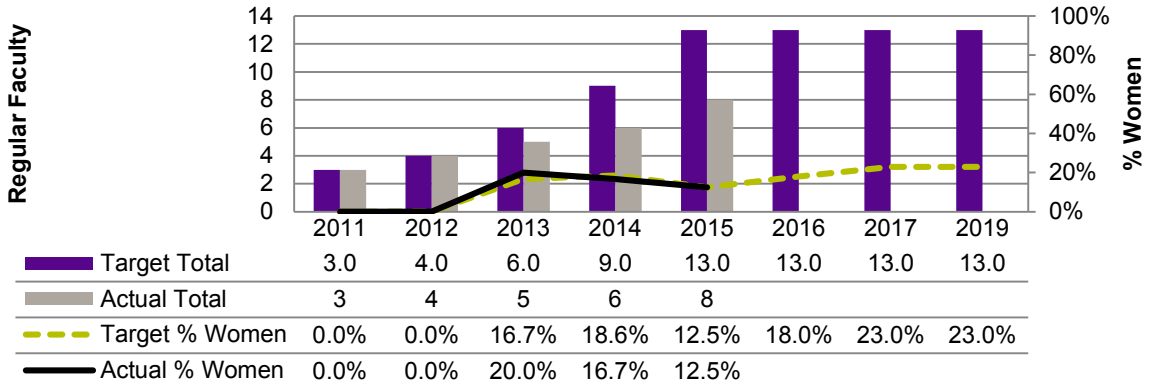
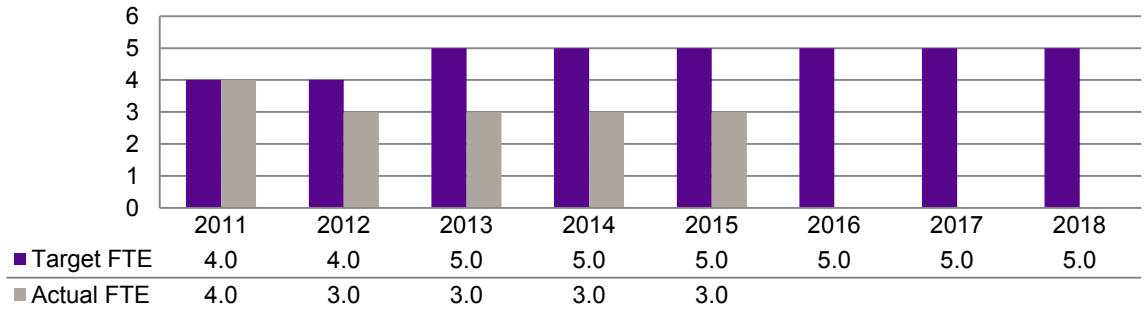


Figure 41: CONRAD Regular Staff Complement Plan Performance to Target



A1: Transition From a Model of Using Faculty Seconded from Other Departments and Sessional Instructors to One in Which There is a Core of Tenured/Tenure-Track Faculty Supplemented with Sessionals Who Bring Professional Experience to the Classroom

- We are well on our way to achieving this goal. Our reliance on part-time faculty has decreased significantly.

A2: Hire an IT and Online Learning Support Manager to Support Growth and Launch of New Programs

- This position has not been necessary.
- We anticipate needing new staff to support our growth and emerging strategic objectives, but not specifically in this domain. For example, a definite-term contract staff position will be established to advance potential global partnerships and programs.

A3: Convert Enterprise Co-op Co-ordinator Position from a Contract to a Continuing Appointment (Once Permanent Mandate to Run E Co-op is Secured)

- This will be revisited when a permanent mandate is secured.

A4: Replace Individuals in Non-complement/Part-time Positions such as the Entrepreneur-in-Residence and Lead Mentor/Business Plan Coach as Required During the Planning Period

- We are currently developing a broader complement of entrepreneurs-in-residence with more people and a greater diversity of skills, but lesser time commitments for each. This strategy revision is cost-neutral.

B. UNDERGRADUATE STUDIES PLAN

B1: Secure Permanent Mandate to Run Enterprise Co-Op

- This proposal should be made to the university's senior leadership in fall 2015.

B2: Collaborate With CECA in Developing Programs around Alternative Labour Models

- The Bridging Entrepreneurs to Students (BETS) and E Co-op programs continue to be highly successful. More information on BETS is provided in Section III. H of this report.

B3: Explore Opportunities to Create Undergraduate Entrepreneurship Options/Specializations

- These objectives have now been achieved with the 2014 launch of the entrepreneurship option in Engineering and the fall 2015 launch of an entrepreneurship minor that is available to all students across the campus.

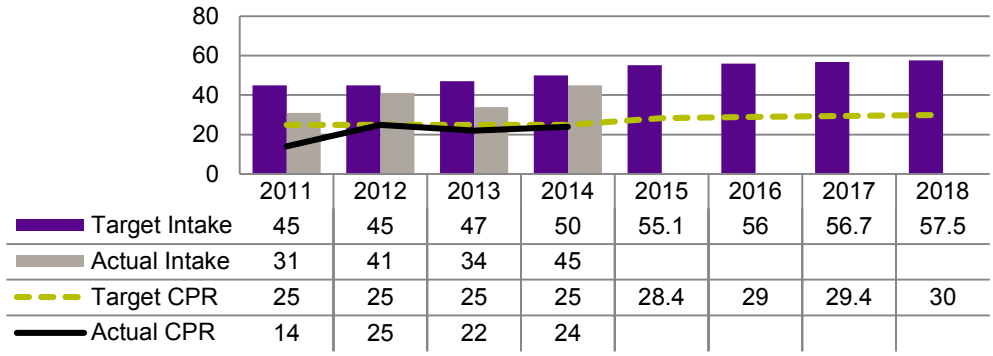
B4: Provide Support for Capstone Entrepreneurship Awards

- A number of awards are now available, most notably the awards funded by the Esch Foundation.

C. GRADUATE STUDIES PLAN

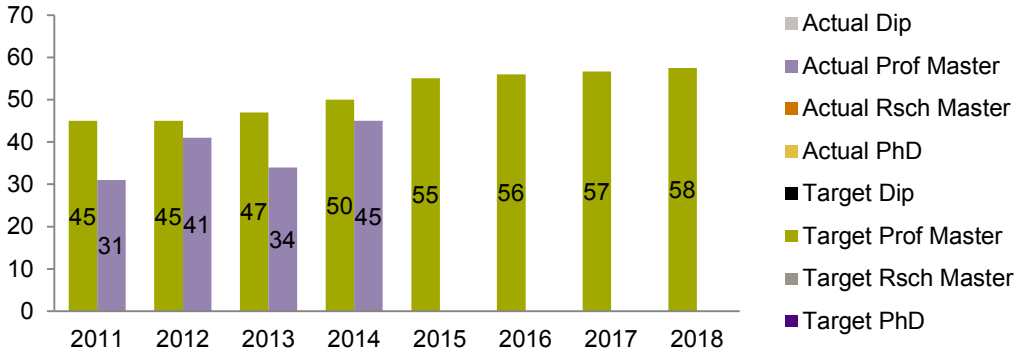
- As shown in Figure 42 and Figure 43, 2014 saw a significant increase in MBET intake.
- Going forward, new immigration rules that make one-year master's programs significantly less attractive are sure to put substantial downward pressure on international intake. We expect 2015 numbers to decrease while we develop new approaches to target domestic candidates. However, there will be a lag before those approaches are likely to bear fruit.
- Growth in MBET numbers seems most likely to arise from future global partnerships and a possible part-time MBET program launch.

Figure 42: CONRAD Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	45	45	47	50	55.1	56	56.7	57.5
Actual Intake	31	41	34	45				
Target CPR	25	25	25	25	28.4	29	29.4	30
Actual CPR	14	25	22	24				

Figure 43: CONRAD Graduate Intake Plan Performance to Target by Program Type



C1: Enhance MBET Program

- MBET has gone through a complete programmatic review in the last year, which has resulted in significant enhancements and greater integration among courses. We are piloting those changes in the coming year.

C2: Launch a Part-time MBET Program

- A business plan for a part-time MBET program is in development.

C3: Offer Diploma in Business and Entrepreneurship to Students in MEng Degree Programs

- This diploma program is now being offered.
- A program review will take place in the coming year.

C4: Develop a Strategic Marketing Plan to Ensure Graduate Intake Targets are Met

- Recruitment has continued to be quite strong in a very difficult market for graduate business education.
- Progress with respect to marketing objectives was negatively affected by staffing challenges from January 2015 to July 2015, during which time formal planning and progress was very minimal.

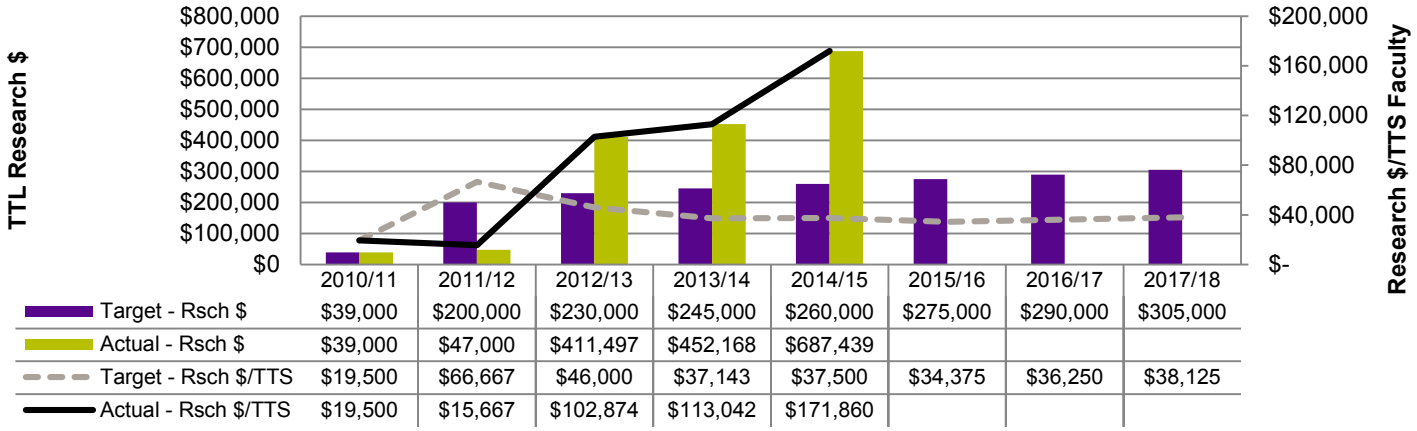
C5: Explore Opportunities for Additional Taught Master's Programs to Launch in 2015-2020 period

- Conrad will continue to focus on MBET as its taught master's program, but also on new iterations and forms. The two most likely possibilities are partnering with ITESM around a Mexican MBET cohort and the launch of a part-time MBET program focused on domestic applicants.

D. RESEARCH PLAN

- Conrad's research funding looks very strong against plan (see Figure 44). However, this is heavily influenced by a single very large multi-year grant. The existing target for funding per tenured/tenure-stream faculty member remains aggressive given the fields in which Conrad faculty specialize.

Figure 44: CONRAD Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$39,000	$200,000	$230,000	$245,000	$260,000	$275,000	$290,000	$305,000
Actual - Rsch $	$39,000	$47,000	$411,497	$452,168	$687,439			
Target - Rsch $/TTS	$19,500	$66,667	$46,000	$37,143	$37,500	$34,375	$36,250	$38,125
Actual - Rsch $/TTS	$19,500	$15,667	$102,874	$113,042	$171,860			

D1: Grow Conrad's Research Capacity and Reputation

- The addition of two new tenure-stream faculty should aid significantly in this respect.

D2: Develop Opportunities for New Faculty to Supervise Research Master's and PhD Students

- These opportunities remain limited. The University of Waterloo lacks research graduate programs in the fields of most Conrad faculty, and Conrad lacks the critical mass of scholars necessary to launch its own programs of this kind.

D3: Encourage Collaboration with Researchers in Other Disciplines

- These efforts are ongoing. Plans for the coming year include convening a semi-formal interdisciplinary group focused on entrepreneurship.

E. DEVELOPMENT PLAN

E1: Establish a Development Committee as a Sub-committee of the Conrad Advisory Council

- Conrad has had a development committee for years.

E2: Establish an Alumni Committee

- We do not have current plans to establish an alumni committee, but have significantly intensified our alumni efforts, including the hosting of semi-annual alumni events in the Greater Toronto Area and Waterloo Region.

E3: Work Closely with Faculty and University Development Efforts to Support Entrepreneurship

- Conrad continues to participate in these efforts as invited.

F. GOVERNANCE, ADMINISTRATION AND LEADERSHIP PLAN

F1: Complete Transition from Independent Research Centre to School within the Faculty of Engineering

- A proposal to make this change will be presented to Engineering Faculty Council in fall 2015.

F2: Launch "Conrad" Brand and Develop a Distinctive Identity for the Centre as an Academic Unit within the Faculty of Engineering

- The transition from CBET to Conrad branding occurred in 2012 and has continued to be supported through marketing efforts since.

F3: Review Role of Entrepreneur-in-Residence (EIR)

- Conrad has written role specifications and is moving to a new model of EIR that will involve more people with smaller time commitments.

F4: Improve Administrative Systems to Increase Efficiency and Scalability as Centre Grows

- Role clarifications, staffing changes, and the implementation of new administrative systems are positioning the centre for growth.

F5: Plan for succession at the Director and Associate Director Levels

- With a recent change of director and the appointment of two new associate directors, Conrad does not face a succession for at least two years. Thought has been given to succession.

Department of Electrical & Computer Engineering

Manoj Sachdev, Chair

The Department of Electrical & Computer Engineering (ECE) went through a period of rapid growth in the last several years, making it one of the largest engineering departments in Canada. In 2014/15, ECE continued its steady progress towards its strategic plan targets. In spite of annual budget cuts and the associated impact on our operation, the department has made substantial progress and is in excellent fiscal health.

At the undergraduate level, our strategic intention was to admit more international students, while keeping overall intake steady. At present, approximately 17% of our incoming students are international. We have implemented several initiatives and made significant resource investments to enhance student engagement and experience. In the past year, we hired a lecturer for CEAB outcomes assessment and Engineering Ideas Clinic™ activities. Furthermore, we held several town hall meetings with large groups of undergraduate students who provided excellent feedback on our activities, both academic and non-academic.

At the graduate level, we have made significant progress on student funding. Additional resources are allocated to ECE graduate scholarships, teaching assistantships, and Canadian and permanent resident student intake. Our graduate program has also been strengthened through the introduction of core courses for research students and an increase to four courses required for doctoral students. ECE has also approved a split in the PhD comprehensive examination to ensure higher-quality graduate studies and more timely feedback for graduate students. Annual milestones have been set for doctoral students to ensure continual feedback through their program.

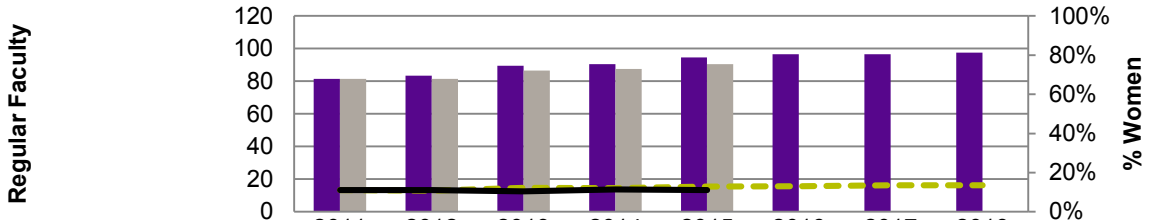
ECE faculty members have been successful this year in receiving major research grants from NSERC, ORF and CFI. We have introduced a research stimulation grant program to provide selected ECE faculty members with financial resources to help them build or increase research capacity. We have allocated $200,000 from department resources this year for this program. The department has also increased the number of internal research awards for ECE faculty who excel in research, from two per year up to four.

A. FACULTY AND STAFF PLAN

A1: Implement the ECE Faculty Hiring Plan

- Five new faculty members joined ECE in 2014/15: Mark Crowley (software), John Long (RFIC), Adam Neale (first-year lecturer), Michael Reimer (ECE/IQC), and Derek Wright (graduate attributes lecturer). Three other faculty members have been hired with start dates after May 1, 2015 and are not included in Figure 45.
- Two faculty members, Siddarth Garg and Shreyas Sundaram, resigned in 2014/15.
- Hiring female faculty members continues to pose a challenge in ECE disciplines.

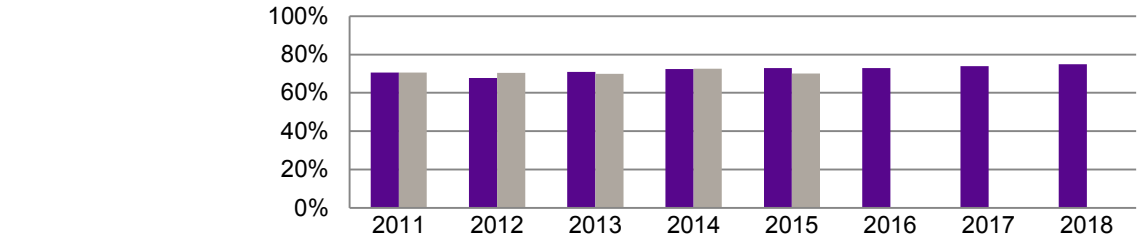
Figure 45: ECE Regular Faculty Complement Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target Total	81.5	83.5	89.5	90.5	94.5	96.5	96.5	97.5
Actual Total	81.5	81.5	86.5	87.5	90.5			
Target % Women	11.0%	10.8%	12.3%	12.2%	13.0%	13.0%	13.5%	13.5%
Actual % Women	11.0%	11.0%	10.4%	11.4%	11.1%			

- The department is actively encouraging faculty members to register as professional engineers in Ontario. Approximately 70% of ECE faculty are registered and/or have applied for PEng. This number is likely to improve as we require our new hires to apply for PEng status as soon as possible.

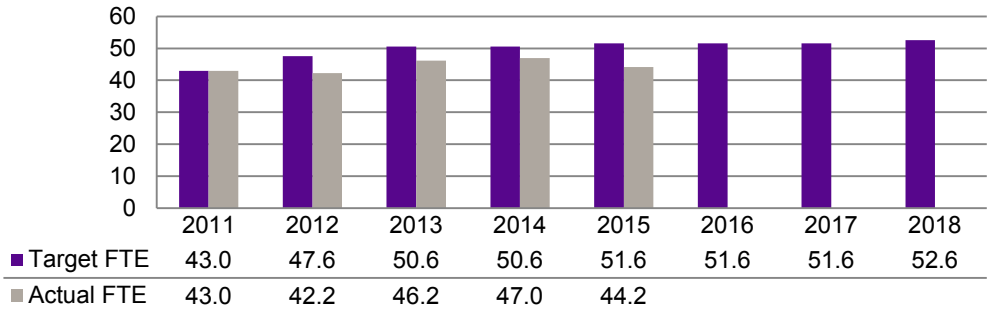
Figure 46: ECE Regular Faculty PEng Status Performance to Target



A2: Implement the ECE Staff Hiring Plan

- We filled two administrative staff positions (Liz Hadland and Jackie Leach) and two research staff positions (Denise Gosselink and Chris Schroeder) in 2014/15. Because the latter positions are contingent on funding, they are not included in Figure 47 below.
- During the same period, two staff members (Paul Hayes and Diana Macfarlane) retired, and two staff members (Annette Dietrich and Rob Mullins) took positions in other departments.
- Over the past few years, several external factors (immigration, safety, etc.) have contributed to increase our compliance responsibilities, which consume large amounts of many employees' time. To meet these increasing compliance functions, we are increasing our use of technology to manage workload and we continue to reshape the staff complement to better serve its stakeholders.
- ECE received the highest possible rating for safety processes and procedures from an audit of our safety management system.

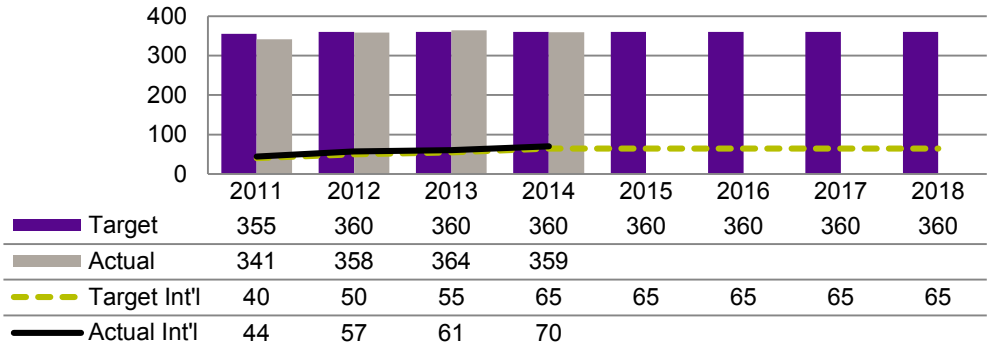
Figure 47: ECE Staff Complement Plan Performance to Target



B. UNDERGRADUATE STUDIES PLAN

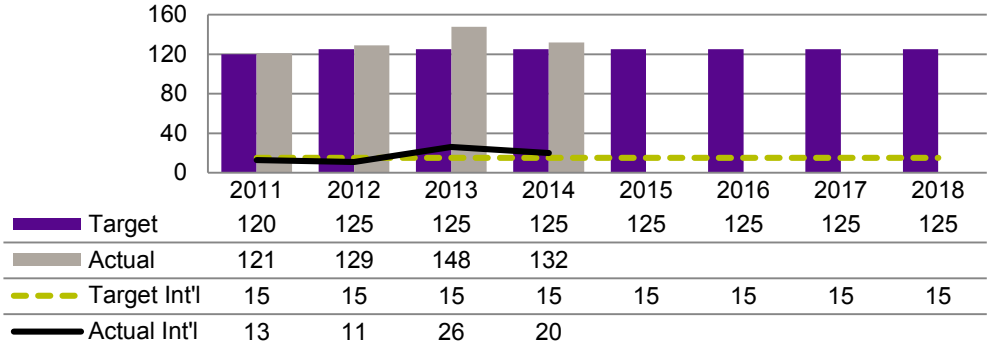
- At the undergraduate level, ECE is responsible for 2,208 students, an increase of over 6% from 2010/11.
- We manage three combined cohorts of students in electrical engineering (EE) and computer engineering (CE) and participate in four collaborative engineering programs: software engineering (50% share); mechatronics engineering (20%); nanotechnology engineering (33%); and biomedical engineering (10%).

Figure 48: EE&CE Undergraduate Intake Plan Performance to Target



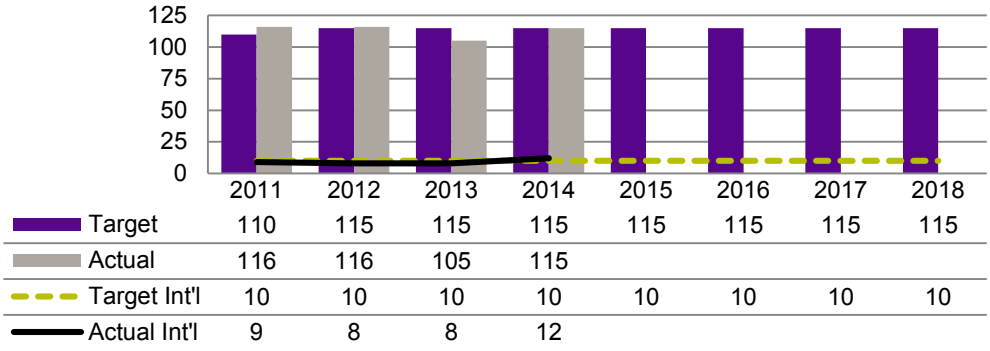
	2011	2012	2013	2014	2015	2016	2017	2018
Target	355	360	360	360	360	360	360	360
Actual	341	358	364	359				
Target Int'l	40	50	55	65	65	65	65	65
Actual Int'l	44	57	61	70				

Figure 49: SE Undergraduate Intake Plan Performance to Target



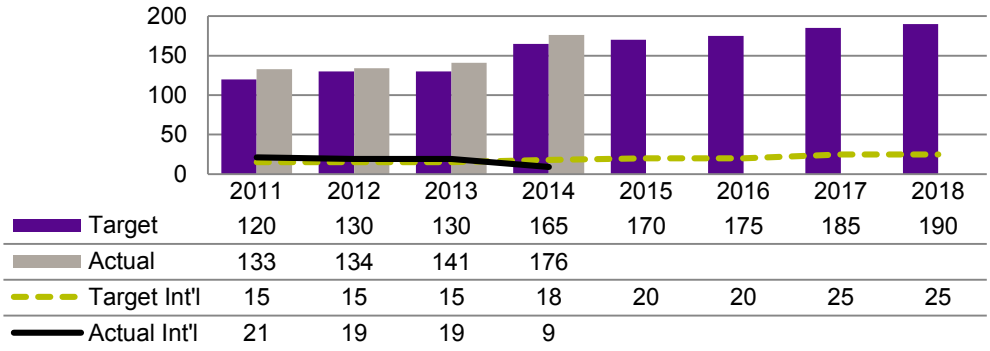
	2011	2012	2013	2014	2015	2016	2017	2018
Target	120	125	125	125	125	125	125	125
Actual	121	129	148	132				
Target Int'l	15	15	15	15	15	15	15	15
Actual Int'l	13	11	26	20				

Figure 50: NANTE Undergraduate Intake Plan Performance to Target



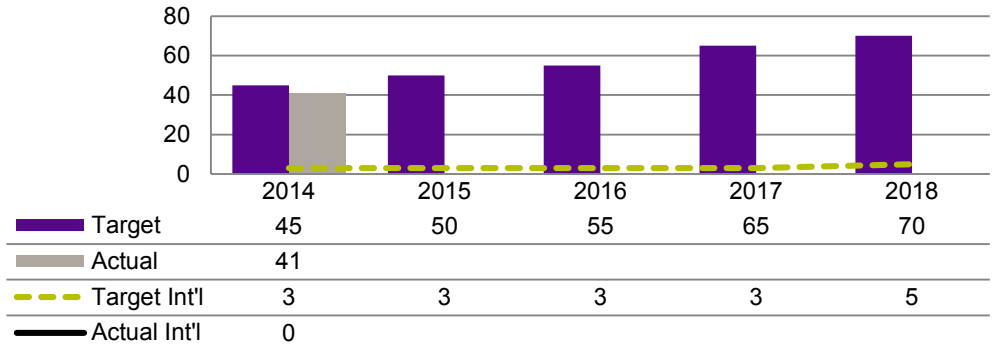
	2011	2012	2013	2014	2015	2016	2017	2018
Target	110	115	115	115	115	115	115	115
Actual	116	116	105	115				
Target Int'l	10	10	10	10	10	10	10	10
Actual Int'l	9	8	8	12				

Figure 51: MCTR Undergraduate Intake Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target	120	130	130	165	170	175	185	190
Actual	133	134	141	176				
Target Int'l	15	15	15	18	20	20	25	25
Actual Int'l	21	19	19	9				

Figure 52: BIOE Undergraduate Intake Plan Performance to Target



B1: Enhance the Quality of Admitted Students in Electrical and Computer Engineering

- The overall quality of the incoming students appears to be improving, as evidenced by increasing high school averages, improved success rates in the first-year program, and anecdotal evidence from some instructors.
- We continue to pool EE and CE students to help ensure that we admit the best students. The current ratio of EE to CE students is approximately 1:1.5.
- As planned, we have been gradually increasing the proportion of visa students. In 2014/15, visa students represent about 17% of the incoming class, which exceeds target.

B2: Improve Student Retention Rates and Enhance Student Engagement

- Academic advising has evolved into a complex specialized role with significant impact on student success and retention. This fundamental shift from the traditional prescriptive practice to a more comprehensive, proactive model to meet the needs of diverse student populations and enhance student learning is significant, and has resulted in increased knowledge and skills required to perform the role.
- Within the department, we have allowed some students (less than 1%) to take a reduced load on a case-by-case basis when recommended by the engineering counsellors.
- To help bolster student engagement in 2014/2015 we financially supported about 10 student design events and sponsored various events aimed at increasing student morale, including an ECE Class of 2015 graduation party at POETS and other class events like paintball and barbeques.

B3: Enhance the Undergraduate Student Experience through Infrastructure Improvements

- In addition to the 400-nasm ECE student space opened in E2 in winter 2014, the ECE space in the upcoming E7 building will have five large classrooms to provide home rooms to all EE and CE undergraduate students.
- ECE continues to use our $2.2M from the Vision 2015 Undergraduate Laboratory Enhancement Initiative to upgrade all of our undergraduate labs. Despite this impressive improvement, the department is concerned that in the absence of a permanent lab budget, lab infrastructure may become obsolete in a decade.

B4: Improve Overall Teaching Quality

- We have made progress toward implementing an outcomes-based assessment process, as mandated by the CEAB. To improve on the initial process implemented in 2013/2014, we have hired a graduate attributes lecturer and an accreditation assistant who will provide feedback and suggestions for program improvements to the associate chair for undergraduate studies and to the Undergraduate Studies Committee.
- Our teaching quality co-ordinator, Prof. David Wang, works closely with instructors and others (including the associate dean, teaching and experts from the Centre for Teaching Excellence) to determine best practices for teaching and to help individual instructors. Prof. Wang also sits in on all sessional instructor interviews and chairs two meetings per term in which student representatives and instructors discuss their courses.
- Due to time limitations, our plan for a systematic review of all ECE labs has not yet been carried out. We have recently created a task force to look into improving our undergraduate laboratories.

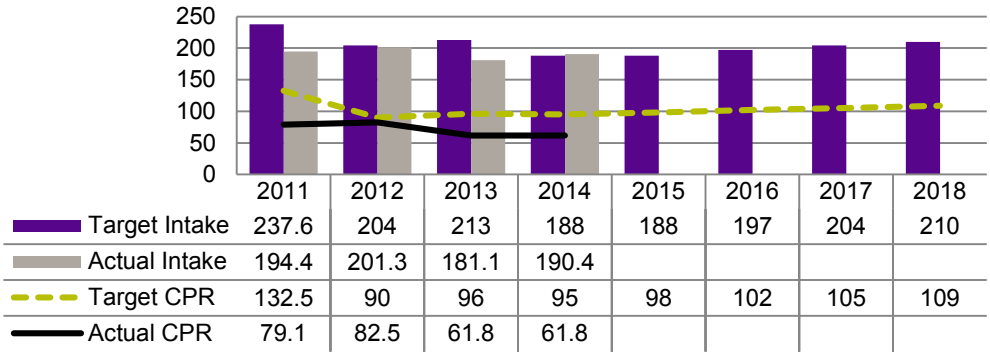
B5: Regular Town Hall Meetings

- In winter 2015, we held several town hall meetings with our 3B and 4B students. We received excellent feedback that will trigger a round of curriculum revisions. We continued the process in spring 2015, when we held a town hall meeting with 3A students. We intend to continue this insightful process.

C. GRADUATE STUDIES PLAN

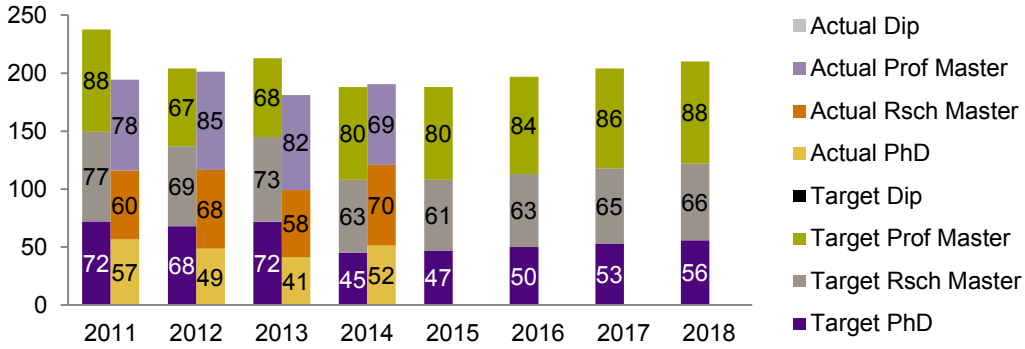
- Our graduate program is one of the largest in the country, with approximately 575 graduate students in 2014.
- As shown in Figure 53 and Figure 54, we witnessed modest growth in graduate intake in 2014. Growth in doctoral and research master's intake was 15% and 11% respectively while professional master's intake declined by 14%.
- We continue to struggle to meet our CPR graduate student targets. We are working with the Engineering Graduate Studies Office to implement strategies to attract more CPR graduate students.

Figure 53: ECE Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	237.6	204	213	188	188	197	204	210
Actual Intake	194.4	201.3	181.1	190.4				
Target CPR	132.5	90	96	95	98	102	105	109
Actual CPR	79.1	82.5	61.8	61.8				

Figure 54: ECE Graduate Intake Plan Performance to Target by Program Type



C1: Increase the Rigour of the PhD Examination

- Starting in fall 2015, the PhD comprehensive examination will be split into two parts: an oral comprehensive background examination to be completed by the end of the third term of registration and an oral comprehensive research proposal examination to be completed by the end of the sixth term of registration. This split allows for a comprehensive examination of the candidate's background knowledge on the subject matter prior to a significant research effort. We also hope this new format will help increase the rigour of the comprehensive process and PhD committee involvement, thereby decreasing time to graduation.
- To further support timely PhD completion, we have amended our research seminar requirements. Students are now required to hold their seminar no later than the end of their third year of registration and the seminar must be attended by the student's supervisor as well as his or her advisory committee.

C2: Provide High-Quality PhD Supervision and Support Timely Degree Completion

- Effective in spring 2015, ECE has implemented online submission of term activity reports, a program requirement for all full- and part-time research programs. Students must report their previous term's accomplishments and goals for the upcoming term. Supervisors must, in turn, provide feedback on the student's performance and identify any areas of growth, improvement, and/or concern so that appropriate action can be taken. These reports are also stored online to provide a clearer, more accessible and simplified communication between supervisors and students.
- PhD committees will formally meet with their doctoral candidate at least once a year over their four-year program: at the comprehensive background examination, the comprehensive research proposal examination, the research seminar, and the PhD defense.

C3: Increase Graduate Course Requirements

- Core courses were introduced to graduate research programs in fall 2014 and the minimum number of courses for PhD students was increased from three to four. In fall 2015 we are adding six new core courses to give students more flexibility in their course choices. Furthermore, we have dedicated teaching resources to ensure that all core courses are taught on a yearly basis.

C4: Increase Recruitment Efforts to Attract CPR Students and Improve Graduate Funding

- ECE has allocated funds to create faculty grants of $22,000 per year to directly support graduate students and their research efforts. These awards are administered by the department with the intent that the money will be used to attract top quality applicants and to encourage timely admission offers.
- In addition to actively participating in all Faculty of Engineering recruitment efforts, each term ECE also makes a presentation to upper-year undergraduate students during their class professor hours to promote graduate studies at Waterloo.

C5: Restructure the MEng Program with a Focus on Quality

- In the last year we have focused on quality admissions where incoming admission averages continue to be correlated with subsequent Waterloo grade averages to identify trends of success and decreased academic performance based on a wide variety of criteria.
- MEng certificates of specialization were renamed diplomas in early 2015 to accommodate accreditation requirements. This has had a positive impact on the appeal of the program to prospective students.
- In May 2015 we hired a new part-time admissions co-ordinator who will solely focus on MEng admissions. With this increase in administrative support, MEng applications can now be more carefully reviewed and vetted before being sent for admission decisions. This has also improved offer-processing time and allowed for more proactive identification of high-quality CPR applicants for timely offers.

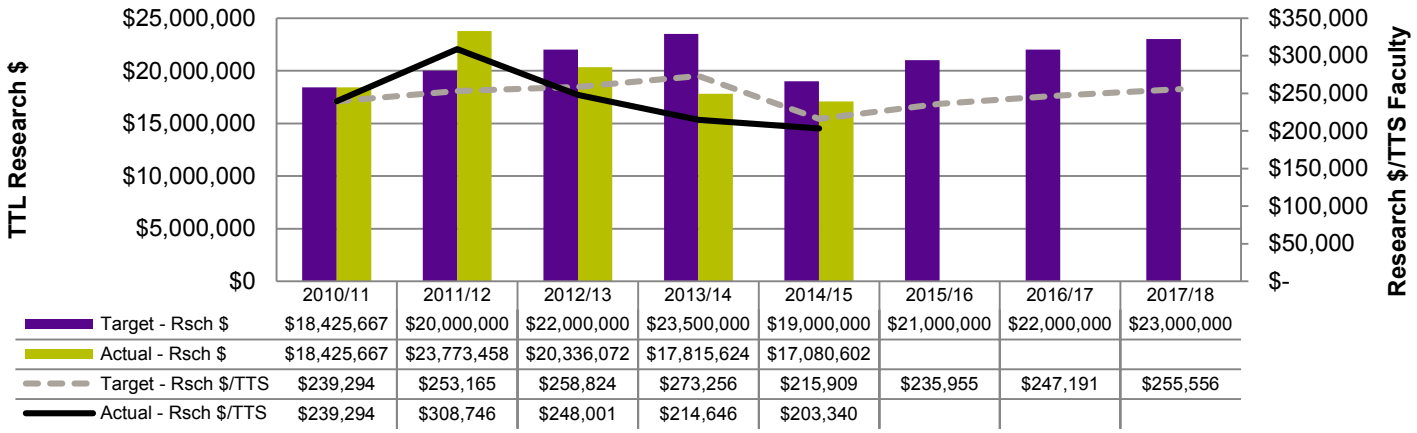
C6: Improve Graduate Student Experience

- In winter 2015 the departmental award for exceptional student performance (based on term activity reports) was increased from $1,250 to $1,500. The increased value of the award reduces the number of awards overall but increases the prestige of the award to reward truly outstanding students.
- At the request of the ECE graduate student association, the chair and the associate chair, graduate studies met with students in a town hall meeting in winter 2015 to answer questions students had about department policies and practices. We will schedule such meetings regularly to improve communication with students.
- Work on the second edition of the ECE graduate studies manual, which is set to be released in September 2015, has been underway since late 2014 and includes updates on the new PhD split comprehensive exam, changes of enrolment, teaching assistantships, and student funding.
- Five teaching assistantship awards continue to be given out each term to recognize the top TAs in ECE.

D. RESEARCH PLAN

- ECE faculty members earned $17.1M in research funding in 2014/15, a 4% decrease from total research funding in the previous year.
- A noticeable increase in department research funding is expected in 2015/2016, due in part to a number of major research awards our faculty have recently received, including six NSERC strategic grants, two major ORF grants, one CFI grant and one NSERC-CREATE grant.

Figure 55: ECE Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$18,425,667	$20,000,000	$22,000,000	$23,500,000	$19,000,000	$21,000,000	$22,000,000	$23,000,000
Actual - Rsch $	$18,425,667	$23,773,458	$20,336,072	$17,815,624	$17,080,602			
Target - Rsch $/TTS	$239,294	$253,165	$258,824	$273,256	$215,909	$235,955	$247,191	$255,556
Actual - Rsch $/TTS	$239,294	$308,746	$248,001	$214,646	$203,340			

D1: Increase the Department's Research Visibility

- A general PowerPoint presentation showcasing ECE and its research activities has been prepared and distributed to all faculty members for use when visiting industrial or other academic organizations.
- ECE distinguished lecture series speakers last year were Prof. Kiat Seng Yeo from SYUD, Singapore on "The Next Big Things in Education and Research" and Prof. Solomon Golomb from University of Southern California on "A Career in Engineering." These events are widely advertised within and outside the university, attracting attendees from other departments and local companies.
- Effort was made this year to increase content and improve user navigation for the wall-mounted interactive computer located in the ECE reception area.

D2: Improve Research Quality

- To further encourage research excellence, the department approved increasing the number of Department Research Awards, through which the merit committee selects recipients to be awarded reduced teaching for the year, from two to four annually as of 2015/2016.

D3: Improve the Department's Research Profile

- ECE actively supports nomination of faculty members for various national and international awards such as IEEE fellowship, EIC fellowship, CAE fellowship, and NSERC Steacie awards.
- In 2015 an ECE faculty member received the IEEE Fellowship and another received EIC Fellowship.
- Over the last year more than 30 announcements have been posted on the news section of the ECE website to highlight faculty achievements.

D4: Increase Research Funds

- The department has established a research stimulation grant program to provide selected ECE faculty members with financial resources to help them build or increase research capacity. The grants are awarded, through a formalized competitive process, to increase department research productivity in terms of publications, graduate student supervision, and enhanced funding opportunities.

D5: Improve the Research Environment

- ECE continues to streamline administrative procedures to facilitate research. Any related research issues or concerns are addressed in the Department Executive Committee weekly meetings and dealt with promptly.
- We strive to enhance teaching and research in ECE by promoting a safe work and study environment. We are proactive in identifying risks and emerging issues, and in developing and implementing practical and sustainable processes to manage them, including external lab user arrangements.

E. RECRUITMENT AND OUTREACH

E1: Improve Deployment of ECE Outreach Efforts

- In 2015 the ECE recruitment co-ordinator left for sabbatical and the new co-ordinator was able to seamlessly handle the transition. This indicates sustainability of the position, including efforts to organize and implement ECE participation in all recruitment and outreach activities.

E2: Increase Faculty Participation in Existing Outreach Activities

- Departmental participation in activities such as Engineering Explorations, March and November Open Houses, You@Waterloo Day, FIRST Lego League, Ontario University Fair and regional science fairs has remained steady.
- A key objective remains the development of ECE-themed modules for Engineering Science Quest, the Catalyst weekend conference and GoEngGirl.

E3: Increase Alumni and Undergraduate Participation

- The Faculty of Engineering ambassador program has been an excellent resource that has helped identify and train ECE students who are well suited to recruitment and outreach. These trusted volunteers help organize events, deliver tours and act as the face of ECE to visitors and prospective students.
- Alumni participation has not increased. A challenge remains asking them to take time off work to participate.

E4: Develop ECE Student Design Teams

- We continue to develop and support student design teams. In 2014/15 ECE provided over $5,000 in funding as well as technical support through our faculty and staff to: (i) UW Nanorobtics team (third place at 2014 International Conference on Robotics and Automation); (ii) WATSAT- UW Micro-Satellite Team (currently in the Canadian Satellite Design Challenge 2014-2016); and (iii) Waterloo Aerial Robotics Group.
- Participation in the ECE-based Waterloo Aerial Robotics Group has increased to 30-40 regular members, an almost 100% increase in participation since 2013/14. Through our support of this group, we have started a remote control car competition aimed at first-year students. This competition allows junior students to experience embedded programming on a safe platform.
- The department has funded two new hackathon events run by ECE students as well as larger hackathons run by interdisciplinary student groups.

E5: Create an Online Repository of Event Media

- Over the past four years we have accumulated a lot of photos, videos and other media of the events we've participated in, which could be an excellent resource for promotional material and marketing. We would like to create an online repository so that authorized users can access this material.

F. ANNUAL ASSESSMENT AND CALIBRATION

- A full-day department retreat in April 2015 included discussion of progress on our strategic plan.
    - At the undergraduate level, we discussed strategies to enhance/streamline the ECE curriculum. We also discussed the relevance of seminar courses and the sequencing of courses to best achieve academic goals and we established a task force to look into undergraduate labs.
    - At the graduate level, we discussed strategies to enhance the quality of instruction for graduate students, including increasing the course requirement for PhD students. We also discussed the qualifying examination for PhD students and how other institutions conduct theirs.
    - As for research, we discussed initiatives to increase research output and our ability to attract government and industrial research funds. These include the introduction of departmental research stimulation grants and department research awards for those who excel in research.

Department of Management Sciences

Samir Elhedhli, Chair

The Department of Management Sciences (MSCI) continues to work toward the priorities set out in our strategic plan, which for the remainder of the extended plan period focus on three key areas: review and update the management engineering undergraduate program; strengthen graduate programs to respond to student expectations and market needs; and foster a motivating work environment for faculty and staff.

We have completed our staff hiring plan and are on target to complete faculty hiring within a year. We will continue efforts to foster a motivating work environment for faculty and staff through such initiatives as our mentoring and teaching-support programs for junior faculty and enhanced communications and collaboration opportunities for staff.

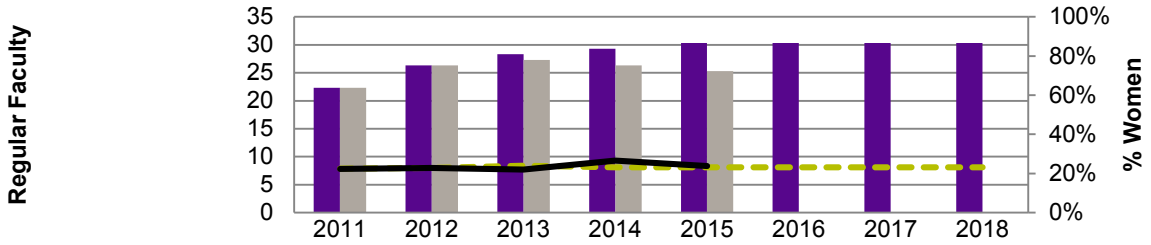
The management engineering undergraduate program has obtained CEAB accreditation for six years, and our students are doing well in terms of co-op employment. Our focus in the coming years will be to complete a thorough program review and to implement outcomes-based assessment.

Over the past year within our graduate program we have begun to pursue the emerging areas of data analytics. For the remainder of the plan period we will work to strengthen the MMSc online program and to secure more funding resources to support research graduate students.

A. FACULTY AND STAFF PLAN

- The increase to our faculty target in 2015 (see Figure 56) results from the addition of a graduate attributes lecturer to support implementation of outcomes-based accreditation and the department's participation in the Engineering Ideas Clinic™.
- In 2014/15 we hired three new tenure-track faculty members and one lecturer. Because three of these appointments had start dates after May 1, 2015 they are not reflected in Figure 56 below. One tenure-track faculty member resigned during this time period.
- We continue to meet and exceed our targets for the representation of women in our faculty complement.
- Two positions will be advertised in 2015 to be filled in 2016.

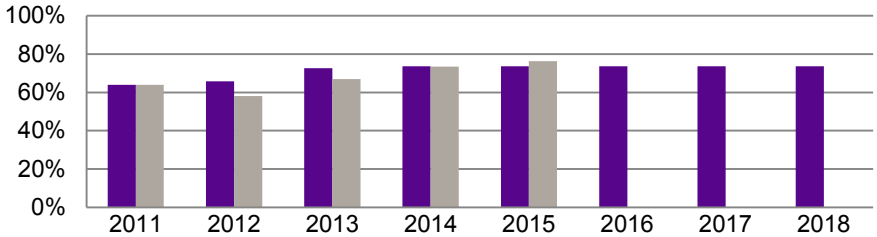
Figure 56: MSCI Regular Faculty Complement Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target Total	22.3	26.3	28.3	29.3	30.3	30.3	30.3	30.3
Actual Total	22.3	26.3	27.3	26.3	25.3			
Target % Women	22.5%	22.9%	23.9%	23.1%	23.1%	23.1%	23.1%	23.1%
Actual % Women	22.4%	22.8%	22.0%	26.6%	23.8%			

- We exceeded our target percentage of faculty members who are registered or have applied for PEng. We continue to require all eligible new hires to apply.
- Among the four faculty hired in the past year, three are eligible.

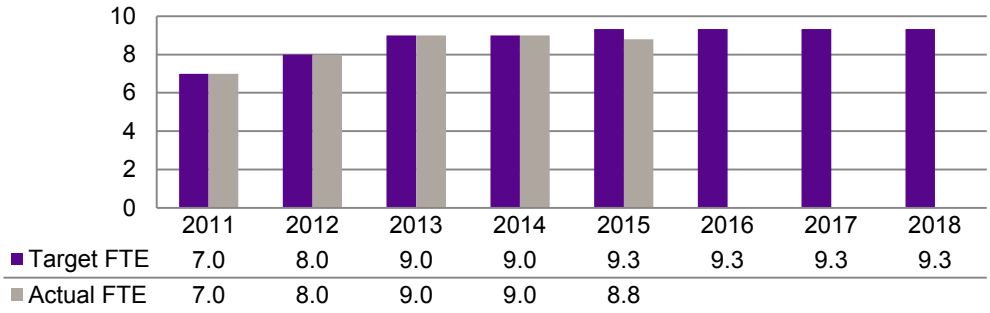
Figure 57: MSCI Regular Faculty PEng Status Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target % Registered&Applied	64.0%	65.7%	72.6%	73.6%	73.6%	73.6%	73.6%	73.6%
Actual % Registered&Applied	64.0%	58.1%	67.0%	73.4%	76.3%			

- The 0.3 increase to our staff target in Figure 58 is due to the addition of a shared (with the Department of Mechanical & Mechatronics Engineering) accreditation assistant to support implementation of outcomes-based assessment required for CEAB accreditation. We anticipate filling this position by September 2015.
- Our staff targets have been met and all positions are currently filled.
- The 0.2 decrease in our actual FTE reflects a staff member on a temporary reduced workload. We have been able to hire a casual staff member as needed to help on special projects and work overload during this time.
- With new systems being implemented and more departmental administrative responsibility required for foreign hiring and possibly with a new resource allocation model, we may need to revisit our staff hiring plan as these new projects are implemented.

Figure 58: MSCI Regular Staff Complement Plan Performance to Target



A1: Faculty High Performance

- MSCI follows very rigorous hiring procedures and uses an online faculty application system to manage the faculty application process.
- To integrate new faculty into our department and communicate performance expectations, we assign a mentor to each new faculty member and set up several meetings with different faculty members to discuss various issues such as graduate student supervision, the undergraduate program and grant applications.
- The department teaching and undergraduate liaison officer helps new faculty with course development, teaching and curriculum.

A2: Staff High Performance

- Regular monthly open-forum administrative staff meetings provide the opportunity for administrative staff to share information, discuss issues and contribute ideas toward improvements within the department.
- As new systems are introduced, staff are provided training to support their success.
- Stronger relationships between faculty and staff are promoted by having regular social events in which faculty and staff members have the opportunity to interact.

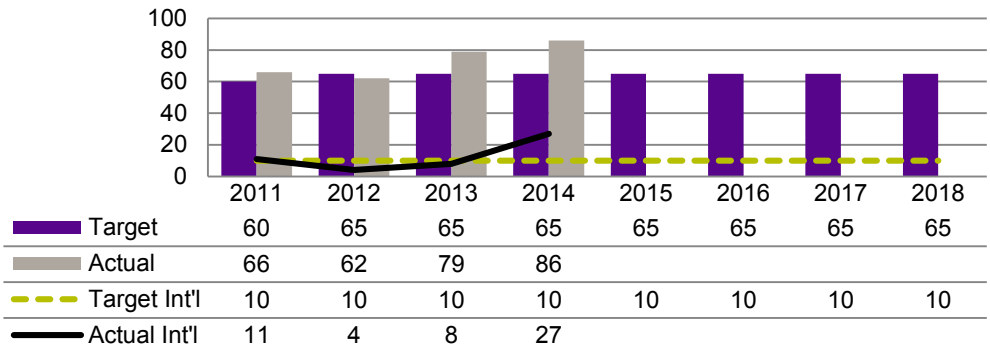
A3: Department Information Tracking Tool Development

- Based on a system developed in the Department of Electrical & Computer Engineering, a graduate student database has been in use since September 2014 and has proven to simplify administrative record keeping. We are still in the development stages but are able to track graduate student records and produce reports for departmental needs. The next stage of development will be to include department key control/space allocation, health and safety records, and student financial records/payments.
- A system has been developed to make data collection for outcomes-based assessment easier. It will be transferred to the recently-hired graduate attributes lecturer.

B. UNDERGRADUATE STUDIES PLAN

- As seen in Figure 59, we are exceeding our undergraduate intake targets. In 2014 we exceeded our target by over 30%, mostly due to international intake.

Figure 59: MGMT Undergraduate Intake Plan Performance to Target



B1: Implement Outcomes-based Program Evaluation

- A graduate attributes assessment and program improvement process will be implemented by the end of 2015.
- A system has been implemented to collect graduate attributes assessment from individual courses each term.
- Our graduate attributes lecturer joined the department on July 1, 2015 and we expect hiring for the new shared administrative staff position to support outcomes-based accreditation to be complete early this fall.

B2: Reduce Student Attrition by Increasing Student Admission Averages

- We continue to hold our intake target steady until the average entering grades of our applicant pool increase sufficiently to warrant an increase.
- An improved program marketing strategy has been implemented with the goal of enhancing the pool of applicants and reducing the fraction of "deflection" applicants admitted in first year.
- To support student success within MSCI, a faculty member has been named the department teaching and undergraduate liaison officer, with a focus on supporting first- and second-year students. Work is also underway to make further improvements to our MSCI 100 course to better serve first-year students.

B3: Increase the Average Teaching Quality of Faculty and TAs

- The department teaching and undergraduate liaison officer provides mentoring for weaker teachers.
- The Department Merit Review Committee is placing more emphasis on teaching quality in annual faculty performance evaluations.
- A new TA hiring and evaluation process has been implemented to more formally evaluate TA quality and guide future hiring decisions.

B4: Enhance the Social, Professional, and Intellectual Experience of Our Students

- New space has been allocated to the management engineering program and renovation is ongoing to prepare a new lab for undergraduate students.
- We support student events financially on a regular basis, including the annual Canadian Student IIE Conference, MEET, and student attendance at international conferences.
- The student IIE Waterloo Chapter has organized a series of events in the past four years, in particular a trip to the annual Canadian Student IIE Conference. They will organize the conference in January 2016.

B5: Expand MSCI Option Course Offerings

- Efforts to give option students greater flexibility in course selection are ongoing.

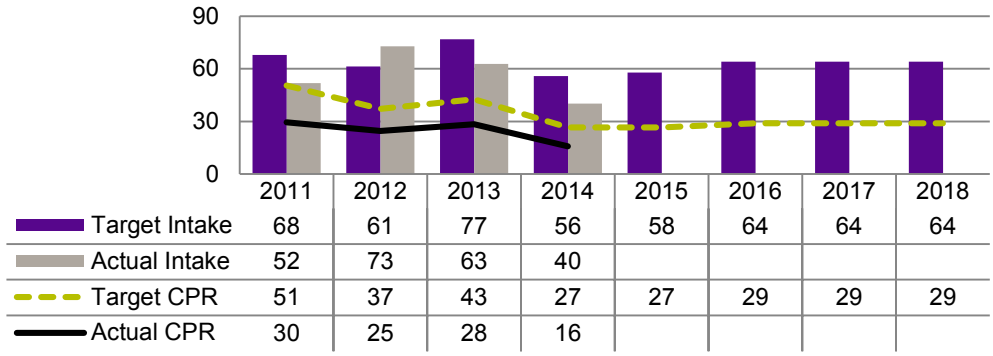
B6: Comprehensive Review of the Undergraduate Program

- A comprehensive review of the undergraduate program is in progress with planned completion in 2016.

C. GRADUATE STUDIES PLAN

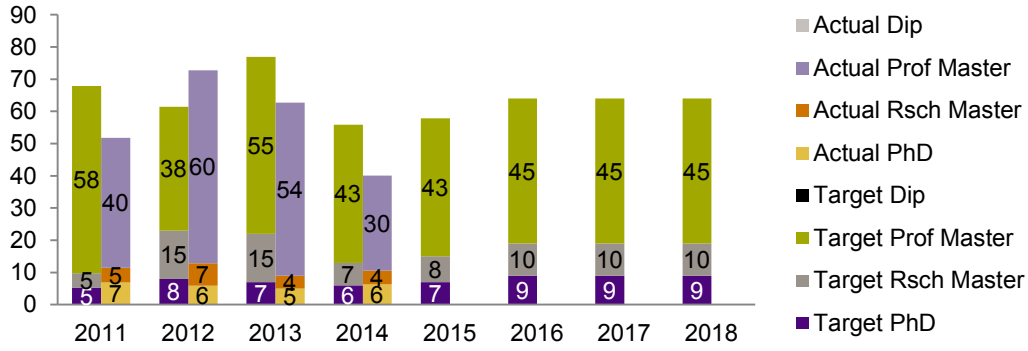
- Given the recent trends in the number of applications from CPR students, our targets were set too high for the current context. We anticipate a more reasonable intake target for the end of the extended plan period would be 55 students overall, with 25 CPR students.
- As shown in Figure 61, we are meeting our targets for PhD but are short on master's intake. The shortfall in research master's student intake can be attributed to limits posed by the mandatory funding requirement while the shortfall in the professional master is related to the applicant pool.

Figure 60: MSCI Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	68	61	77	56	58	64	64	64
Actual Intake	52	73	63	40				
Target CPR	51	37	43	27	27	29	29	29
Actual CPR	30	25	28	16				

Figure 61: MSCI Graduate Intake Plan Performance to Target by Program Type



C1: Excellence in Graduate Programs

- We are in the process of creating a Diploma in Data Analytics.
- MSCI has consistently offered about 20 elective courses during the past few years.
- Course groupings have been created by theme and are advertised on our website.
- The department continues to contribute funds to assist faculty in supporting graduate students; however, the availability and size of such initiatives is budget-dependent. Negotiations are ongoing to allow MSCI to use teaching assistantships as a contributor toward mandatory graduate student support.

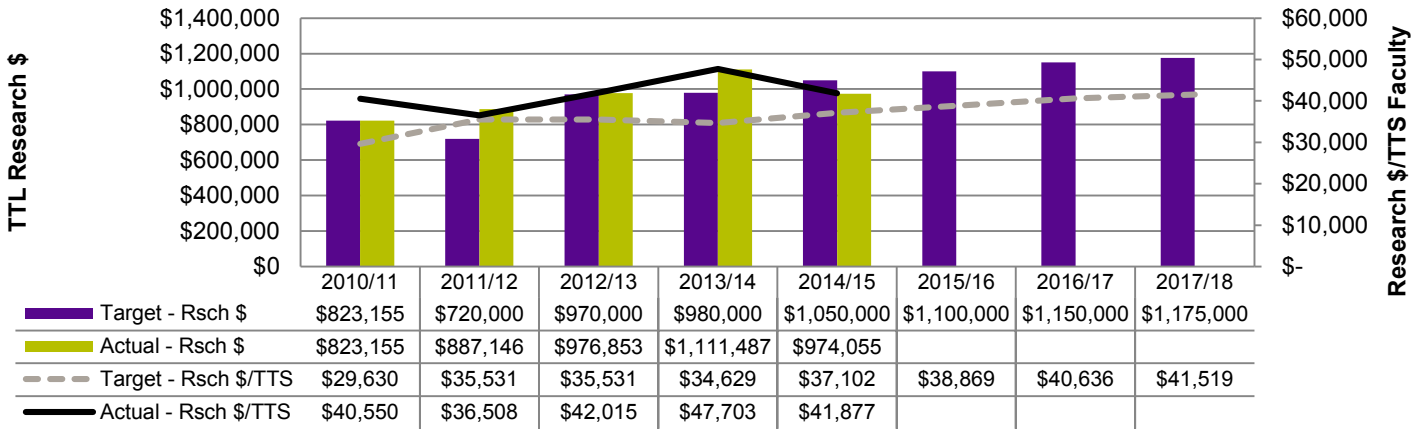
C2: Enhanced MMSc Online Program

- Currently the model of video-recording on-campus lectures to other courses for use in the online program is in use with one course. We continue to seek opportunities to extend this model and to otherwise increase the participation of regular faculty in the online program.
- Consideration is being given to distributing a survey to MMSC online students to solicit more frequent feedback, including what elective courses students would like to see added to the program.
- Due to poor attendance, the annual on-campus gathering of students in the online program has not run in the last two years. Better ways are needed to engage these students outside of their courses.

D. RESEARCH PLAN

- MSCI research funding largely correlates with the number of research faculty. As seen in Figure 62, while our total research funding for 2014/15 was slightly below target, the average funding per tenured/tenure-stream faculty member exceeded target because we had fewer faculty members than anticipated on May 1, 2015.
- It should be possible to meet targets as tenure-track faculty become more established over the course of the plan period.

Figure 62: MSCI Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$823,155	$720,000	$970,000	$980,000	$1,050,000	$1,100,000	$1,150,000	$1,175,000
Actual - Rsch $	$823,155	$887,146	$976,853	$1,111,487	$974,055			
Target - Rsch $/TTS	$29,630	$35,531	$35,531	$34,629	$37,102	$38,869	$40,636	$41,519
Actual - Rsch $/TTS	$40,550	$36,508	$42,015	$47,703	$41,877			

D1: Increase Research Funding Level

- We have reduced teaching loads from four to three for those faculty members who are either supervising many students or are actively working on several research grants.
- The Engineering Research Office provides proposal writing support to MSCI faculty on an individual basis.
- We seek to leverage support from the Engineering Research Office and the university's Office of Research to assist with the identification and development of industrial research funding opportunities.

E. EXTERNAL RELATIONS PLAN

E1: Strengthen Existing Industry Relationships

- We have begun to solicit design projects directly from our alumni. An announcement to management sciences alumni in 2014 directly resulted in a capstone project with PWO Canada, a local manufacturer, in 2015/2016. This model will be followed in the future.
- Since 2012, the capstone symposium has served to showcase management engineering achievements to alumni and industry representatives.

E2: Create New Industry Partnerships

- Better co-ordination is being sought between the industry partnerships liaison in the Office of Research and the MSCI industry liaison, taking advantage of existing resources and avoiding duplication of effort.
- The industry page on our website, in particular the capstone design page, outlines successful industry-based projects. There is currently insufficient advertising of faculty research projects with industry on the website.
- Periodic emails to local company mailing lists promote the capstone program and result in new industry-based design projects. For example, an email to the Manufacturing Innovation Network resulted in a very successful design project with Fischer Canada.

E3: Strengthen the Relationship with Our Growing and Diverse Alumni Body

- The capstone design symposium reception has been successful in bringing 10-15 alumni in each of the two times the event has been held. Multiple alumni have also participated as guest speakers in the capstone design courses in the last three years.
- Some informal evidence suggests that as the number of management engineering alumni grows, many have begun recruiting management engineering students for their companies' co-op needs. Our related efforts have been in helping promote information sessions run by alumni.

E4: Better Communicate the Department, Mission and Relevant Information to a Variety of Audiences through Our Web Presence

- The MSCI website has been completely converted to the Drupal content management system.
- A new website committee was created in 2015, with the goal of promoting MSCI through our website and providing tailored information to target internal and external audiences. The first priority of the committee is the development of a new research page (targeted at future graduate students) and a data analytics page.

- Website priorities for the remainder of the extended plan period include: tracking current user demographics; seeking user feedback; and developing new tailored content to better promote MSCI to target audiences.

Department of Mechanical & Mechatronics Engineering

Jan Huissoon, Chair

The Department of Mechanical & Mechatronics Engineering (MME) proposed several new initiatives to improve the learning experience at both undergraduate and graduate levels in our original Vision 2015 plan. At the undergraduate level, a major focus is on developing an MME clinic. We hired a lecturer and a lab engineer to facilitate the development of the clinic, which opened in October 2014. Over 4,500 student contact hours logged since opening.

At the graduate level, we had planned two online MEng offerings: a Diploma in Green Energy and a MEng in Mechatronics Engineering. Despite being quite widely publicized since its introduction in January 2014, interest in the online component of the green energy diploma has been relatively low to date. The departments of Electrical & Computer Engineering and Systems Design Engineering initially declined to participate in the MEng in Mechatronics, primarily for reasons related to resource issues; the proposal is being reworked to address this. We had proposed hiring a lecturer to act as director of this program, which has been put on hold until the program is approved.

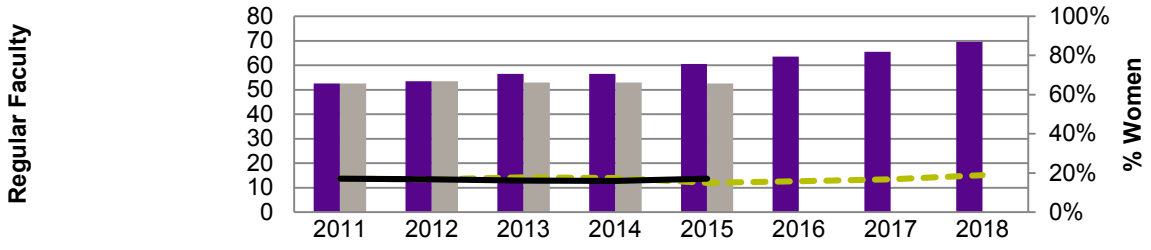
Space availability continues to be an issue, especially for our graduate students. The upcoming allocation of the ground floor of EC4 to MME will greatly alleviate these concerns. This was noted in the MME graduate studies report, which was generally positive with its recommendations. Space in DWE for the mechatronics undergraduate expansion has been used in part for clinic activities, which have progressed exceptionally well in their first year.

The department's key priorities through the extended strategic plan period will be: hiring for the mechatronics expansion, biomedical program, and upcoming retirements; updating the undergraduate program to better integrate inter-term concepts and incorporate clinic activities and safety; and strengthening the graduate program by developing and promoting exchange opportunities and online courses.

A. FACULTY AND STAFF PLAN

- The net actual faculty complement (with two departures, two arrivals and one reduced workload) decreased by 0.5 to 52.5 on May 1, 2015.
- Five additional new faculty have been hired and are due to start by September 2015. Because their start dates fall after May 1, 2015 they are not included in the actual counts presented in Figure 63.
- The discrepancy between the target and actual numbers shown in Figure 63 is due to the Mechatronics MEng program being delayed, an IRC position that had been filled but for which the start date has been postponed twice, and a deferred starting date for the filled graduate attributes lecturer position.

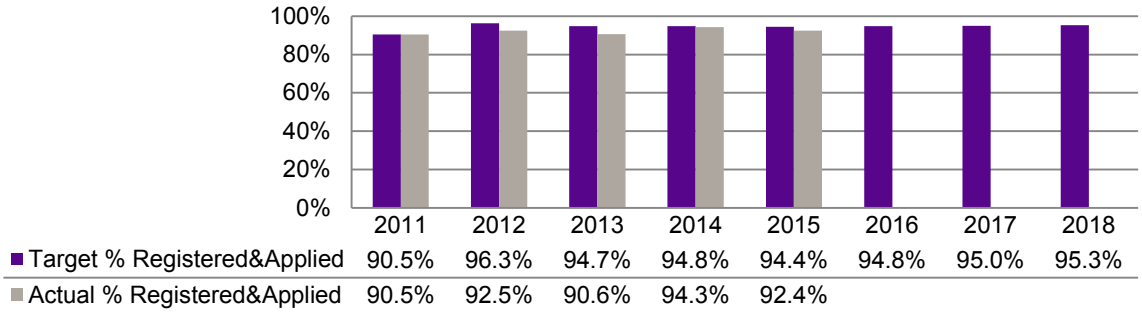
Figure 63: MME Regular Faculty Complement Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target Total	52.5	53.5	56.5	56.5	60.5	63.5	65.5	69.5
Actual Total	52.5	53.5	53	53	52.5			
Target % Women	17.1%	16.8%	17.7%	17.4%	15.0%	15.7%	16.8%	18.9%
Actual % Women	17.1%	16.8%	16.0%	16.0%	17.1%			

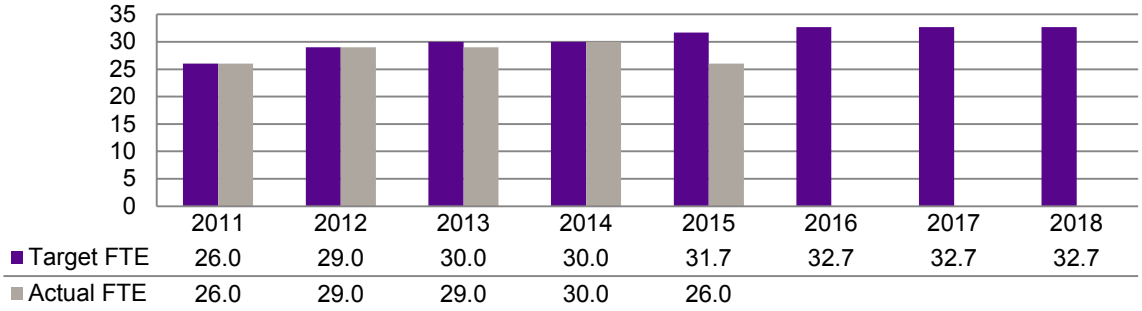
- Only four faculty members were unlicensed in Ontario and had not applied on May 1, 2015.

Figure 64: MME Regular Faculty PEng Status Performance to Target



- Four staff positions were vacant on May 1 due to three retirements and one resignation in 2015. Three of the four positions have been temporarily filled, and interviews for two of the positions have been held.

Figure 65: MME Regular Staff Complement Plan Performance to Target



A1: Hire New Faculty to Support New Initiatives

- Carol Hulls joined the department as continuing lecturer in September 2014. This is a new position under the mechatronics program expansion.
- The start date for the TransCanada Pipelines/NSERC Industrial Research Chair support position that had been filled was postponed to July 1, 2015.
- We have hired Andrew Milne for the new graduate attributes lecturer position. Due to his commitments as postdoctoral fellow at MIT his start date was delayed to July 1, 2015.
- The balance of salary resulting from a faculty member choosing a reduced workload to retirement will be used to hire definite term lecturers in the materials and solid mechanics areas.

A2: Replace Faculty Retirements with Positions in Emerging Areas

- James Tung joined the department as assistant professor in July 2014, filling a position vacated by Fathy Ismail who retired in December 2013.
- Andrew Brzezinski left the department in July 2014. Kevin Musselman has been hired to fill this position starting July 1, 2015.
- Metin Renksizbulut retired in December 2014. Because another existing faculty position was bridged to this retirement, it will not be filled.

A3: To Better Support the Department's New Activities, Increase FTE Staff Complement

- The new administrative staff position to support the mechatronics engineering expansion has been advertised and candidates have been shortlisted.

A4: Provide Professional Development and Training for Our Staff

- Seventeen technical staff took a total of 122 courses for 633 hours of professional development. The average number of training courses per technical staff was seven with an average of 17 hours per staff member. All staff took at least one course with one member taking 16 courses.

- Eleven administrative staff took a total of 56 courses for 142 hours of professional development. The average number of training courses per administrative staff was five with an average of 13 hours per staff member. All staff took at least one course with one member taking 12 courses.
- All staff members are encouraged to seek out professional development to enrich their current roles and growth opportunities. We strongly encourage cross-functional training within MME.

B. UNDERGRADUATE STUDIES PLAN

- Mechanical engineering undergraduate intake was unexpectedly lower than planned. It appears that the uptake of offers was a bit lower than predicted, and that we lost about 60% of the visa student confirmations, which together resulted in the lower-than-planned intake. This is apparently considered to be within the normal range of fluctuation.
- Mechatronics engineering undergraduate intake was over target by 6.7% and an unusually high repeat and transfer addition to the cohort resulted in 199 students in 1A.

Figure 66: ME Undergraduate Intake Plan Performance to Target

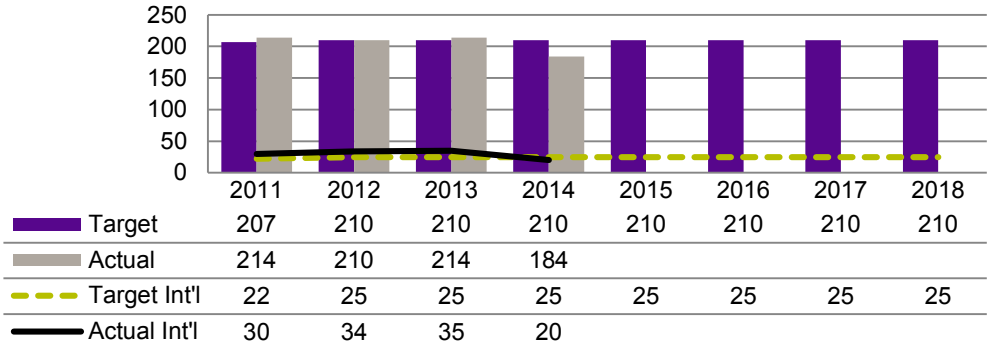


Figure 67: MCTR Undergraduate Intake Plan Performance to Target

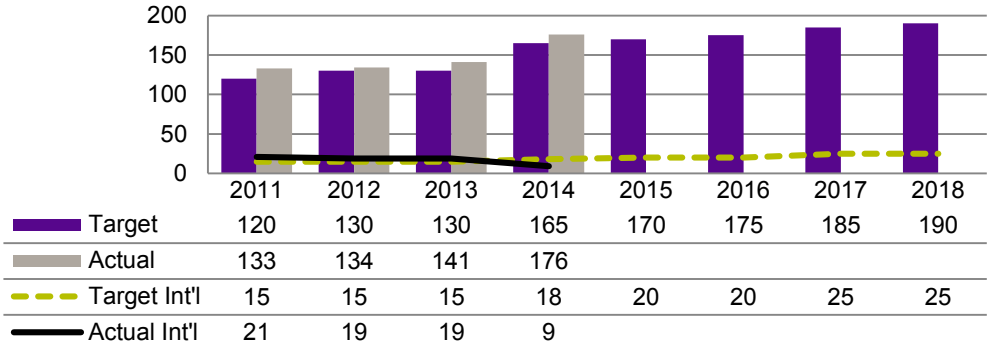
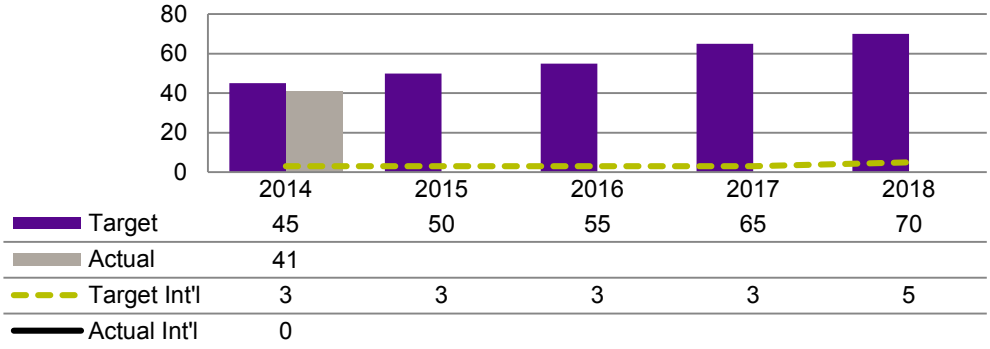


Figure 68: BIOE Undergraduate Intake Plan Performance to Target



B1: Establish an Engineering Clinic within our Undergraduate Programs

- Andrew Trivett (MME clinic director) and Jen Rathlin (MME clinic engineer) have been developing the operation and facilities of the MME clinic, which is now located in DWE. Since opening in October 2014, the clinic has developed a scalable model for delivery of hands-on activities for our students. Delivery of MME clinic activities has focused on small numbers of students at one time (15-20) with close contact from TAs, clinic staff, and co-op students. Students have responded well to the personal and attentive feel of the clinic activities. In these small groups, they have a chance to ask questions and genuinely explore open-ended tasks. Faculty and TAs have been able to interact on a more personal level with students to mutual benefit.
- The MME clinic activities have been based on two models:
  - Hardware exploration activities. These have included dissection of Traxxas RC cars and fuel cell cars, hardware café exploration of consumer goods, engine dissection and carburetor exploration. The activities have been delivered to students in first-, second-, and third-year mechanical engineering courses. Using the small-group 'café' format, there have been more than 4,000 student contact hours involving students in eight courses since October. In the coming year, new activities are being developed and will be implemented in courses that currently have no clinic component.
  - Maker-space prototyping for designs. Since January, the clinic maker space has supported more than 500 student contact hours. In these sessions, typically with groups of three students, prototypes are created for first-year and capstone design projects. The equipment available to students currently includes six small 3D printers, an Epilog Laser Cutter, a 3D benchtop milling machine, assorted hand tools and simple measurement tools. Using the clinic resources, students can make early pre-prototypes quickly, then proceed to make better use of the equipment available to them in other on-campus facilities such as the student machine shop.

B2: Improve the Undergraduate Experience

- This has primarily focussed on implementing clinic activities, with positive feedback from students.

B3: Undergraduate Lab Renewal

- $319,000 was spent on undergraduate lab equipment in 2014/15.

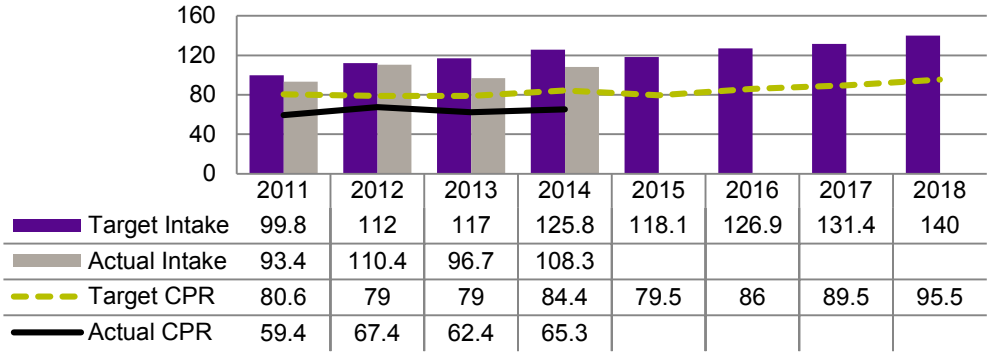
B4: Increase Admission to Mechatronics Engineering

- The admission target for mechatronics was significantly exceeded with the first double stream of the program expansion. The first-year class totalled 199 students in fall 2014, of which 176 were new students.

C. GRADUATE STUDIES PLAN

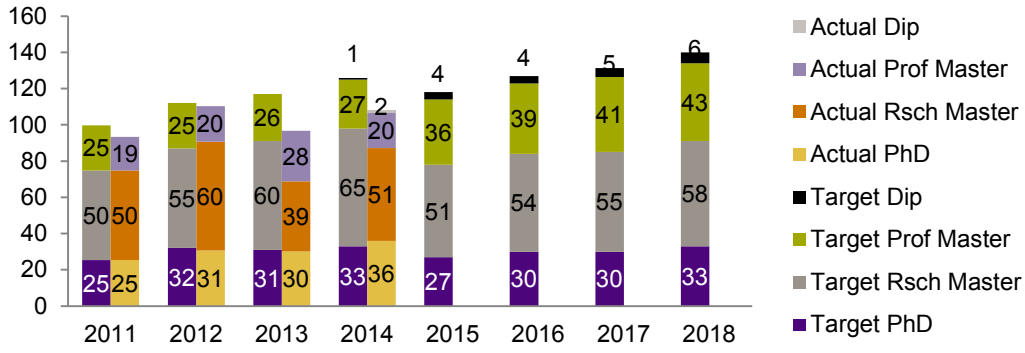
- While both total and CPR intake is somewhat below the projected targets, this is expected to improve significantly as new tenured/tenure-stream faculty are hired, with the expectation that we will match the planned targets within the next few years.

Figure 69: MME Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	99.8	112	117	125.8	118.1	126.9	131.4	140
Actual Intake	93.4	110.4	96.7	108.3				
Target CPR	80.6	79	79	84.4	79.5	86	89.5	95.5
Actual CPR	59.4	67.4	62.4	65.3				

Figure 70: MME Graduate Intake Plan Performance to Target by Program Type



C1: Increase Graduate Student Funding

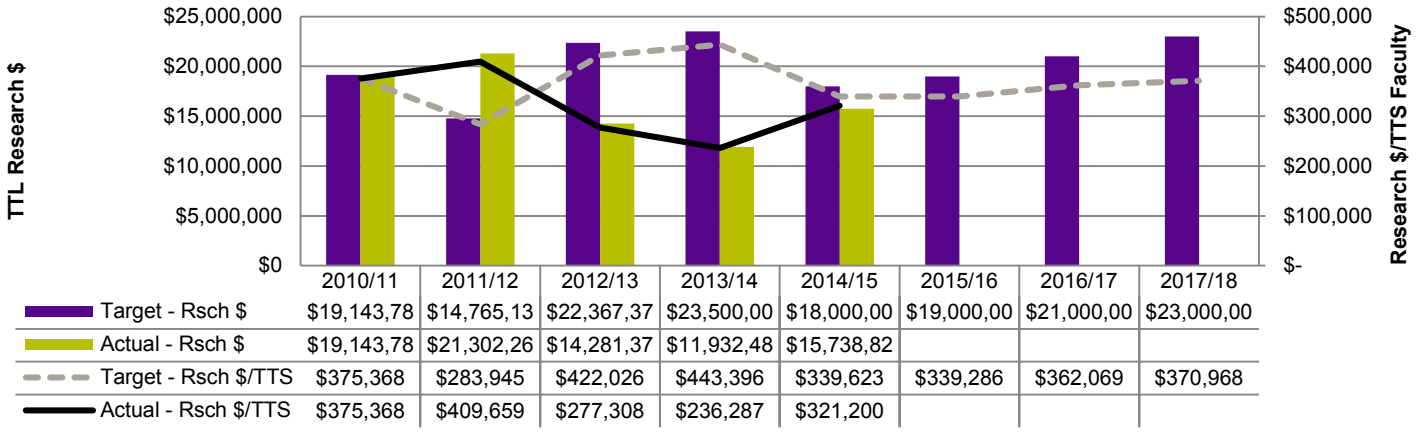
- With the introduction of the Engineering Domestic Doctoral Student Award (described more fully in section III. C), we expect to see an increase to be compatible with our domestic PhD target.

C2: Expand Graduate Program with Emphasis on Quality

- A department retreat on graduate studies in late December 2014 resulted in a few recommendations to improve the quality of our MEng program. Our graduate program reviewers also made a few similar comments. We plan to implement these recommendations in the 2015/16 academic year.

D. RESEARCH PLAN

Figure 71: MME Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$19,143,78	$14,765,13	$22,367,37	$23,500,00	$18,000,00	$19,000,00	$21,000,00	$23,000,00
Actual - Rsch $	$19,143,78	$21,302,26	$14,281,37	$11,932,48	$15,738,82			
Target - Rsch $/TTS	$375,368	$283,945	$422,026	$443,396	$339,623	$339,286	$362,069	$370,968
Actual - Rsch $/TTS	$375,368	$409,659	$277,308	$236,287	$321,200			

D1: Increase Research Funding

- Research funding increased in 2013/14 after the decline seen in the previous two years.

D2: Promote Identified Focus Areas

- Advanced manufacturing and additive manufacturing, in particular, are being promoted.

E. PHYSICAL SPACE PLAN

E1: Create New Space and Explore Rental of Off-Campus Space

- Allocation of a floor in EC4 to MME will create much needed new space and will fortunately remove the need to investigate off-campus space rental.
- Newly acquired space in DWE will address the need for student lab, clinic and work space to accommodate the mechatronics engineering expansion.

E2: Rationalize and Actively Track Space Utilization

- We have fully implemented a graduate student seating space utilization database.

Department of Systems Design Engineering

Paul Fieguth, Chair

The 2014/15 academic year is the year that the biomedical engineering program began, with great success. This program has been the singular focus for the Department of Systems Design Engineering (SDE) for the past few years. That is, whereas this strategic plan report will report on a variety of goals, some of which saw progress and others not, the biomedical engineering program necessarily took priority, and remains a priority. However, in many cases the biomedical engineering program is complementary to other goals (e.g. faculty and staff hiring, graduate program) rather than in competition.

Our undergraduate laboratory program and design sequence remain ongoing priorities for SDE throughout this plan period. We also recognize the need to do a better job of engaging with students through the undergraduate class professor program. We will also work to determine, during the remainder of this plan period, what creative approach the department wishes to take to the Engineering Ideas Clinic™ philosophy, including what pedagogic strategies would be complementary to existing classroom and lab instruction.

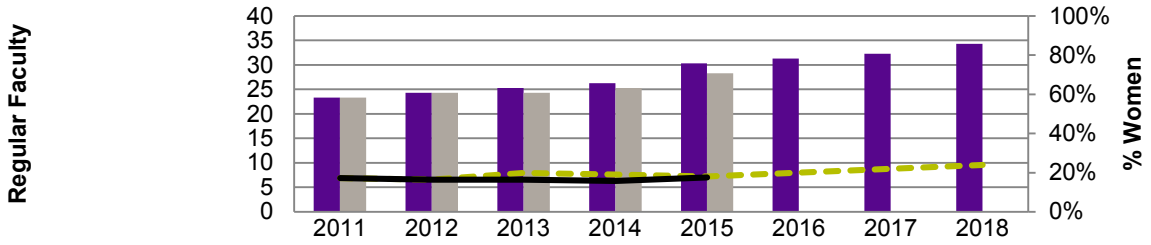
Key successes in graduate studies and research during 2014/15 included a significant increase in graduate student admissions and a substantial increase to research funding, primarily due to a very large automotive CFI award for the Green and Intelligent Automotive (GAIA) research facility. We will continue to work toward enhancing the graduate program identity, connecting MEng students more closely to the department and increasing our graduate students' knowledge of systems theory and engineering design. We will also seek to leverage our planned biomedical engineering hires to help secure NSERC Industrial Research Chairs.

We must also continue to address our growing need for physical space, particularly with the biomedical engineering expansion. We require undergraduate laboratory facilities, office space for new faculty and staff and research space for new faculty.

A. FACULTY AND STAFF PLAN

- There is currently one open position in SDE (the new Schlegel Chair in aging, which was not anticipated in our original faculty complement plan represented in Figure 72). Additional positions will be advertised this fall.
- We very nearly approached target with respect to female faculty; continued efforts will be required during hiring to ensure strong applicant pools.

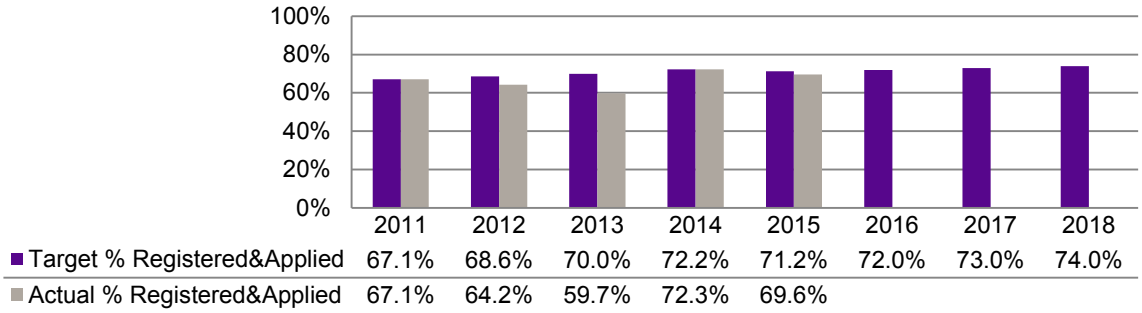
Figure 72: SDE Regular Faculty Complement Plan Performance to Target



	2011	2012	2013	2014	2015	2016	2017	2018
Target Total	23.3	24.3	25.3	26.3	30.3	31.3	32.3	34.3
Actual Total	23.3	24.3	24.3	25.3	28.3			
Target % Women	17.2%	16.5%	19.8%	19.0%	18.0%	20.0%	22.0%	24.0%
Actual % Women	17.2%	16.5%	16.5%	15.8%	17.6%			

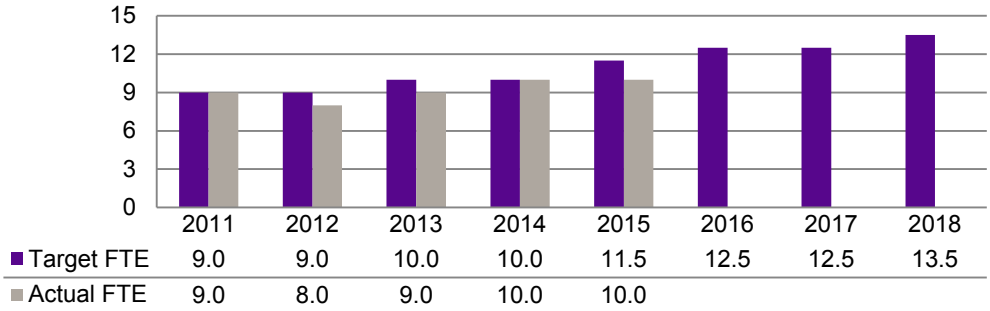
- PEng registration increased significantly in 2014 and remains close to target.

Figure 73: SDE Regular Faculty PEng Status Performance to Target



- Our staff complement has seen significant change, most recently on the administrative side, and there are continuing adjustments with regards to training.
- We have been quite satisfied with the strong candidates we have been able to attract to open positions and currently have a strong staff complement.

Figure 74: SDE Regular Staff Complement Plan Performance to Target



A1: Faculty Mentoring and Career Development

- The mentoring of pre-tenure faculty has been successfully implemented: All pre-tenure faculty have meetings twice a year, in addition to merit review, with progress discussed on research, teaching and service.

A2: Faculty and Teaching Assignments

- The effective and fair assignment of teaching remains problematic, despite focused efforts from the undergraduate chair. Because teaching flexibility will be critical for SDE, long-term, further effort is needed in this direction.
- The number of graduate courses remains inadequate; however, this is partially due to biomedical engineering teaching obligations increasing more rapidly than the teaching tasks produced by new hires. Over time the availability of teaching tasks will improve and will allow a greater breadth of graduate courses.

A3: Staff Restructuring

- A new design instructor and a new department secretary were hired in 2015.
- The interview process for a new biomedical laboratory instructor was recently completed.
- Shifts have been made in administrative staff positions for the events/outreach co-ordinator, graduate secretary, and assistant to the chair.

B. UNDERGRADUATE STUDIES PLAN

- Undergraduate intake has generally been strong.
- Biomedical engineering has seen huge demand, with 15 to 20 applicants per available spot. There is absolutely no shortage of demand for the program.
- The mechatronics engineering program continues to have very strong demand, with a second stream started in 2014.

- Systems design engineering applications have generally been satisfactory. The number of applicants was not significantly different in 2014 relative to other years. The reduction in the 2014 intake is partly statistical fluctuation, and partly due to class size limitations caused by a larger number of students repeating 1A from the previous year.

Figure 75: SDE Undergraduate Intake Plan Performance to Target

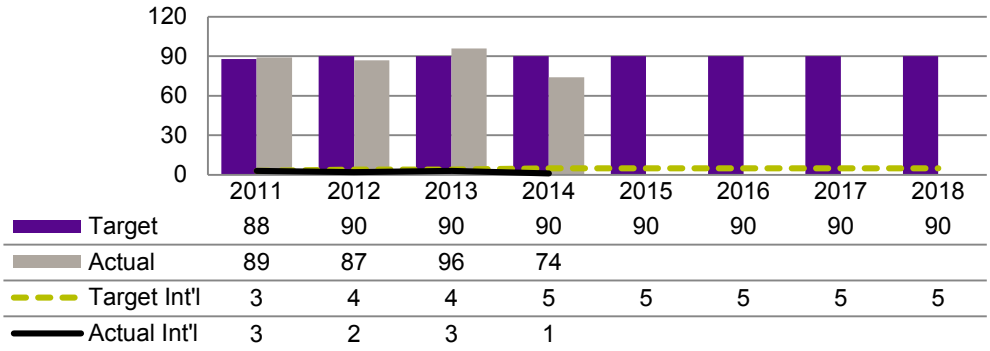


Figure 76: BME Undergraduate Intake Plan Performance to Target

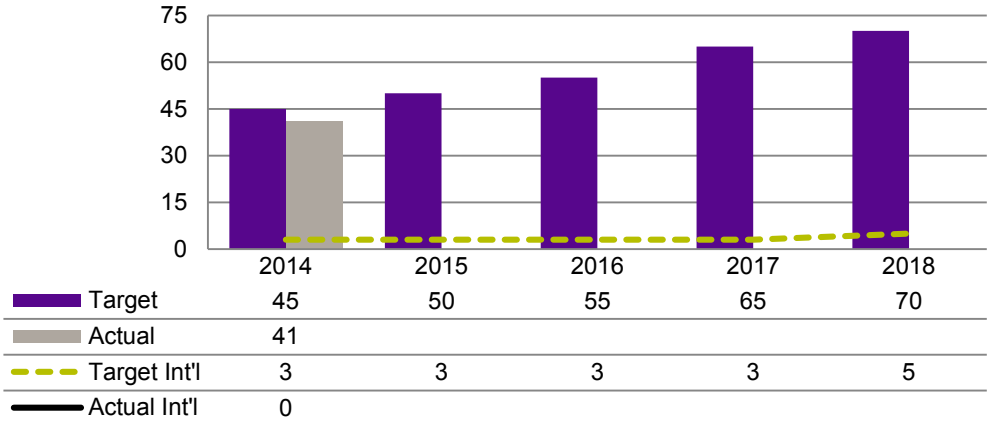
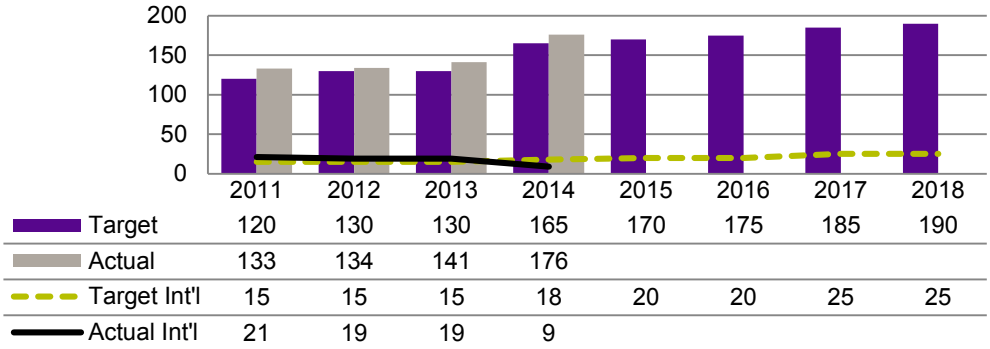


Figure 77: MCTR Undergraduate Intake Plan Performance to Target



B1: Teaching Quality

- Professor Glenn Heppler is working with Associate Dean Gordon Stubley on teaching quality.
- Three faculty members have completed the instructional skills workshop and three faculty members have completed the teaching excellence academy.

B2: Laboratory Program

- All undergraduate students now purchase a lab kit, which includes digital and analogue components, designed around an Arduino microcontroller system. The goal is for course labs and projects to be consistently built around this framework.

- The SYDE 192 lab has been completely revised, with further changes to course content planned.
- The SYDE 292 lab has been modified to include Arduino components.
- The SYDE 352 lab is currently being completely overhauled with new experimental apparatus.

B3: Fractional-Load First Year Program

- This goal has stalled, and will be removed from our strategic plan going forward. We intend to observe the student performance in our first-year program and may revisit this topic in the future.

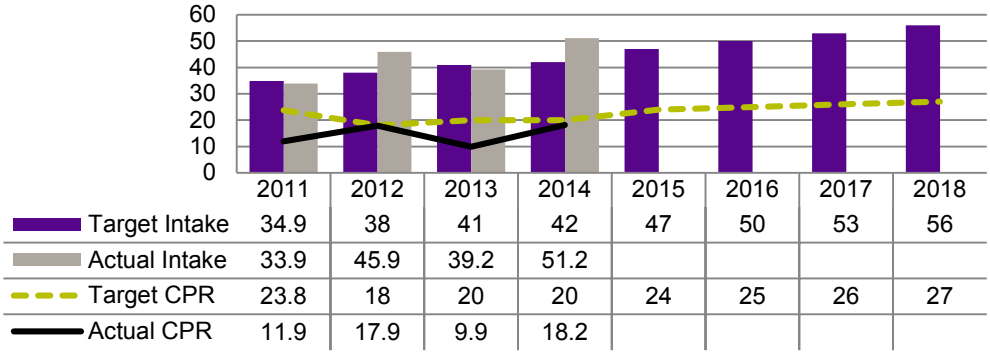
B4: Other Curriculum Components

- Significant progress was made on the role that work reports play, our expectations for the reports, and how to grade to those expectations. It will take a few terms of experience to be able to report on work report evaluation statistics and any improvements over time.
- The outcomes-based assessment approach has seen huge help with the hiring of two positions, a lecturer and an administrative staff position.
- The class professor time is not sufficiently well co-ordinated, and the activities undertaken vary enormously from one professor to another. A more comprehensive plan is essential, and is a high priority for next year.

C. GRADUATE STUDIES PLAN

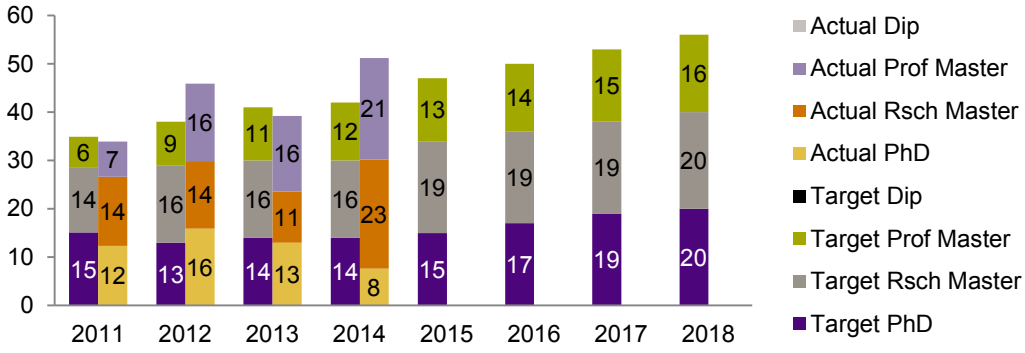
- We are quite pleased with the graduate intake results for 2014. In particular, total graduate intake was well above target, and CPR intake was right on target.

Figure 78: SDE Graduate Intake Plan Performance to Target by Visa Status



	2011	2012	2013	2014	2015	2016	2017	2018
Target Intake	34.9	38	41	42	47	50	53	56
Actual Intake	33.9	45.9	39.2	51.2				
Target CPR	23.8	18	20	20	24	25	26	27
Actual CPR	11.9	17.9	9.9	18.2				

Figure 79: SDE Graduate Intake Plan Performance to Target by Program Type



C1: Graduate Growth

- We have had discussions with the Engineering Graduate Studies Office (EGSO) regarding strategies and ideas for graduate growth. We are participating very actively in the graduate recruitment tracking tool recently introduced by the EGSO and are anticipating some increase in graduate interest through that medium.
- The new biomedical engineering program and expanded mechatronics engineering program are leading to significant hiring in SDE over time, which will lead to growth in the graduate program.

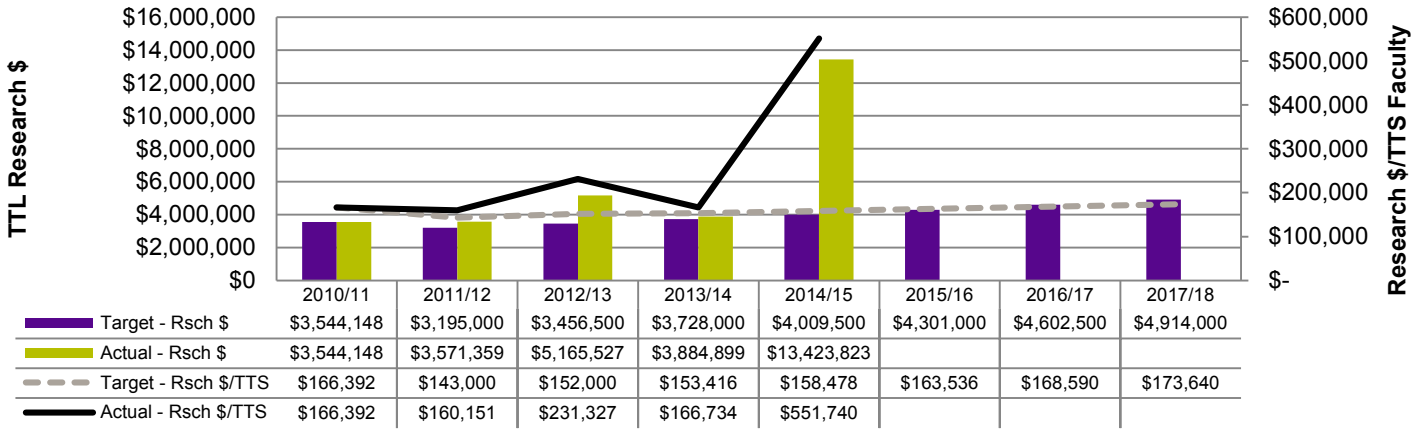
C2: Graduate Program Quality

- There have been repeated attempts to overhaul the graduate curriculum. There are significant challenges present, the most significant of which is that the undergraduate teaching tasks associated with the biomedical engineering program currently exceed the teaching tasks available from hired faculty. The limitation on teaching tasks will improve, over time, as hiring is completed.
- Attention to the graduate curriculum will continue to be a priority in 2015/16.

D. RESEARCH PLAN

- We are clearly very pleased with the 2014/15 research funding shown in Figure 80, being far above target. However, this performance cannot be extrapolated, since a significant portion of the research funding is associated with one very large grant (the CFI funding for the GAIA automotive project).
- Nevertheless, we have a significant number of researchers with active and growing industrial collaborations, a circumstance we expect to continue as strong researchers are hired for the biomedical engineering program.

Figure 80: SDE Research Funding Plan Performance to Target



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Target - Rsch $	$3,544,148	$3,195,000	$3,456,500	$3,728,000	$4,009,500	$4,301,000	$4,602,500	$4,914,000
Actual - Rsch $	$3,544,148	$3,571,359	$5,165,527	$3,884,899	$13,423,823			
Target - Rsch $/TTS	$166,392	$143,000	$152,000	$153,416	$158,478	$163,536	$168,590	$173,640
Actual - Rsch $/TTS	$166,392	$160,151	$231,327	$166,734	$551,740			

D1: Research Directions

- The biomedical engineering program explicitly identifies three directions of interest, all three of which are intended research directions for the department: biomechanics, biosignals and biodevices.
- Since the faculty hires associated with our undergraduate expansion in biomedical and mechatronics engineering represent a highly significant one-time hiring opportunity, a strategic planning session with SDE faculty will be undertaken in 2015/16 to clarify long-term strategic directions.

D2: Research Funding

- The current focus is on the development of NSERC Industrial Research Chair (IRC) opportunities, because our biomedical and mechatronics engineering hires offer good opportunities to tie junior hiring to IRC positions. No IRCs are yet certain, but will be the direction of focus and attention throughout 2015/16.

E. BIOMEDICAL ENGINEERING PLAN

E1: Biomedical Engineering Undergraduate Program

- The program was approved, and the first class arrived in fall 2014. This is a spectacular accomplishment, and reflects the hard work of many people. There are two main priorities for the next four years:
  - The continued roll-out of new core and elective courses. New undergraduate courses will continue to be introduced until winter 2019. Throughout these five years, the development of a quality curriculum and strong instruction is the number one priority.
  - The development of course laboratory components, including course material, lab exercises, lab equipment, lab staffing, lab room allocations, etc. We will place significant attention on the subjects of lab equipment and lab space in 2015/16.

E2: Biomedical Engineering Graduate Program

- There has so far been no progress on this goal; all focus has been on the undergraduate program. However, we are receiving anecdotal comments that an increasing number of graduate students are looking for biomedical-related programs. Furthermore, the presence of a biomedical graduate program may very well be attractive for hired faculty. Consideration of such a program will be a priority in 2015/16.

F. DESIGN PLAN

F1: Design Sequence

- Implementation of our design plan remains a priority. We propose to strike a committee in 2015/16 to clearly articulate expectations and to refocus certain design courses.

F2: Design Symposia

- Significant progress was made in 2014/15, with a variety of initiatives introduced including:
  - include design prototype assessments in the 4A term, and not just at the end of 4B;
  - work to distinguish the 3B and 4B experiences; and
  - have an event in 4B that celebrates student achievement and success more broadly than just the design projects.
- Based on experience and feedback from last year, we intend to put significant effort and budget into continuing these innovations into the 2015/16 year.

F3: Design Support

- Departmental support for design has significantly increased over the plan period.
- A design instructor has been hired and, in a positive development separate from this specific position, SDE technical staff members have become far more involved in design, both in the laboratory and project contexts.
- As the biomedical engineering program grows, and the number of laboratory courses increases, there will be increased demands on technical staff time. As such, the nature and extent of design support will need to be re-evaluated from time to time.

F4: Ideas Clinic

- The Engineering Ideas Clinic™ should complement the learning which students experience through design projects and classroom instruction. Ideally these would be interdisciplinary, possibly interdepartmental exercises which integrate material from multiple courses. Such an approach to instruction is very much consistent with the systems design engineering philosophy, and is a longer-term priority.
- In the shorter term, we first need to address issues in the design curriculum (see F1 above), before moving on to integrating ideas-clinic components into the curriculum.

G. ADVANCEMENT PLAN

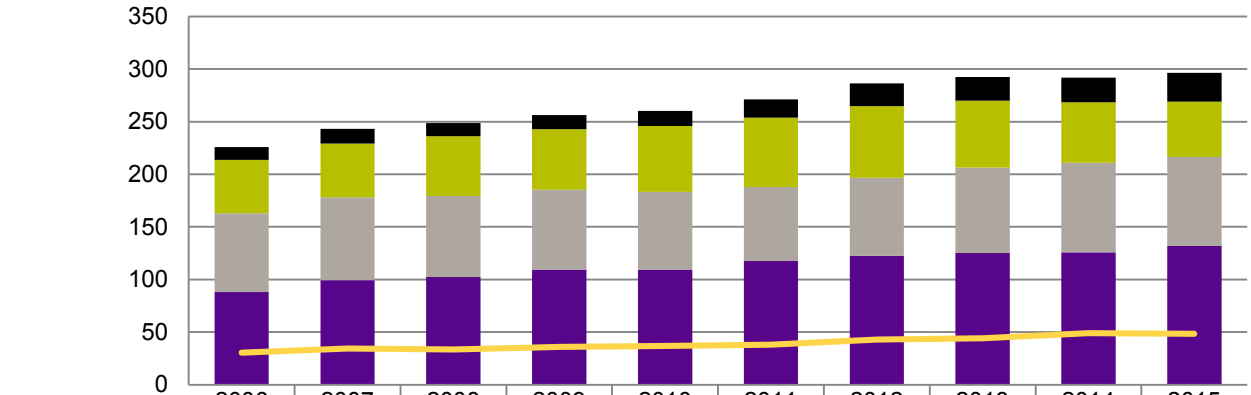
- We are proposing to start with two steps, to better maintain and nurture ties our alumni:
  - Improved monitoring. A very first step is for SDE to be informed of alumni contributions and to thank/recognize these alumni.
  - Improved engagement. We invite alumni back to departmental events on campus in only extremely limited ways. There are certain events, such as symposia, which could be better promoted. We now have a staff events/outreach co-ordinator who can play a large role in improving such promotion.

IV. Key Metrics & Performance Indicators

The information presented in this section focuses on overview data at the Faculty level. For more detailed information at the department or program level, please refer to the tabular data presented in Appendices V.A-H. For data definitions and sources, please refer to the alpha-numeric code in parentheses at the end of each figure title and the corresponding entry in Appendix V.I.

A. Faculty and Staff

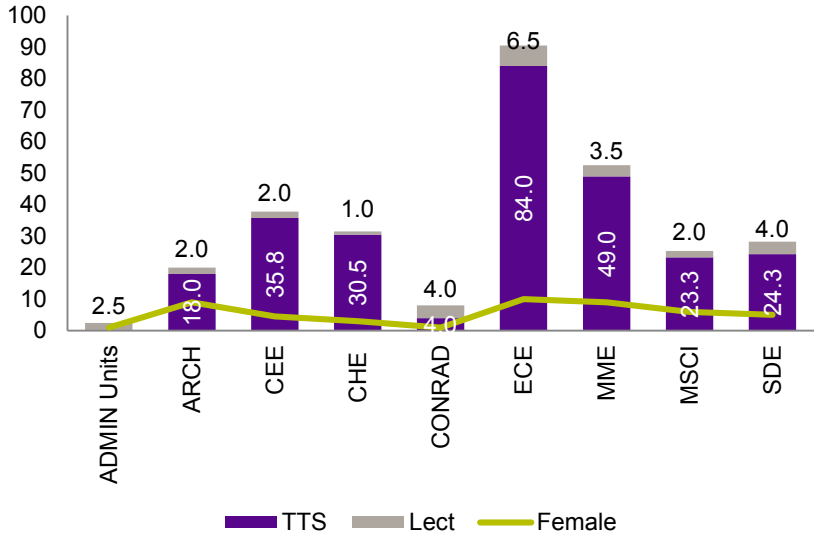
Figure 81: Regular Faculty 2006-2015 (A1)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Lect	12.0	14.0	12.5	13.5	14.5	17.5	21.5	22.5	23.5	27.5
Asst Prof	51.0	51.3	57.0	57.5	62.5	66.0	68.0	63.5	57.5	52.5
Assoc Prof	74.8	78.5	76.8	75.8	73.8	70.3	74.3	81.0	85.0	84.5
Prof	88.0	99.5	102.5	109.5	109.5	117.5	122.5	125.3	125.9	131.9
Female	30.5	34.5	33.5	36.0	37.0	38.0	43.0	44.0	49.0	48.5

Over the past decade, the regular faculty complement in Waterloo Engineering has grown by 71 (31%), and the number of women faculty has increased by 18 (59%).

Figure 82: Regular Faculty, 2015 (A1)



As of May 1, 2015 Waterloo Engineering's regular faculty complement was 296.3, comprised of 268.9 tenured/tenure-stream faculty and 27.5 lecturers (definite-term and continuing).

The proportion of faculty who are women ranged among departments from 9.5% to 45%, with a Faculty-wide average of 16.4%.

Figure 83: TTS Faculty by PhD School, 2015 (A4)

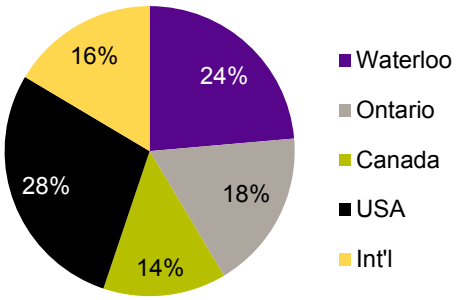
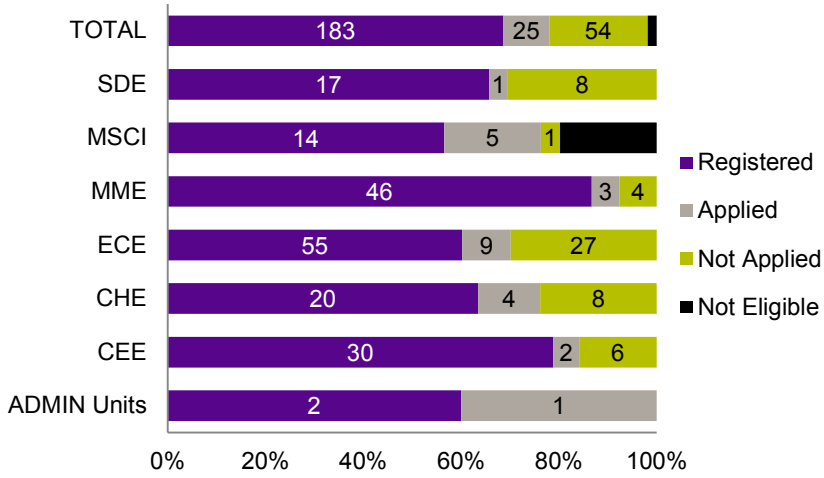


Figure 84: Regular Faculty by PEng Status, 2015 (A2)

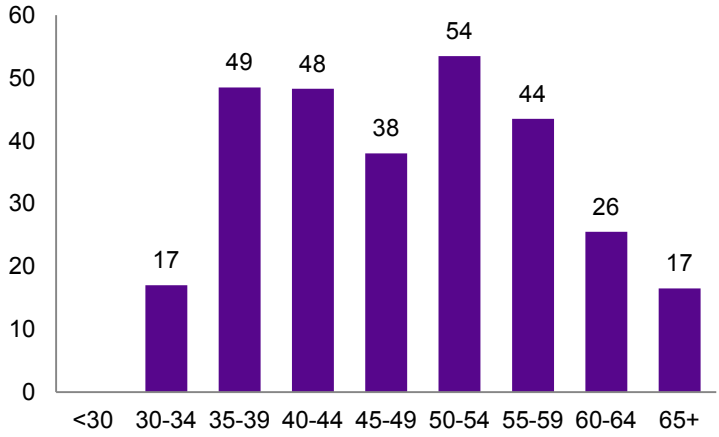


Our complement includes faculty members who have earned PhDs from a wide range of schools (see Figure 83).The proportion of faculty who have earned degrees from Waterloo has declined by another percentage point between 2014 and 2015, as a broader and more global representation of PhD schools has developed.

As shown in Figure 84, 78% of faculty in engineering disciplines are registered or have applied for the PEng (including some limited licences). This ranges from 70% to 92% among departments.

Figure 85: Age Distribution of Regular Faculty, 2015 (A3)

As of May 2015, 33% of our faculty members are 55 years old or older, an increase of 4 percentage points over last year, while the proportion of faculty members under the age of 40 has decreased to 20%. The most significant group (48%) remains in the 40-55 range (see Figure 85).



In addition to our regular faculty complement, the contributions of a wide range of non-regular faculty members (as shown in Figure 86 and Figure 87) enrich our academic and research environment.

Figure 86: Non-regular and Non-faculty Appointments by Department, 2015 (A5)

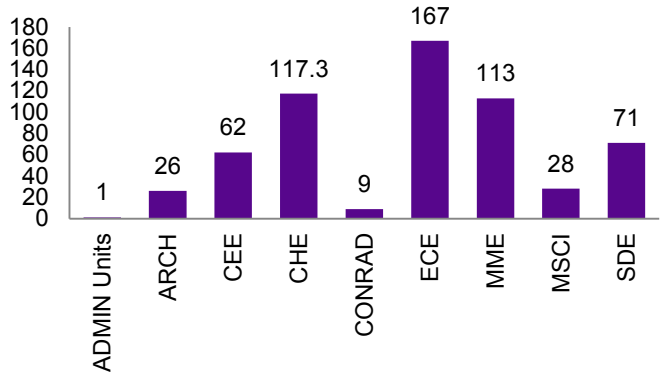


Figure 87: Non-regular and Non-faculty Appointments by Type, 2015 (A5)

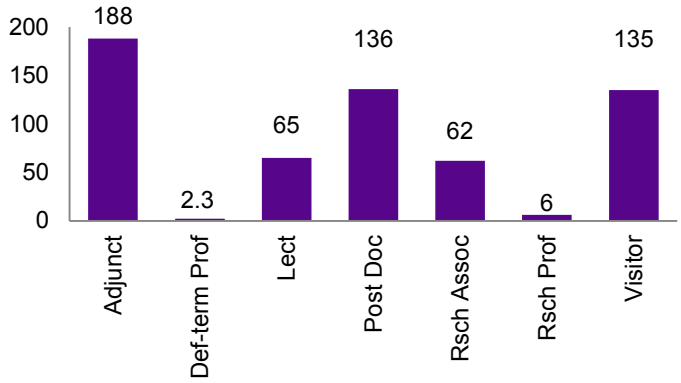
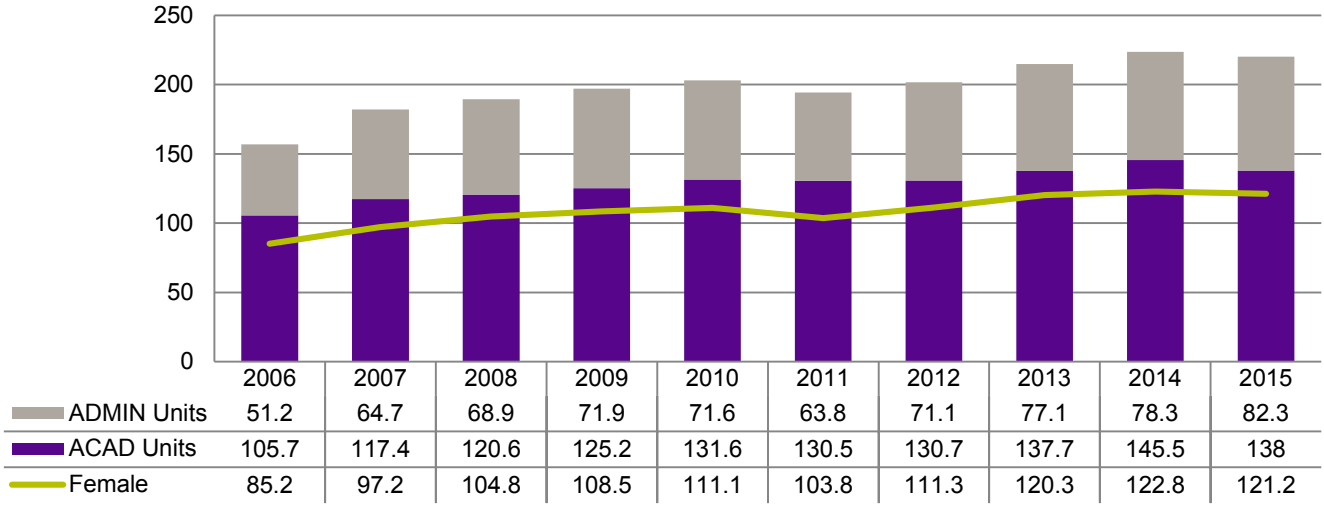


Figure 88: FTE Staff, 2006-2015 (A7)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
ADMIN Units	51.2	64.7	68.9	71.9	71.6	63.8	71.1	77.1	78.3	82.3
ACAD Units	105.7	117.4	120.6	125.2	131.6	130.5	130.7	137.7	145.5	138
Female	85.2	97.2	104.8	108.5	111.1	103.8	111.3	120.3	122.8	121.2

The staff complement in Waterloo Engineering has grown by 63.5 (40.5%) over the past decade. As of May 1, 2015 there were 220 regular FTE staff members in Engineering: 138 FTE (74 technical staff and 64 administrative staff) in our academic units and 82 (61 administrative and 21 technical) in our administrative units. The current distribution of staff is shown in Figure 89 and Figure 90.

Figure 89: FTE Staff in Academic Units, 2015 (A7)

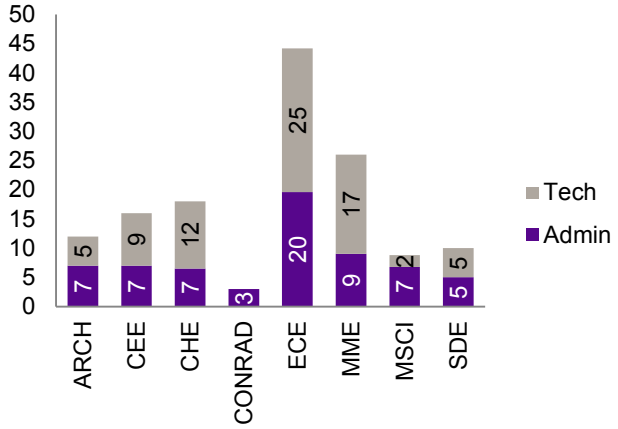


Figure 90: FTE Staff in Administrative Units, 2015 (A7)

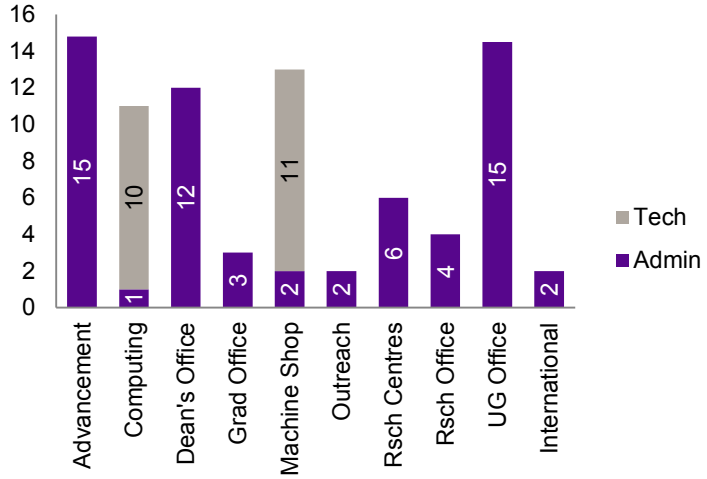
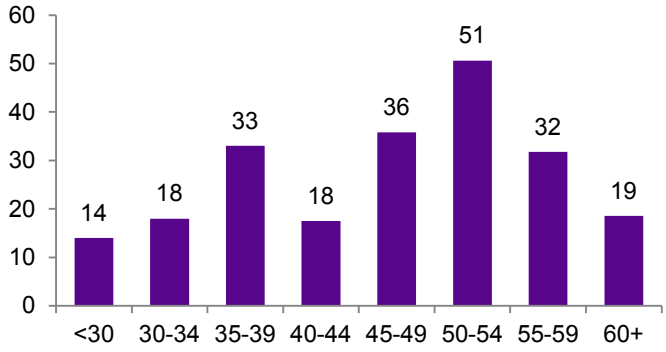
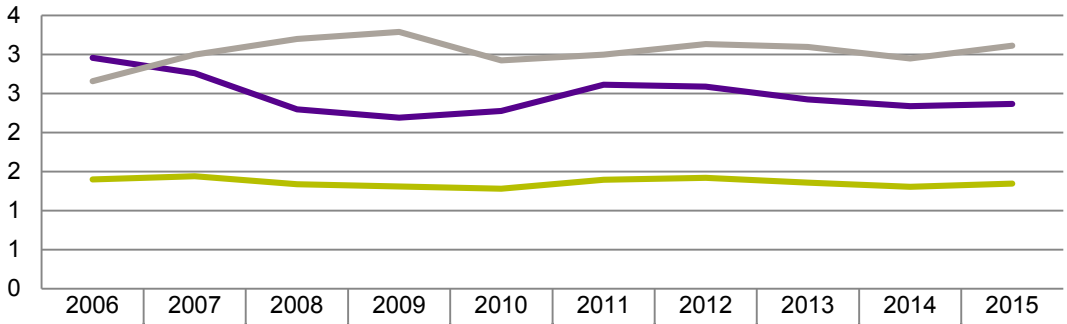


Figure 91: Age Distribution of Staff, 2015 (A8)



The current age distribution of our staff complement points to a need to plan for increasing staff renewal in the coming years: 23% of our staff complement is 55 years of age and older, and an additional 39% is aged 45 to 55 years old.

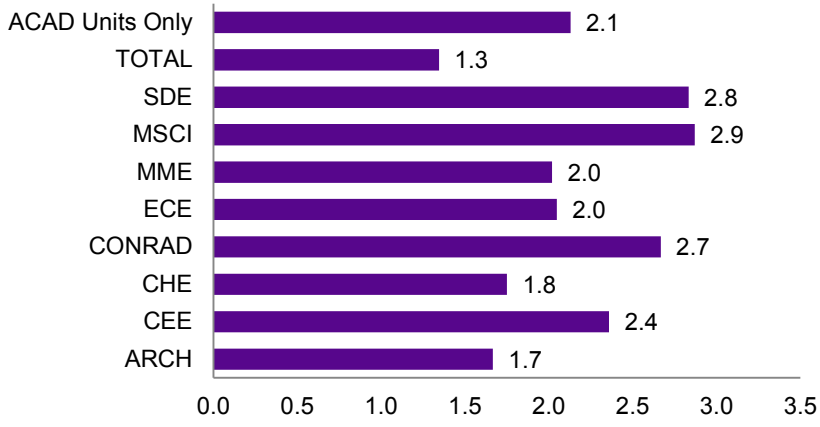
Figure 92: Faculty to Staff Ratios, 2006-2015 (A10)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Faculty:Admin Staff	3.0	2.8	2.3	2.2	2.3	2.6	2.6	2.4	2.3	2.4
Faculty:Tech Staff	2.7	3.0	3.2	3.3	2.9	3.0	3.1	3.1	2.9	3.1
Faculty:Total Staff	1.4	1.4	1.3	1.3	1.3	1.4	1.4	1.4	1.3	1.3

The average ratio of regular faculty members to FTE staff members for the Faculty as a whole (including staff in administrative units, which do not typically have a faculty complement) has remained stable over the past decade. However, as shown in Figure 92, the distribution of this figure as applied to administrative staff and technical staff has varied over the same time period.

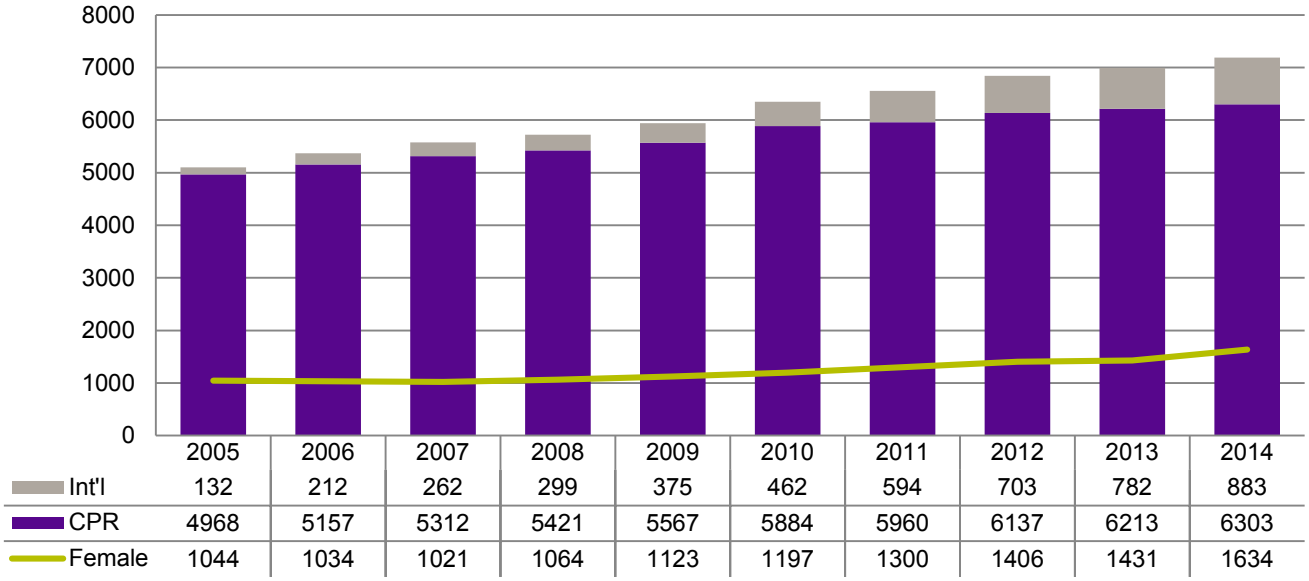
Figure 93: Faculty to Staff Ratios, 2015 (A10)



As of May 1, 2015, the ratio of regular faculty to all FTE staff was 1.3 for the Faculty as a whole and 2.1 in academic units only (i.e. excluding staff in administrative support offices). Figure 93 shows the distribution of this ratio across academic units, which varies among disciplines, largely due to their varying technical intensity.

B. Undergraduate Studies

Figure 94: Undergraduate Enrolment 2005-2014 (B1)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Int'l	132	212	262	299	375	462	594	703	782	883
CPR	4968	5157	5312	5421	5567	5884	5960	6137	6213	6303
Female	1044	1034	1021	1064	1123	1197	1300	1406	1431	1634

Over the past decade, our undergraduate enrolment (head count) has increased by 41%, or almost 2,100 students, to a record total of 7,186 students as of November 1, 2014. Over the same time frame, international student enrolment grew by 751 students and the enrolment of female students increased by 590 students. We now have the highest enrolment of female undergraduate students in the Faculty of Engineering ever (1634).

Figure 95: Undergraduate Enrolment, Fall 2014 (B1)

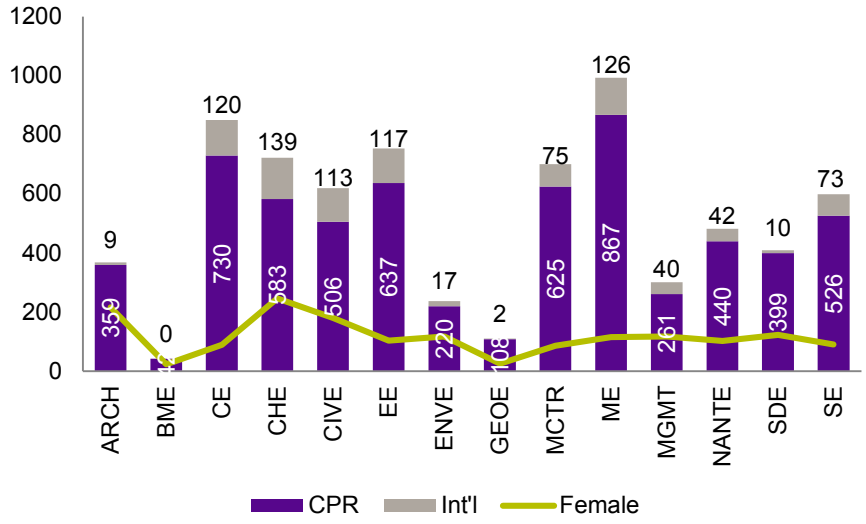


Figure 95 shows the distribution of the fall 2014 undergraduate enrolment in the Faculty of Engineering by program, including our newest program, Biomedical Engineering, which launched in fall 2014.

Figure 96: Undergraduate Students per Regular Faculty Member, 2005/06-2014/15 (B6)

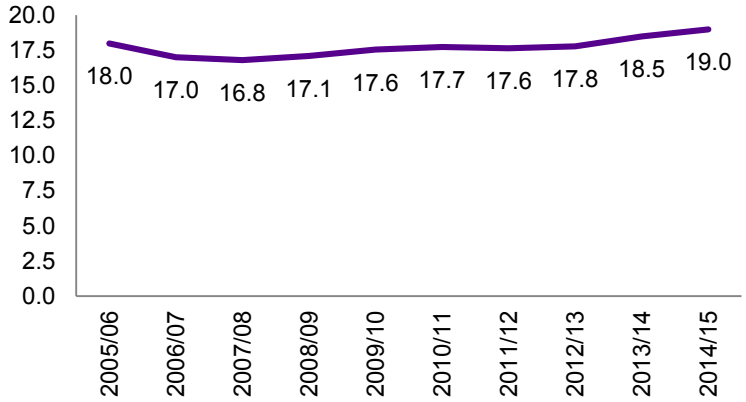
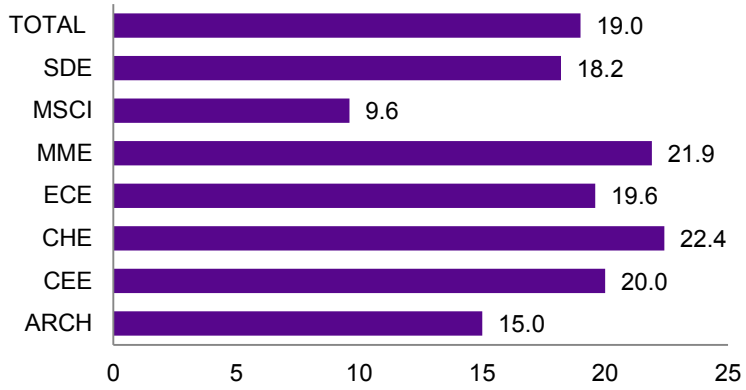


Figure 97: Undergraduate Students per Regular Faculty Member, 2014/15 (B6)



Widely recognized as one indicator of undergraduate program quality, the ratio of undergraduate students to regular faculty members is a metric we monitor annually. Figure 96 shows a gradual increase in this number since a low point in 2007/08, rising to 19 in 2014/15. Despite strategic increases to the faculty complement in recent years, this ratio has risen due to commensurate undergraduate enrolment increases across programs, including the new biomedical engineering program and the expansion of our highly sought-after mechatronics program, both of which began in fall 2014. It is important to note that calculation of this ratio does not include faculty members who had been hired but had not yet started their positions as of May 1, of which there were 13 in 2015.

For 2014/15, this ratio at the Faculty level is 19. The distribution of this ratio by department is shown in Figure 97. Management sciences is anomalous here because it was home to an established graduate program and undergraduate option before launching the undergraduate management engineering program in 2007.

Figure 98: Undergraduate Year One New Admissions, 2007-2014 (B4)

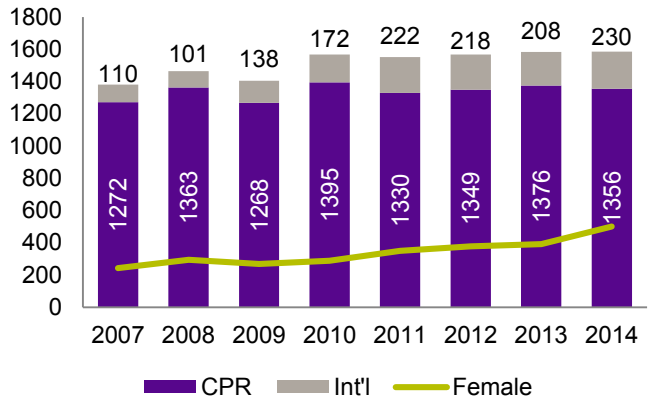
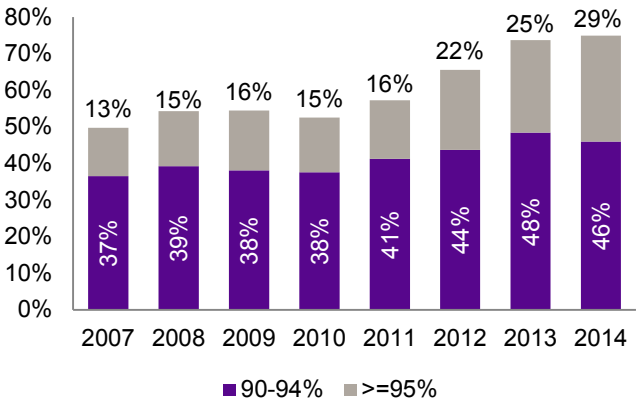


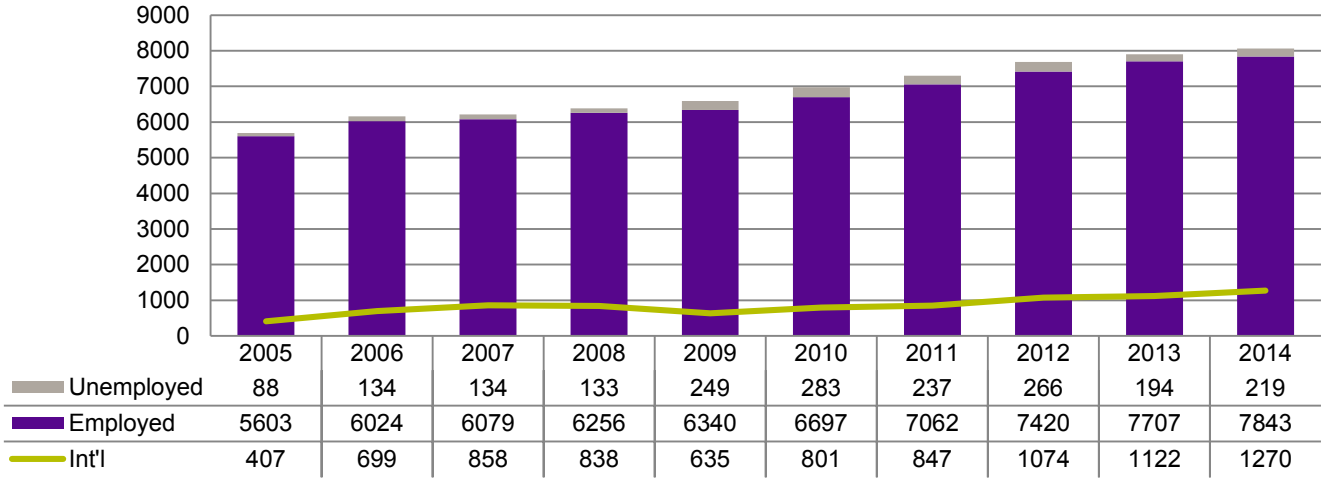
Figure 99: Undergraduate Admissions by Final Entering Grade Averages, 2007-2014 (B5)



Over the past eight years, first-year intake into the Faculty of Engineering has increased by just over 200 students or 15%. Over the same time period, international admissions have increased by 109% and the number of female students admitted to the first-year class has increased by 106% to reach a record high of 500.

Figure 99 depicts a steady increase over the past eight years in the proportion of undergraduate students entering Waterloo Engineering with incoming final high school averages over 95% and between 90-94%. The record high in 2014 indicates that 75% of entering students had a final high school average of 90% or higher, an affirmation of the exceptionally high quality students we attract to our renowned undergraduate program.

Figure 100: Co-op Employment, 2005-2014 (B8)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Unemployed	88	134	134	133	249	283	237	266	194	219
Employed	5603	6024	6079	6256	6340	6697	7062	7420	7707	7843
Int'l	407	699	858	838	635	801	847	1074	1122	1270

As our undergraduate student enrolment increases, so does the number of work terms required to fulfill our commitment to co-operative education for all undergraduates. In 2014, the number of required work terms reached an all-time high of 8,062. This is an increase of almost 2,400 work terms (or 42%) over the number required a decade ago (see Figure 100). Despite this substantial increase, we maintain excellent employment rates. In 2014, the overall employment rate was 97.3%, consistent with performance that has ranged from 95.9% to 98.5% since 2005. Employment rates for 2014 range by program from 93.6% to 99.7% (see Figure 101).

Figure 101: Co-op Employment by Program, 2014 (B8)

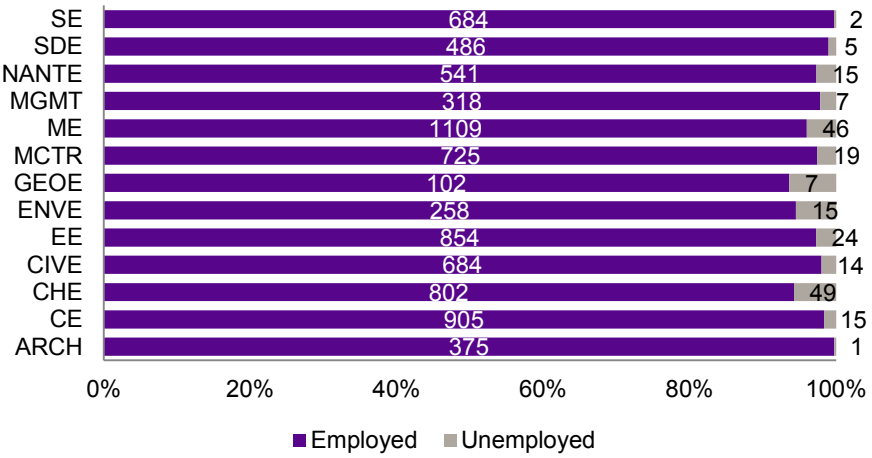


Figure 102: Co-op Employment by Location, 2014 (B8)

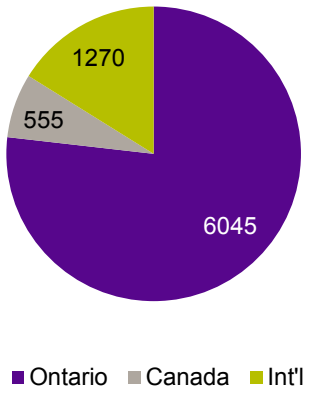
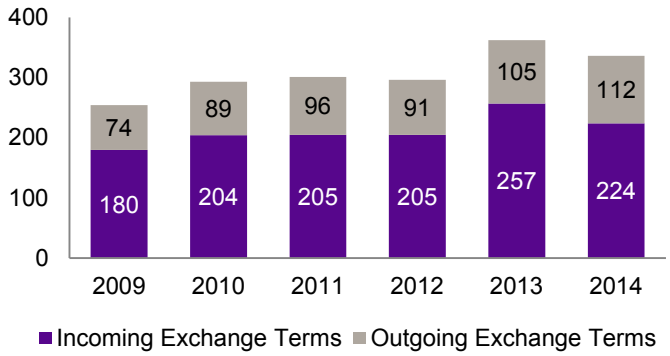


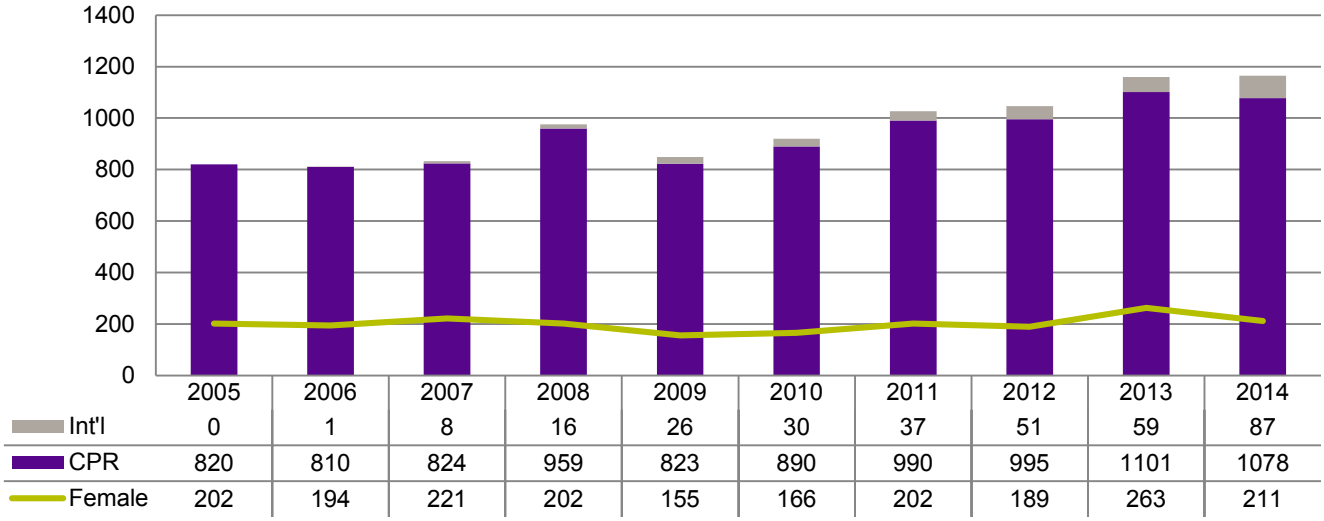
Figure 103: Undergraduate International Exchange Participation, 2009-2014 (B10)



Work terms afford engineering undergraduate students at Waterloo the unique opportunity to explore multiple work settings over the course of their studies, including global experiences. As shown in Figure 100, over the past decade the number of work terms completed outside of Canada has more than doubled, reaching a record total of 1,270 in 2014.

In addition to international work terms, another valuable global experience available to Waterloo Engineering undergraduates is international exchange, participation in which has also increased in recent years (see Figure 103). In 2014, outgoing exchange terms totalled over 100 for the second year in a row.

Figure 104: Undergraduate Degrees Granted, 2005-2014 (B3)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Int'l	0	1	8	16	26	30	37	51	59	87
CPR	820	810	824	959	823	890	990	995	1101	1078
Female	202	194	221	202	155	166	202	189	263	211

Over the past 10 years, degrees awarded annually to Waterloo Engineering undergraduate students increased by 42%. In 2014 we reached an all-time high number of degrees granted, awarding 1,165 undergraduate degrees across 13 programs.

Figure 105 shows the distribution of undergraduate degrees granted in 2014 by program and Figure 107 provides a normalized indicator of degrees granted per regular faculty member. Management sciences is anomalous here because it was home to an established graduate program and undergraduate option before launching the undergraduate management engineering program in 2007.

To better understand the extent to which the increase in degrees awarded over time is related to increasing faculty complement, Figure 106 shows an increase in the number of degrees granted per regular faculty member over the past six years.

Figure 105: Undergraduate Degrees Granted, 2014 (B3)

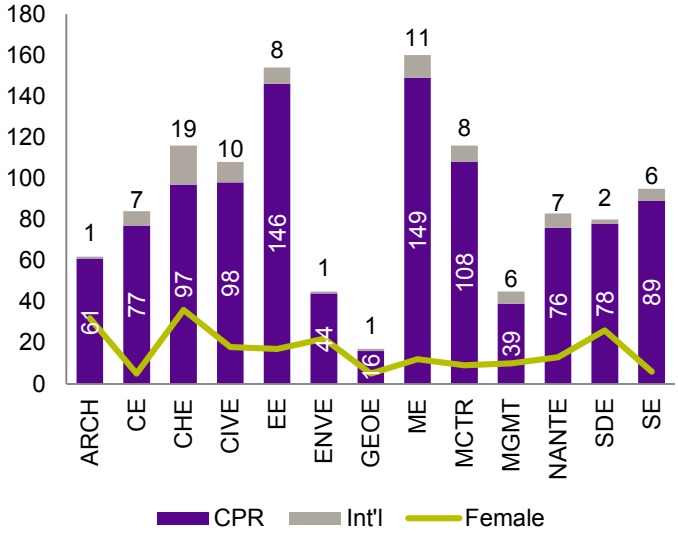


Figure 106: Undergraduate Degrees Granted per Regular Faculty Member, 2009/10-2014/15 (B7)

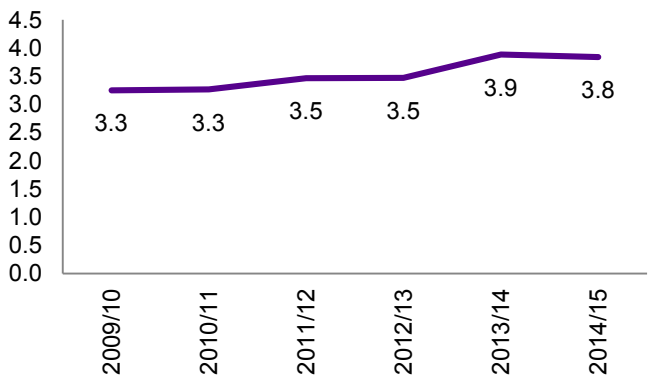
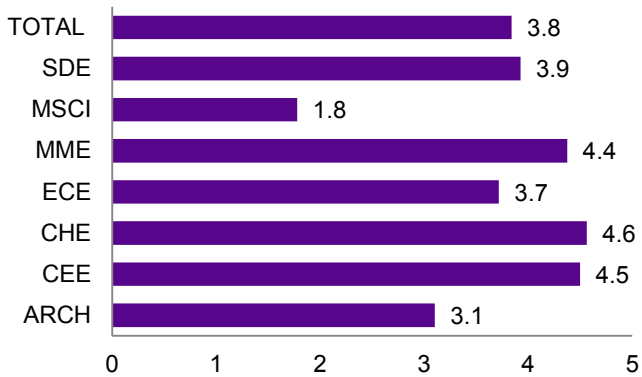
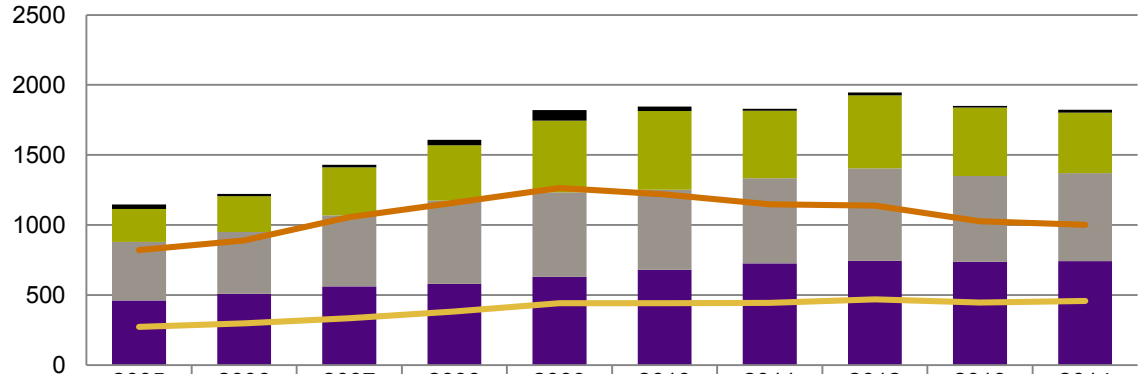


Figure 107: Undergraduate Degrees Granted per Regular Faculty Member, 2014/15 (B7)



C. Graduate Studies

Figure 108: Graduate Enrolment, 2005-2014 (C1)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
ND (incl Dip, Cert)	32	16	18	37	75	32	12	21	12	19
Prof Master	237	255	343	396	513	562	483	520	488	432
Rsch Master	418	440	506	594	604	570	609	660	612	628
PhD	460	510	562	580	629	681	725	745	738	743
Female	272	298	333	383	442	441	444	469	445	457
CPR	821	889	1056	1159	1264	1218	1147	1139	1026	1002

Over the past 10 years, our graduate enrolment (head count) has increased by 59% or 675 students to 1,822 on November 1, 2014. Over that period, PhD enrolment increased by 61.5% and the number of female students enrolled increased by 68%. The number of students who are Canadian or permanent residents increased by 22%, growing at a rate significantly slower than the overall enrolment rate (reflecting the increasing proportion of our graduate student body that is comprised of international students).

Figure 109: Graduate Enrolment, 2014 (C1)

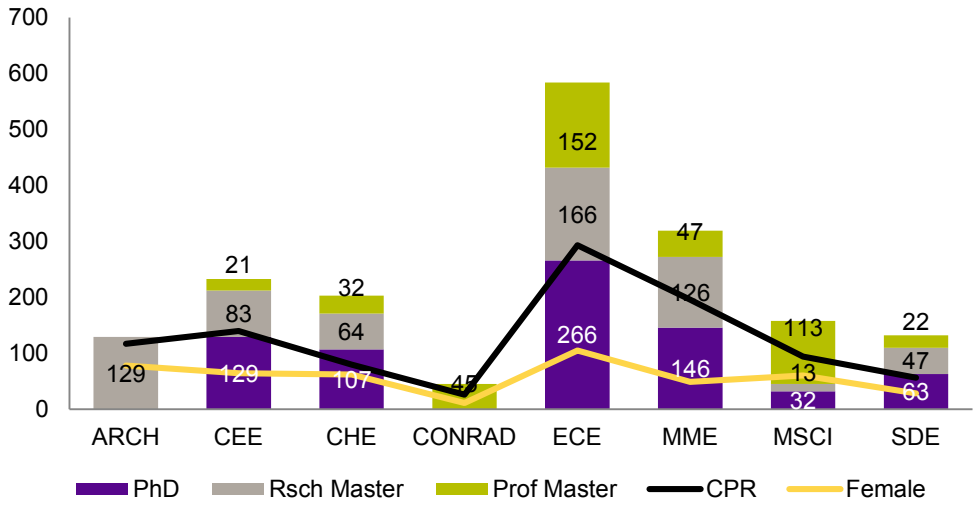


Figure 109 shows the distribution of fall 2014 graduate enrolment by department, visa status and gender. Figure 111 normalizes that data to tenured-tenure/stream faculty. In Figure 110, which shows the trend over the past 10 years in graduate student to faculty ratios, it can be seen that the ratio of research students to faculty members has been relatively stable over the past seven years. The addition of professional master's students to this ratio results in more variability.

Figure 110: Graduate Students per TTS Faculty Member, 2005/06-2014/15 (C5)

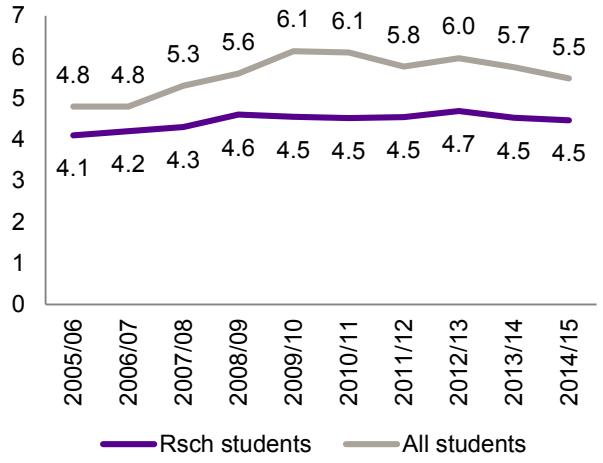
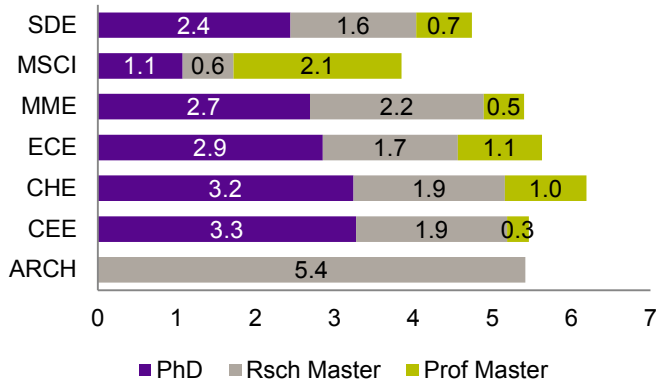


Figure 111: Graduate Students per TTS Faculty Member, 2014/15 (C5)



**graph excludes Conrad, which had 9.9 professional master's students per TTS faculty member in 2014/15.*

While graduate enrolments have been increasing over the past decade, so too have undergraduate enrolments. We track the proportion of the overall FTE student enrolment that is comprised of graduate students as a means to better understand graduate growth in the context of overall Faculty activity. Figure 112 shows this proportion over the past six years. In 2014/15, the graduate proportion of total FTE student enrolment ranged across departments from 18.5% to 27% (excluding Conrad, which is comprised entirely of professional master's graduate students).

Figure 112: Graduate Proportion of Total FTE Enrolment, 2009/10-2014/15 (C7)

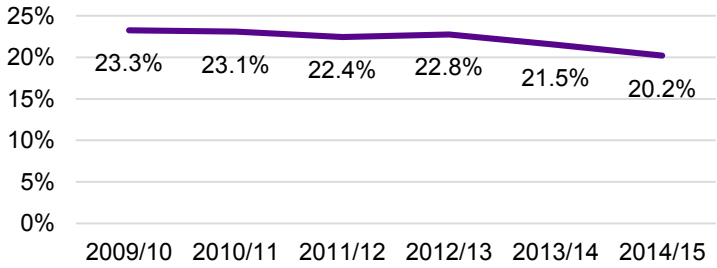


Figure 113 shows the trend in engineering graduate admissions by program type over the past four years, during which time total admissions were relatively stable but the distribution among programs varied slightly and the proportion of admitted students who are Canadian or permanent residents decreased. Figure 114 provides department-level detail of the most current year's admissions.

Figure 113: FTE Graduate Student Admissions, 2011-2014 (C4)

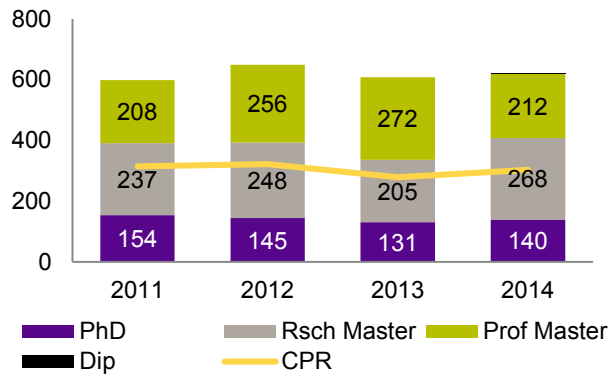
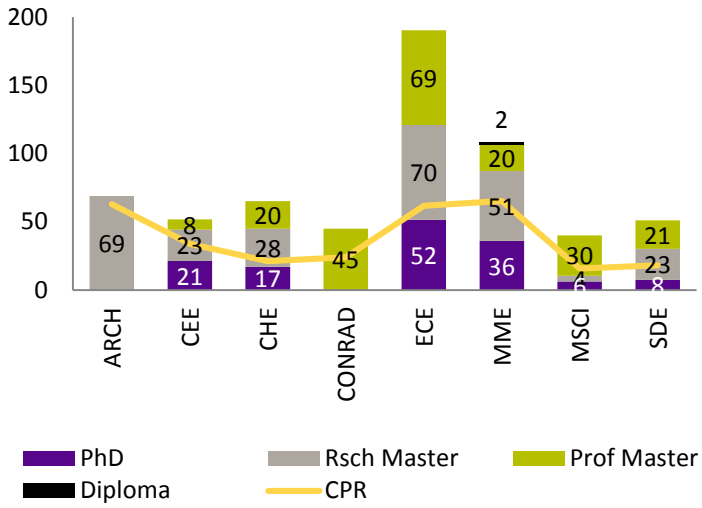


Figure 114: FTE Graduate Student Admissions, 2014 (C4)



We monitor average graduate student support (as shown in Figure 115 and Figure 116) because financial support for research graduate students has an important impact on the quality of our graduate student experience and on the competitiveness of our graduate recruitment efforts. Additionally, the proportion of students holding external scholarships can be considered a metric of student quality.

Figure 115: Graduate Student Financial Support, 2009/10-2014/15: PhD Students (C8)

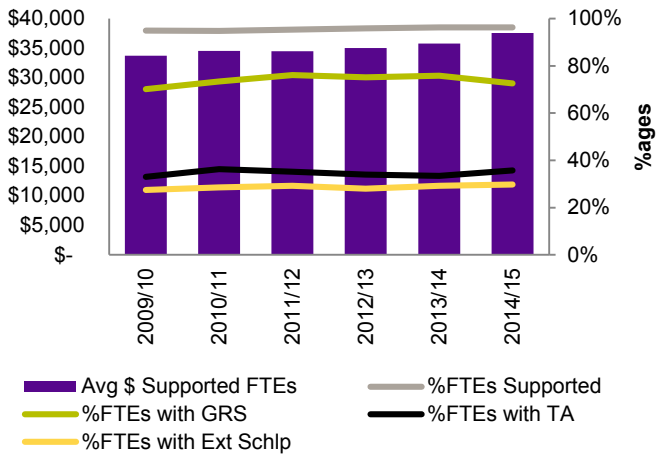


Figure 116: Graduate Student Financial Support, 2009/10 - 2014/15: Research Master's Students (C8)

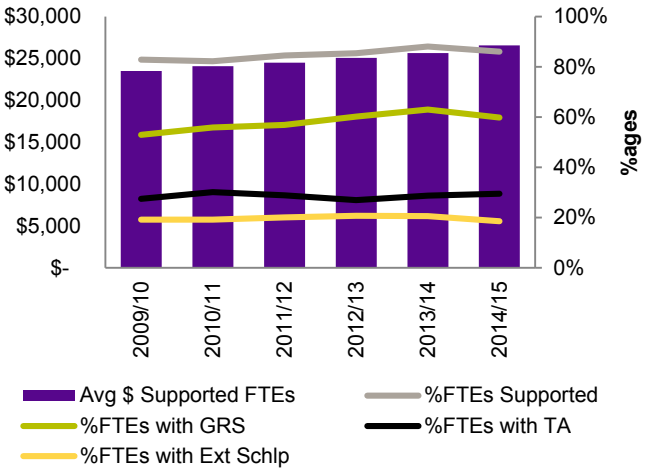
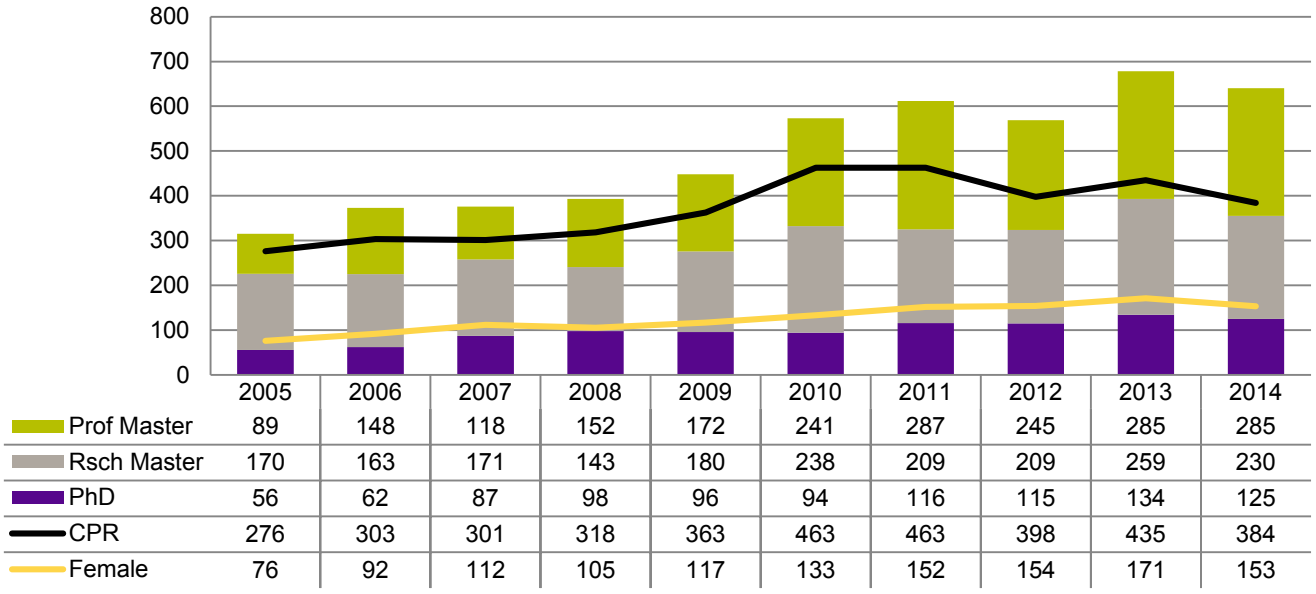


Figure 117: Graduate Degrees Granted, 2005-2014 (C3)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Prof Master	89	148	118	152	172	241	287	245	285	285
Rsch Master	170	163	171	143	180	238	209	209	259	230
PhD	56	62	87	98	96	94	116	115	134	125
CPR	276	303	301	318	363	463	463	398	435	384
Female	76	92	112	105	117	133	152	154	171	153

Over the past 10 years, degrees awarded annually to Waterloo Engineering graduate students increased by 325 degrees or 103%, reaching 640 in 2014, our second-highest year for graduate degrees granted ever. Reflecting our increased research intensity, the number of doctoral degrees granted increased by 123%. However, the largest growth remained in professional master's degrees (220%).

Figure 118: Graduate Degrees Granted, 2014 (C3)

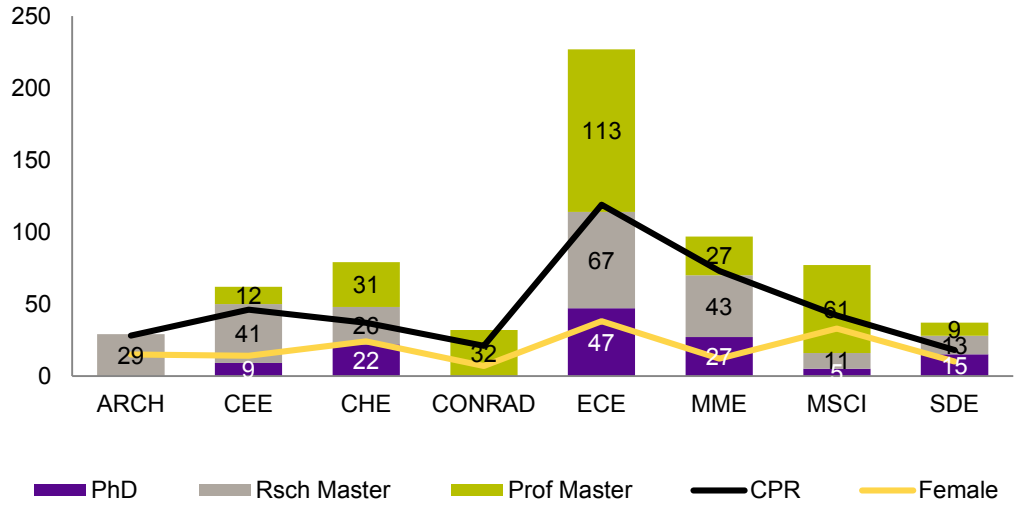


Figure 118 shows the distribution of degrees granted in 2014 by department, degree type and gender. Figure 119 and Figure 120 normalize that data to tenured/tenure-stream faculty. Following a small increase last year, this ratio has returned to a figure that has been quite stable over the past six years.

Figure 119: Graduate Degrees Granted per TTS Faculty Member, 2009/10-2014/15 (C6)

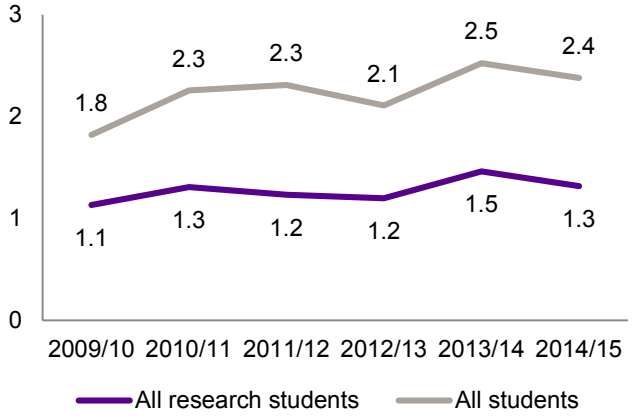
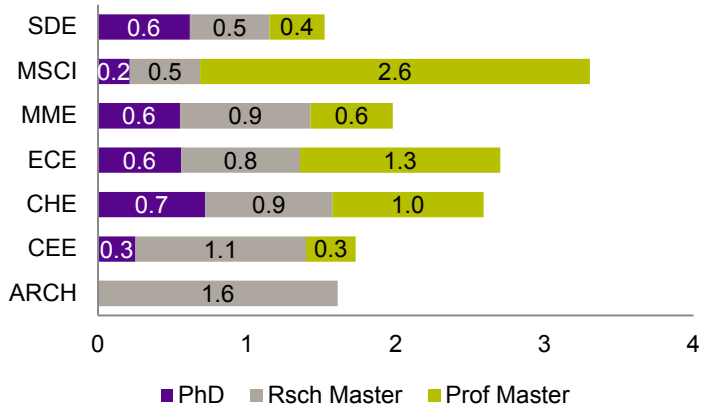


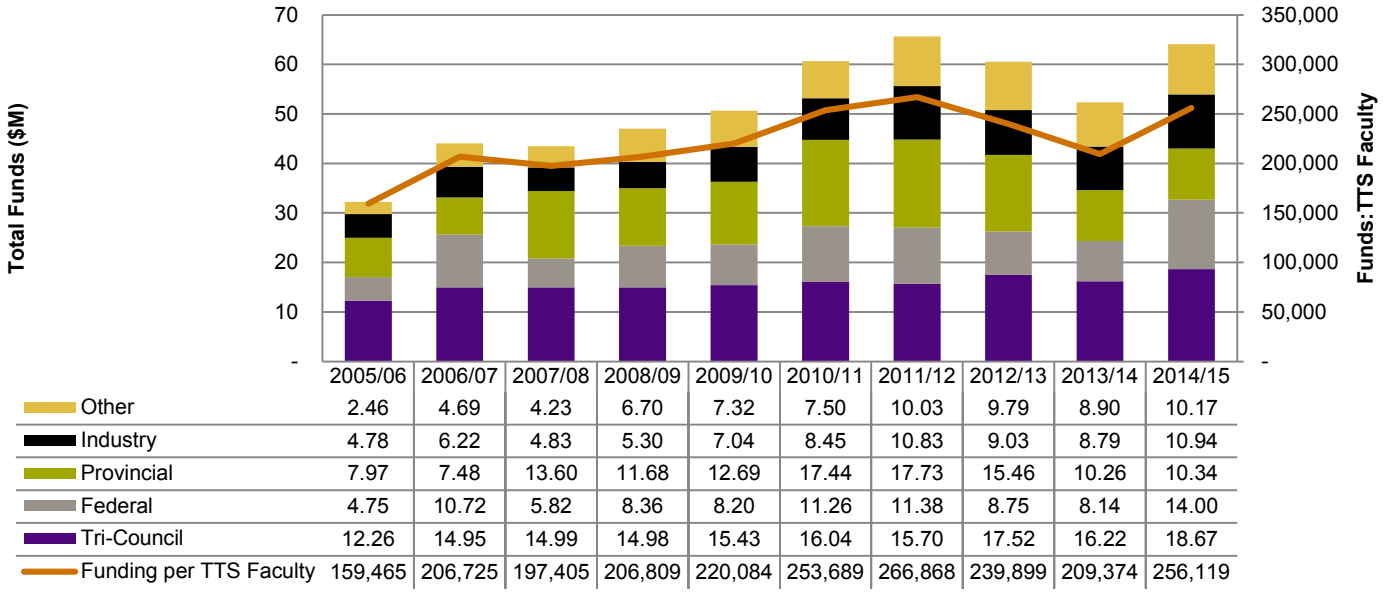
Figure 120: Graduate Degrees Granted per TTS Faculty Member, 2014/15 (C6)



** graph excludes Conrad, which awarded 8 professional master's degrees per TTS faculty member in 2014/15.*

D. Research

Figure 121: Research Funds by Sector ($millions) and per TTS Faculty Member, 2005/06-2014/15 (D1&D7)



	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Other	2.46	4.69	4.23	6.70	7.32	7.50	10.03	9.79	8.90	10.17
Industry	4.78	6.22	4.83	5.30	7.04	8.45	10.83	9.03	8.79	10.94
Provincial	7.97	7.48	13.60	11.68	12.69	17.44	17.73	15.46	10.26	10.34
Federal	4.75	10.72	5.82	8.36	8.20	11.26	11.38	8.75	8.14	14.00
Tri-Council	12.26	14.95	14.99	14.98	15.43	16.04	15.70	17.52	16.22	18.67
Funding per TTS Faculty	159,465	206,725	197,405	206,809	220,084	253,689	266,868	239,899	209,374	256,119

In 2014/15, research funding to Waterloo Engineering faculty members reached its second-highest annual total ever, at $64.1 million or $256,119 per tenured/tenure-stream faculty member. This represents a 129% increase in total research funding and a 61% increase in funding per tenured/tenure-stream faculty member over the past decade, and a 23% increase over the previous year. From 2005/06 to 2014/15, growth in industry funding (129%) continues to substantially outpace growth in Tri-Council funding (52%), a necessary expansion of funding sources given constraints on government program budgets.

Figure 122: Research Funds by Sector ($millions), 2014/15 (D1)

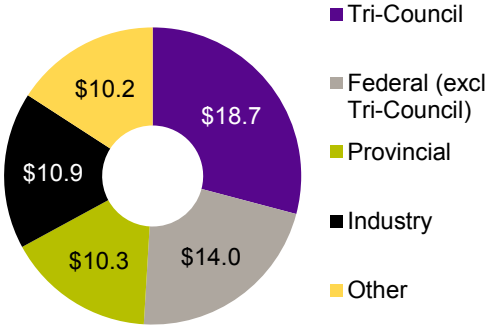
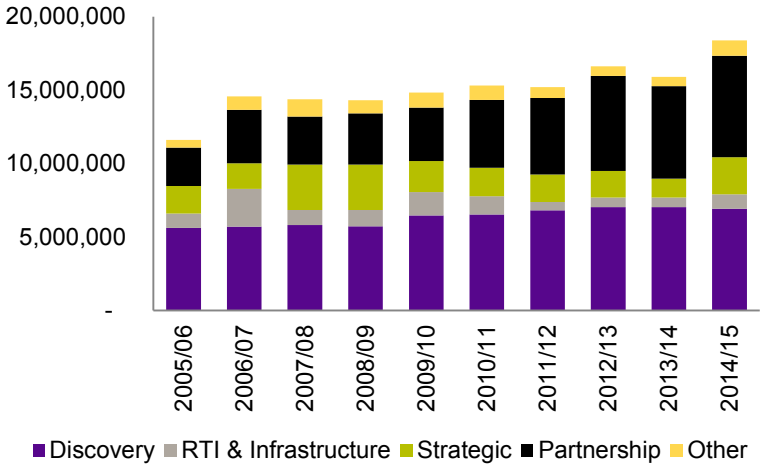


Figure 123: NSERC Funding by Type, 2005/06-2014/15 (D3)



In 2014/15, Waterloo Engineering external research funding totalled $64,124,254 or $256,119 per tenured/tenure-stream faculty member. The distribution of this funding by sector is shown in Figure 122.

Tri-Council funding has increased by 52% since 2005/06, reaching an all-time high of $18.7M in 2014/15. This growth is further explored in Figure 123, by NSERC program type. In 2014/15, 29% of research funding came from the Federal Tri-Council granting agencies, mostly NSERC. The distribution of Tri-Council funding and of NSERC funding by program in 2014/15 is provided in Figure 124.

Figure 124: Tri-Council Funding and NSERC Funding by Type ($millions), 2014/15 (D2&D3)

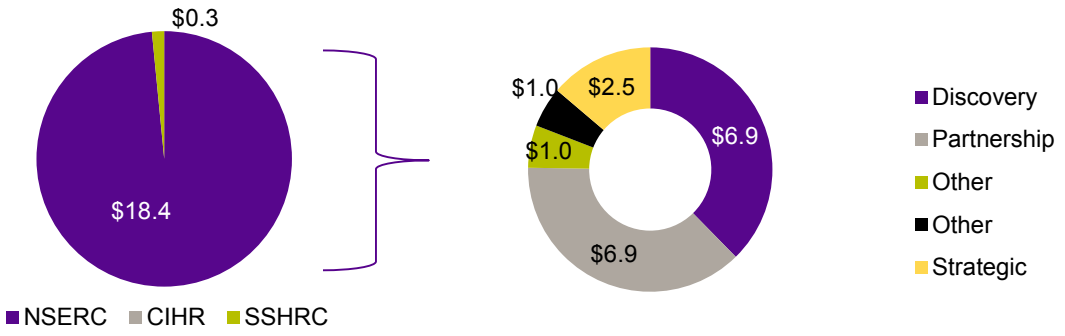


Figure 125: University of Waterloo Share of NSERC Awards in Engineering Subjects, 2009/10-2014/15 (D4)*

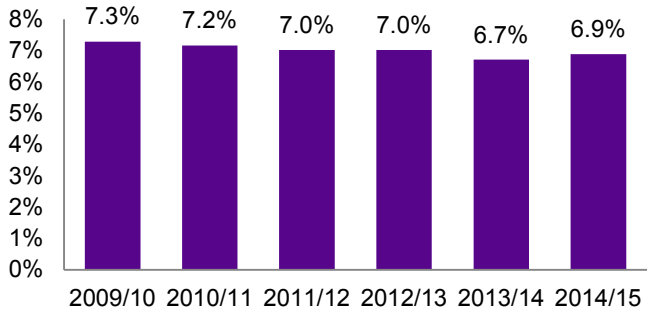
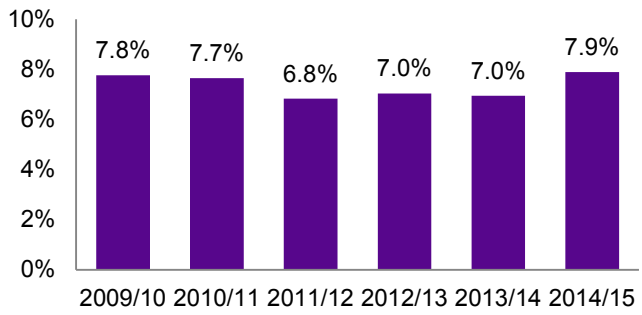


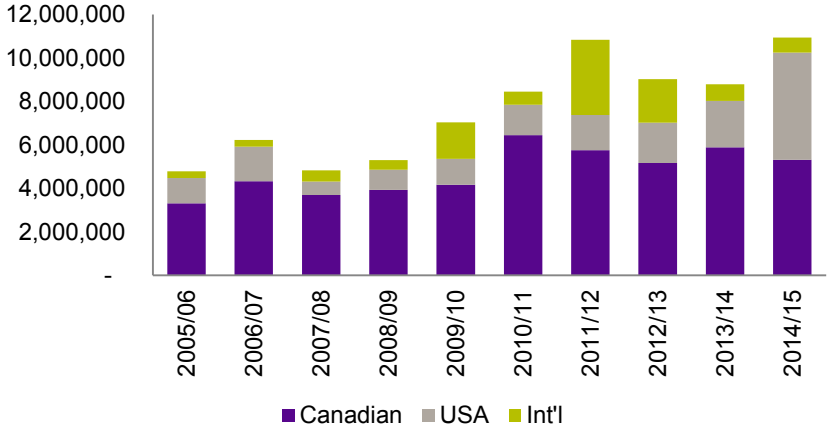
Figure 126: University of Waterloo Share of NSERC Funding in Engineering Subjects, 2009/10-2014/15 (D4)*



Another context to assess our NSERC funding performance is the proportion of total funding and awards available from NSERC programs that we are earning annually. Figure 125 and Figure 126 show relatively stable performance over the past five years by University of Waterloo researchers in NSERC subject areas related to engineering.

**Because these data are provided by NSERC research area and not by academic department, they will include some researchers outside the Faculty of Engineering and will exclude some Faculty of Engineering researchers.*

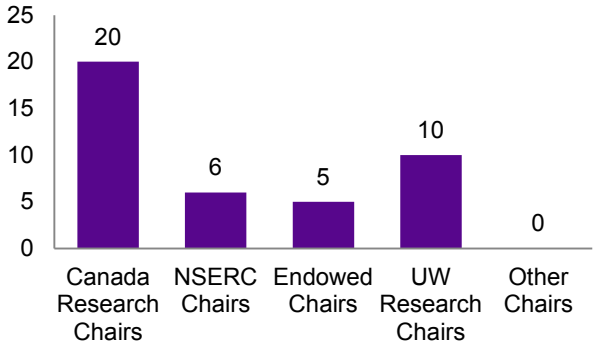
Figure 127: Industry Research Funding by Region, 2005/06-2014/15 (D6)



As noted above, industry research funding increased by 129% between 2005/06 and 2014/15. As seen in Figure 127, a significant proportion of this growth results from investment from outside Canada, which increased by over 280% between 2005/06 and 2014/15.

Funding cannot be our sole measure of research success. Another indicator of research excellence can be seen through major research chair holders. As shown in Figure 128, 41 Waterloo Engineering faculty members (15% of the tenured/tenure-stream complement) hold major research chairs. An additional four faculty members are university professors.

Figure 128: Research Chair Holders, 2015 (D9)

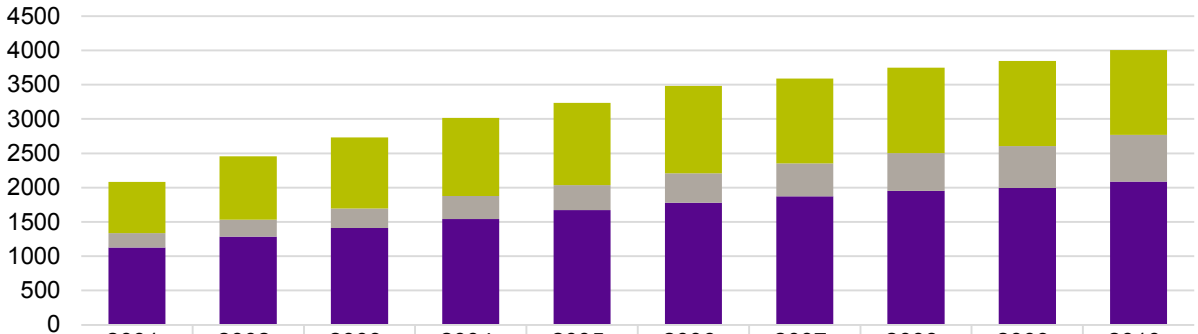


A selection of bibliometric indicators (Figure 129 to Figure 131) has also been included here, to provide additional insight into our scholarly output and research impact. The measures used this year reflect changes and enhancements to the proprietary Thomson Reuters tool (InCites) used at the University of Waterloo to analyze bibliometric data. Most notably, conference proceedings are now included (in addition to journals and books) which allows us to consider scholarly output in computer science in a more complete way.

Figure 129 to Figure 131 are based on a sample of University of Waterloo research documents in the scholarly areas where Faculty of Engineering researchers are most active. The sample is limited to documents indexed by Thomson Reuters and includes all documents by University of Waterloo-affiliated individuals in publications classified as engineering, materials science or computer science. Because these data are defined by Thomson Reuter's subject classification of the publication and not by the academic department of the author, they will include documents by University of Waterloo authors outside the Faculty of Engineering and will miss the work of some Engineering faculty members who publish outside these three areas.

Furthermore, it is important to note that because publication expectations and citation practices vary among research disciplines, and because the amount of source material indexed by Thomson Reuters in each discipline varies, it is not meaningful to compare bibliometric data among disciplines. To that end, the data presented must be considered over time within each subject area, but without comparison between or among areas.

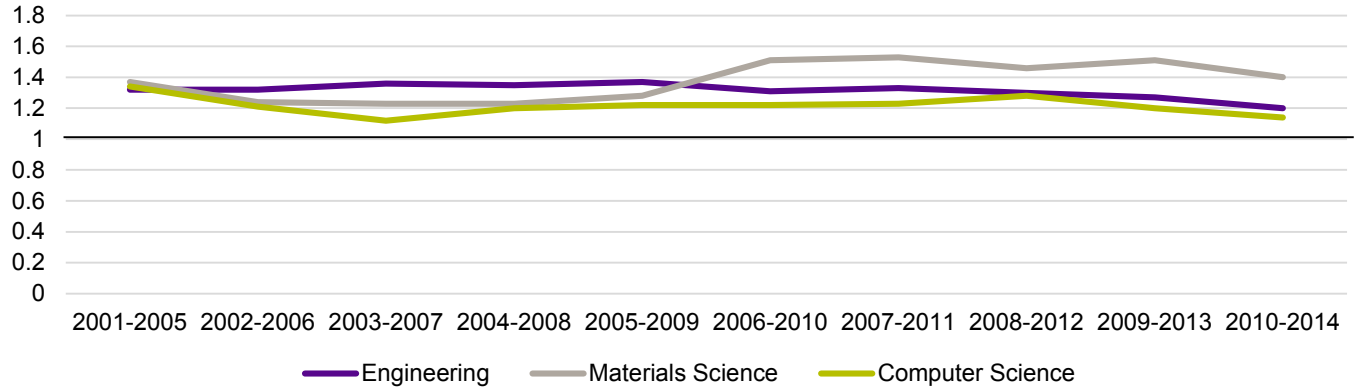
Figure 129: University of Waterloo Documents in Thomson Reuters-indexed Publications Classified as Engineering, Materials Science or Computer Science, Over Time (D10)*



	2001-2005	2002-2006	2003-2007	2004-2008	2005-2009	2006-2010	2007-2011	2008-2012	2009-2013	2010-2014
Computer Science	748	924	1036	1140	1198	1271	1238	1249	1240	1237
Materials Science	208	249	282	335	365	432	478	547	611	681
Engineering	1129	1284	1412	1542	1673	1779	1875	1954	1997	2087

Figure 130 examines the impact of these publications, using a normalized indicator of citations (also limited to those in Thomson Reuters-indexed publications) to the documents that make up the sample represented in Figure 129. The use of this normalized indicator addresses the challenge of differing citation patterns in each discipline by measuring Waterloo's impact (citations per document) in the specified disciplinary category relative to the impact of all institutions in the same category overall. In this way, comparisons can be made among subjects by noting to what extent the institution is under- or over-performing the overall system norm (defined as 1.0) for that specific subject.

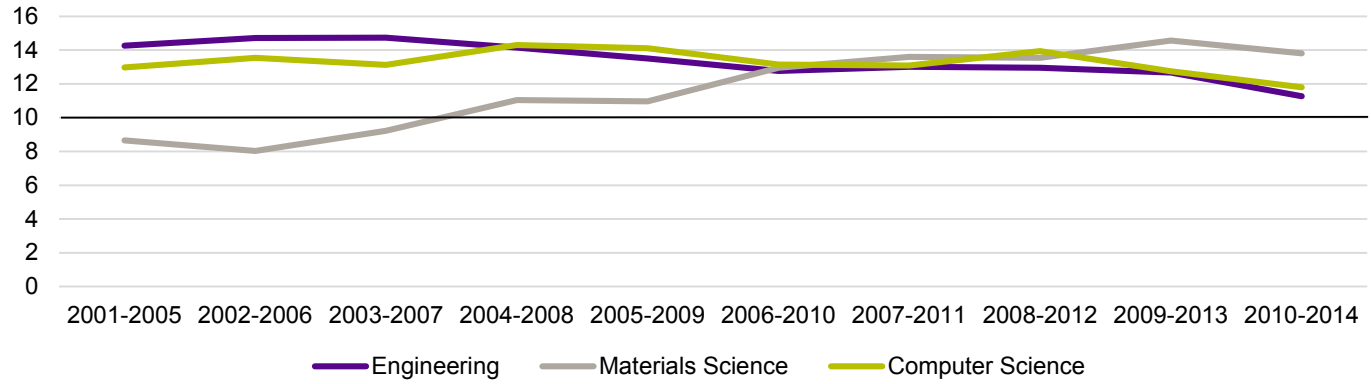
Figure 130: Category Normalized Citation Impact (in Engineering, Materials Science or Computer Science Categories) of University of Waterloo Publications in Thomson Reuters-indexed Publications, Over Time (D11)*



As shown in Figure 130, Waterloo's citation impact relative to the norm of each category we are tracking has consistently met or exceeded 1.0 in recent years, which indicates that Waterloo's impact in the category is equal to or greater than the average impact in the category overall. Waterloo's category-normalized citation impact in engineering and in computer science have been relatively stable over the past decade. In materials science, Waterloo's category-normalized citation impact saw a significant increase in the 2006-2010 period and has remained quite stable since. It is likely that faculty hires in support of new undergraduate programs in nanotechnology and mechatronics are contributing to this increase.

A similar pattern is seen in the proportion of materials science documents that are in the top 10% of all documents in Thomson Reuters-indexed publications classified as materials science, as measured by the number of citations in Thomson Reuters-indexed publications (see Figure 131): from 2001-2005 to 2010-2014, this has increased from 8.65% to 13.8%. In looking at publications classified as engineering and computer science, we see a slight decline in this measure; however, our performance here remains very strong: In both the engineering and computer science classifications, Waterloo has consistently maintained more than 10% of its papers in the top 10%.

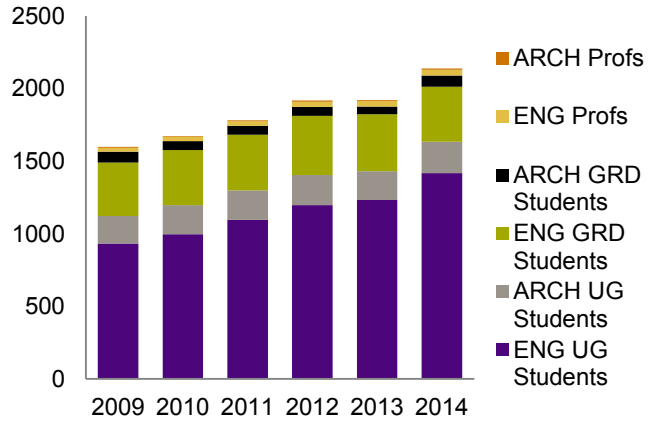
Figure 131: % of University of Waterloo Documents in Thomson Reuters-indexed Publications Classified as Engineering, Materials Science or Computer Science in the Top 10% (based on citations), Over Time (D12)*



**Because the data presented in Figure 129 to Figure 131 are provided by Thomson Reuters journal classification and not by academic department, they will include researchers outside the Faculty of Engineering who are publishing in engineering, materials science or computer science journals and will exclude some Faculty of Engineering researchers who publish outside these areas.*

E. Women in Engineering

Figure 132: Women in Engineering and Architecture, 2009-2014 (A1&B1&C1)



The total number of women students and faculty in the Faculty of Engineering has increased by 34% over the past six years, to reach 2,140.

As we work to increase the participation of women in engineering disciplines specifically, it is a positive indicator that the number of women at all levels in engineering programs has increased over the past six years: undergraduate students have increased 52% to 1,418; graduate students have increased 3% to 379; and faculty have increased 46% to 40.

Figure 133 and Figure 134 provide details of the current participation of women in our engineering programs and in our School of Architecture separately.

Figure 133: Women in Engineering Programs, 2014 (E1)

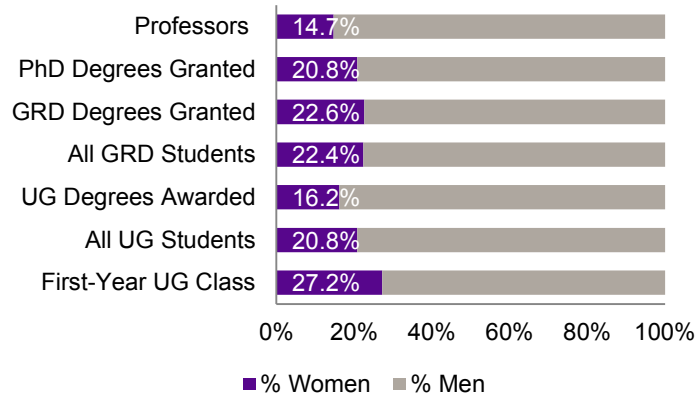
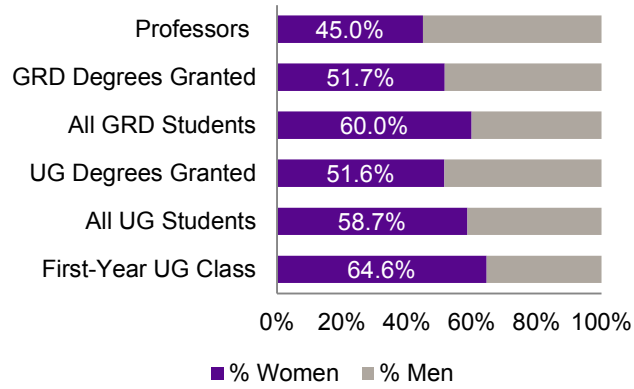


Figure 134: Women in Architecture, 2014 (E2)



F. Internationalization

Over the past six years, international student enrolment in undergraduate programs has increased by 136% to 883 and in graduate programs by 48% to 820.

While the percentage growth in international undergraduate students might appear high, it must be noted this growth is over a very low baseline. Over the past decade, we have added international places incrementally to our existing domestic undergraduate intake targets.

The current proportion of undergraduate students who are international is 12% (see Figure 136). International students now account for 45% of graduate students.

Figure 135: International Students, 2009-2014 (B1&C1)

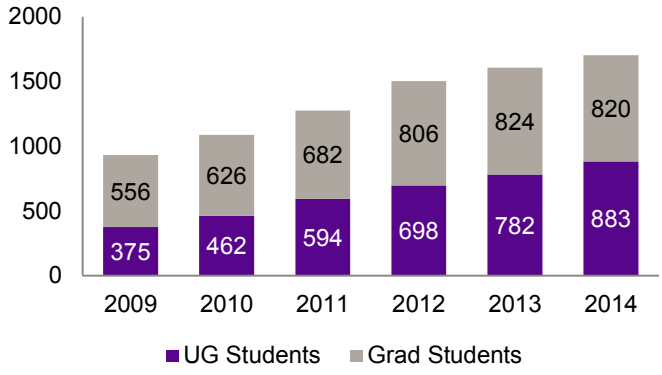
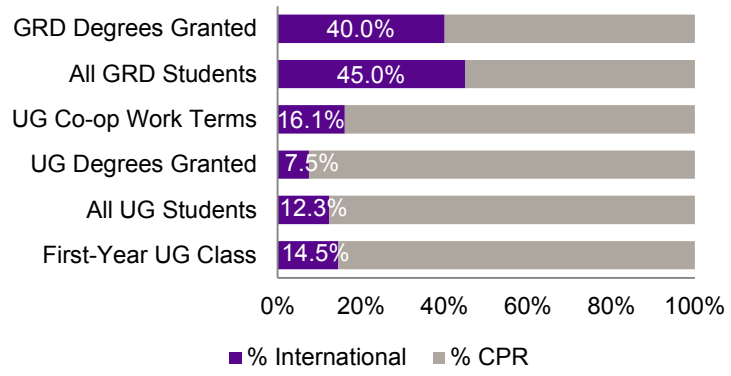


Figure 136: International Students, 2014 (F1)



Our efforts to increase international opportunities for undergraduate students have proven successful, with the number of international co-op terms doubling (to a record 1,270) and outgoing exchange students growing by 51% (to 112) over the past six years (see Figure 137).

Figure 138 shows the composition of our industrial research funding in 2014/15, with over half of our industrial research funding coming from outside Canada in the past year.

Figure 137: International Opportunities for Undergraduate Students, 2009-2014 (B8&B10)

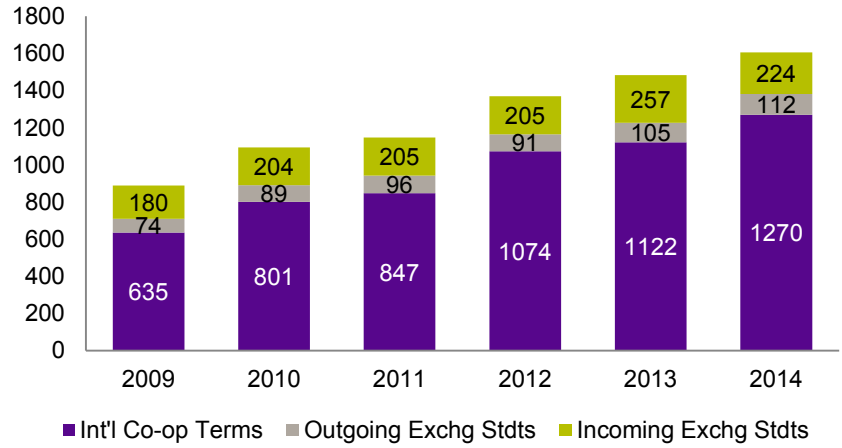
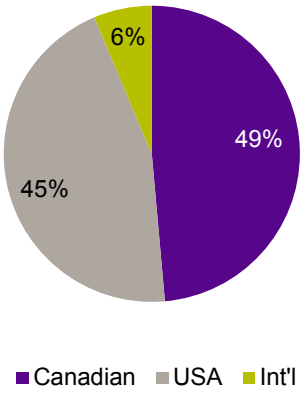
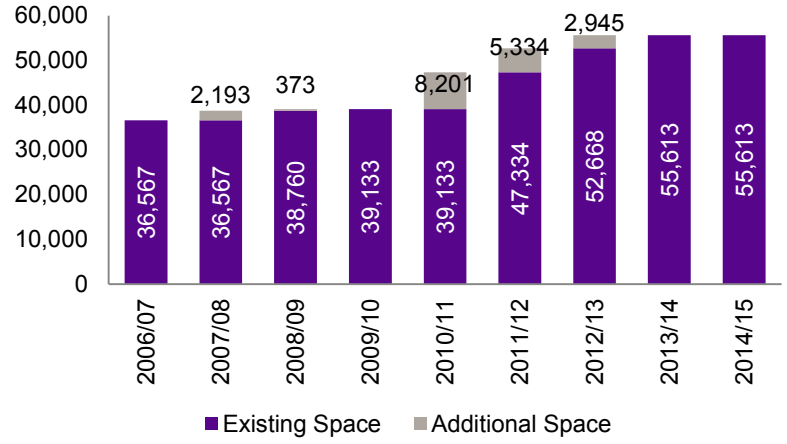


Figure 138: Industry Research Funding by Source Region, 2014/15 (D6)



G. Space

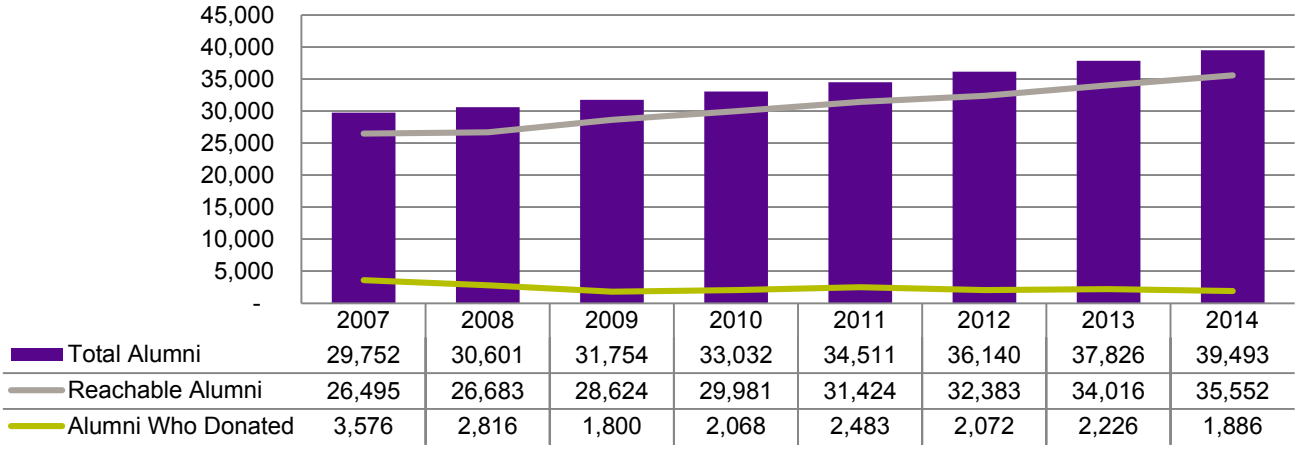
Figure 139: Space Holdings (nasm), 2006/07-2014/15 (G1)



Waterloo Engineering space holdings have increased by 19,046 nasm (52%) over the past nine years, to reach 55,613 nasm. While this is a significant achievement, space limitations remain the most pressing constraint to the achievement of many of our plan goals.

H. Advancement

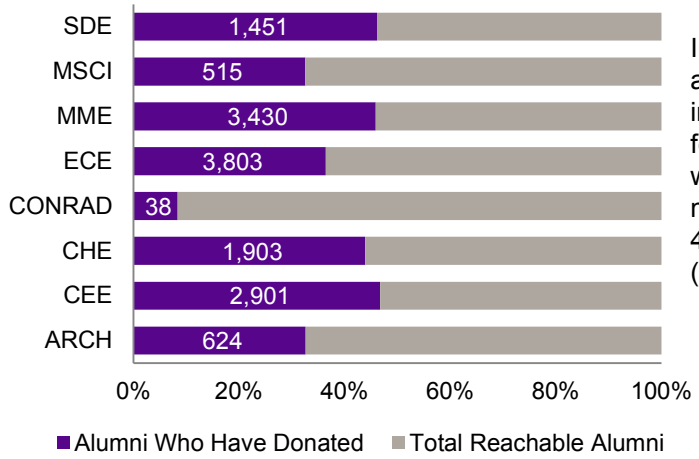
Figure 140: Alumni, 2007-2014 (H1&H2)



	2007	2008	2009	2010	2011	2012	2013	2014
Total Alumni	29,752	30,601	31,754	33,032	34,511	36,140	37,826	39,493
Reachable Alumni	26,495	26,683	28,624	29,981	31,424	32,383	34,016	35,552
Alumni Who Donated	3,576	2,816	1,800	2,068	2,483	2,072	2,226	1,886

As of December 31, 2014 Waterloo Engineering had graduated a total of 39,493 alumni, for 90% of whom the Office of Alumni Affairs had at least one method of contact. Of those, 5% made a donation to the University of Waterloo in 2014. Figure 140 shows the proportion of alumni for whom we have a method of contact and the proportion choosing to make a donation to Waterloo in each year over the past eight years.

Figure 141: Alumni Who Have Donated to Waterloo as of December 31, 2014 (H3)



In addition to the number of alumni who choose to make a gift to the University of Waterloo in each year, another important indicator of the degree of affinity our alumni feel for their alma mater is the proportion of all alumni who have ever, over their "lifetime" as an alumnus, made a donation to the University. At the end of 2014, 41% of all Waterloo Engineering alumni had done so (see Figure 141 for departmental distribution).

Alumni donations are part of the overall picture of philanthropic support that helps move Waterloo Engineering forward. Figure 142 details total funds raised for Waterloo Engineering in the past five years. With the public launch of our Educating the Engineer of the Future campaign, a new target and priorities have been set. Figure 143 shows we have reached 73% of the new campaign goal of $70M since May 1, 2013.

Figure 142: Funds Raised ($millions), 2010/11-2014/15 (H4)

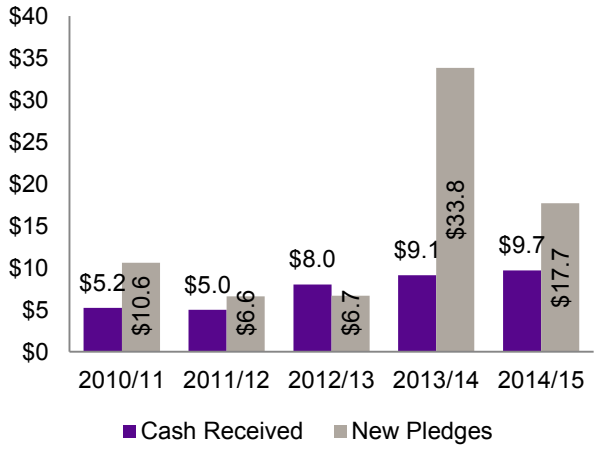
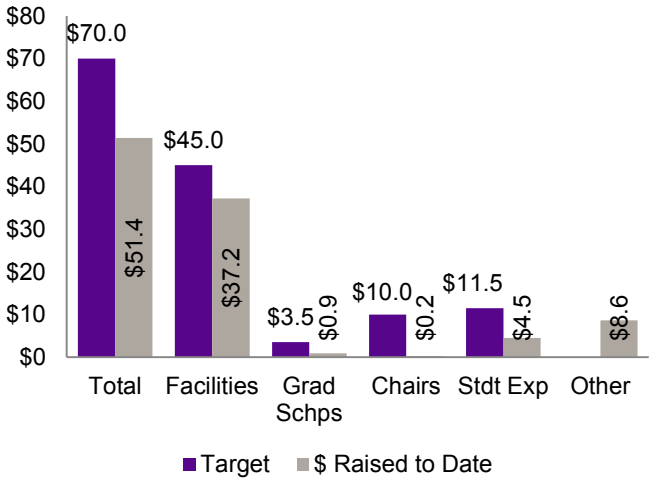


Figure 143: Campaign Progress ($millions), May 1, 2013 to May 1, 2015 (H5)



V. Appendices

The tables appended here contain the data for this plan year that were provided to all Waterloo Engineering units in order to assist in their planning and annual plan review and progress update. Data for past years are available in previous progress reports, posted online at https://uwaterloo.ca/engineering/about/strategic-planning. Appendix V.I provides the definitions and sources used to create these data.

A. Faculty and Staff Data Tables

1. Total Regular Faculty, 2014/15

Department	Prof	Assoc Prof	Asst Prof	Lect	Total	# Female	% Female
Architecture	6.0	10.0	2.0	2.0	20.0	9.0	45.0%
Chemical	20.5	7.0	3.0	1.0	31.5	3.0	9.5%
Civil & Environmental	17.3	11.0	7.5	2.0	37.8	4.5	11.9%
Conrad	1.0	3.0	0.0	4.0	8.0	1.0	12.5%
Electrical & Computer	40.0	27.0	17.0	6.5	90.5	10.0	11.1%
Management Sciences	8.3	5.0	10.0	2.0	25.3	6.0	23.8%
Mechanical & Mechatronics	26.5	15.5	7.0	3.5	52.5	9.0	17.1%
Systems Design	12.3	6.0	6.0	4.0	28.3	5.0	17.6%
Administrative Units	0.0	0.0	0.0	2.5	2.5	1.0	39.8%
TOTAL	131.9	84.5	52.5	27.5	296.3	48.5	16.4%

2. Distribution of Regular Faculty by PEng Status, 2014/15

Department	Registered	Applied	Not Applied	Not Eligible	Total
Chemical	20.0	4.0	7.5	0.0	31.5
Civil & Environmental	29.8	2.0	6.0	0.0	37.8
Electrical & Computer	54.5	9.0	27.0	0.0	90.5
Management Sciences	14.3	5.0	1.0	5.0	25.3
Mechanical & Mechatronics	45.5	3.0	4.0	0.0	52.5
Systems Design	17.3	1.0	8.0	0.0	26.3
Administrative Units	1.5	1.0	0.0	0.0	2.5
TOTAL	182.9	25.0	53.5	5.0	266.4

3. Distribution of Regular Faculty by Age, 2014/15

	<35	35-39	40-44	45-49	50-54	55-59	60-64	65+
Regular Faculty	16	42	56.82	34	49.51	50.5	29.01	18.5

4. Distribution of TTS Faculty by PhD School, 2014/15

	Waterloo	Ontario	Canada	USA	Int'l
TTS Faculty	61	46	35.5	73.3	42.5

5. Total Non-regular and Non-faculty Appointments, 2015

Department	Adjunct Profs	Lect (Adj/ Special)	Rsch Profs	Post Docs	Rsch Assocs	Visitors	Def-term Profs	Total
Architecture	1.0	25.0	0.0	0.0	0.0	0.0	0.0	26.0
Chemical	24.0	4.0	1.0	37.0	5.0	45.0	1.3	117.3
Civil & Environmental	24.0	3.0	3.0	10.0	8.0	14.0	0.0	62.0
Conrad	3.0	5.0	0.0	0.0	0.0	1.0	0.0	9.0
Electrical & Computer	31.0	7.0	0.0	54.0	31.0	44.0	0.0	167.0
Management Sciences	18.0	8.0	0.0	1.0	0.0	1.0	0.0	28.0
Mechanical & Mechatronics	44.0	11.0	1.0	23.0	14.0	20.0	0.0	113.0
Systems Design	42.0	2.0	1.0	11.0	4.0	10.0	1.0	71.0
Administrative Units	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
TOTAL	188.0	65.0	6.0	136.0	62.0	135.0	2.3	594.3

6. Selected Major Faculty Awards and Honours, 2014

Department	Faculty Member	Award
Architecture	Winton, Tracey	Creative Achievement Award for Architectural Education
Chemical Engineering	Gu, Frank	Early Researcher Award
	Matsen, Mark	University Research Chair
	Ricardez Sandoval, Luis	Faculty of Engineering Teaching Excellence Award
	Yu, Aiping	Early Researcher Award
Civil & Environmental Engineering	Basu, Nandita	Early Researcher Award
	Brush, David	Engineering Society Teaching Excellence Award
	Emelko, Monica	Council of the Federation Excellence in Water Stewardship Award
	Haas, Ralph	Distinguished Alumni Award, University of Alberta
	Haas, Ralph	Transportation Research Board's Roy W Crum Award
	Narasimhan, Sriram	Canada Research Chair: Tier 2
	Pandey, Mahesh	NSERC IRC
	Tighe, Susan	The College of New Scholars, Artists and Scientists, Royal Society of Canada
Electrical & Computer Engineering	Cui, Bo	Faculty of Engineering Research Excellence Award
	El-Saadany, Ehab	Canada Research Chair: Tier 2
	Fischmeister, Sebastian	Early Researcher Award
	Golab, Wojciech	Google Research Award
	Kamel, Mohamed	Royal Society of Canada Fellow
	Kulic, Danica	Early Researcher Award
	Mansour, Raafat	PEO Engineering Medal for Research and Development
	Nairn, David	Faculty of Engineering Teaching Excellence Award
	Safavi-Naeini, Safieddin	En-hui Yang Engineering Research Innovation Award
	Salama, Magdy	Faculty of Engineering Research Excellence Award
	Sedra, Adel	Distinguished Professor Emeritus
	Sedra, Adel	Order of Ontario
	Tan, Lin	Google Research Award
	Wang, Zhou	E.W.R. Steacie Memorial Fellowship
	Wilson, Christopher	Early Researcher Award
Mechanical & Mechatronics Engineering	Daun, Kyle	Faculty of Engineering Teaching Excellence Award
	Erkorkmaz, Kaan	Fellow Member, International Academy for Production Engineering
	Fraser, Roydon	NSF Outstanding Long-Term Advisory Award
	Gerlich, Adrian	NSERC IRC
	Li, Xianguo	University Research Chair
	Peterson, Sean	Early Researcher Award
	Ren, Liqing Carolyn	Canada Research Chair: Tier 2

Department	Faculty Member	Award
Systems Design Engineering	Abdel-Rahman, Eihab	Faculty of Engineering Research Excellence Award
	Eliasmith, Chris	The College of New Scholars, Artists and Scientists, Royal Society of Canada
	McPhee, John	Canada Research Chair: Tier 1
	McPhee, John	NSERC Synergy Award for Innovation
	Yeow, Tze Wei John	Canada Research Chair: Tier 2

7. FTE Staff, 2014/15

Department	Tech	Admin	Total	# Female	% Female
Architecture	5.0	7.0	12.0	7.0	58.3%
Chemical	11.5	6.5	18.0	8.5	47.2%
Civil & Environmental	9.0	7.0	16.0	8.0	50.0%
Conrad	0.0	3.0	3.0	3.0	100.0%
Electrical & Computer	24.6	19.6	44.2	25.6	57.9%
Management Sciences	2.0	6.8	8.8	6.8	77.3%
Mechanical & Mechatronics	17.0	9.0	26.0	10.0	38.5%
Systems Design	5.0	5.0	10.0	5.0	50.0%
Dean of Engineering Office	0.0	12.0	12.0	10.0	83.3%
Engineering Advancement	0.0	14.8	14.8	11.8	79.7%
Engineering Computing	10.0	1.0	11.0	1.0	9.1%
Engineering Graduate Office	0.0	3.0	3.0	3.0	100.0%
Engineering International Office	0.0	2.0	2.0	2.0	100.0%
Engineering Machine Shop	11.0	2.0	13.0	1.0	7.7%
Engineering Outreach Office	0.0	2.0	2.0	1.0	50.0%
Engineering Research Office	0.0	4.0	4.0	2.0	50.0%
Engineering Undergraduate Office	0.0	14.5	14.5	11.5	79.3%
Research Institutes	0.0	6.0	6.0	4.0	66.7%
TOTAL	95.1	125.2	220.3	121.2	55.0%

8. Distribution of FTE Staff by Age, 2014/15

	<30	30-34	35-39	40-44	45-49	50-54	55-59	60+
FTE Staff	14.0	18.0	33.0	17.5	35.8	50.6	31.8	18.6

9. Staff Awards and Honours, 2014

Department	Staff Member	Award
Systems Design	Kirsten Deckert	Dean of Engineering Outstanding Staff Performance Award
Mechanical & Mechatronics	Jim Baleshta	Dean of Engineering Outstanding Staff Performance Award

10. Faculty:Staff Ratios, 2014/15

Department	Faculty to Admin Staff	Faculty to Tech Staff	Faculty to Total Staff
Architecture	2.86	4.00	1.67
Conrad	2.67	n/a	2.67
Chemical	4.85	2.74	1.75
Civil & Environmental	5.39	4.19	2.36
Electrical & Computer	4.62	3.68	2.05
Management Sciences	3.71	12.63	2.87
Mechanical & Mechatronics	5.83	3.09	2.02
Systems Design	5.67	5.67	2.83
FACULTY TOTAL	2.37	3.12	1.35
Academic Units Only	4.60	3.97	2.13

B. Undergraduate Studies Data Tables

1. Total Undergraduate Enrolment (head count), Fall 2014

Program	Total	#Female	% Female	#Int'l	% Int'l
Architecture	368	216	58.7%	9	2.4%
Biomedical	42	23	54.8%	0	0.0%
Chemical	722	246	34.1%	139	19.3%
Civil	619	180	29.1%	113	18.3%
Computer	850	89	10.5%	120	14.1%
Electrical	754	103	13.7%	117	15.5%
Environmental	237	118	49.8%	17	7.2%
Geological	110	25	22.7%	2	1.8%
Management	301	118	39.2%	40	13.3%
Mechanical	993	115	11.6%	126	12.7%
Mechatronics	700	86	12.3%	75	10.7%
Nanotechnology	482	102	21.2%	42	8.7%
Software	599	90	15.0%	73	12.2%
Systems Design	409	123	30.1%	10	2.4%
TOTAL	7186	1634	22.7%	883	12.3%

2. FTE Undergraduate Enrolment, 2014/15

Program	Total	# Female	% Female	#Int'l	% Int'l
Architecture	299.5	175.2	58.5%	7.1	2.4%
Biomedical	41.5	23.0	55.4%	0.0	0.0%
Chemical	568.7	194.2	34.1%	103.3	18.2%
Civil	483.0	142.0	29.4%	87.8	18.2%
Computer	674.1	70.9	10.5%	88.9	13.2%
Electrical	606.3	79.2	13.1%	98.5	16.2%
Environmental	190.4	90.9	47.7%	12.5	6.6%
Geological	83.2	17.3	20.8%	2.1	2.5%
Management	241.7	91.6	37.9%	30.3	12.5%
Mechanical	792.9	92.5	11.7%	99.0	12.5%
Mechatronics	590.1	72.4	12.3%	62.3	10.6%
Nanotechnology	394.5	82.2	20.8%	34.7	8.8%
Software	484.2	74.3	15.3%	54.1	11.2%
Systems Design	330.7	100.0	30.2%	8.5	2.6%
TOTAL	5780.7	1305.7	22.6%	689.0	11.9%

3. Undergraduate Degrees Granted, 2014

Program	Total	#Female	% Female	#Int'l	% Int'l
Architecture	62	32	51.6%	1	1.6%
Chemical	116	36	31.0%	19	16.4%
Civil	108	18	16.7%	10	9.3%
Computer	84	5	6.0%	7	8.3%
Electrical	154	17	11.0%	8	5.2%
Environmental	45	22	48.9%	1	2.2%
Geological	17	5	29.4%	1	5.9%
Management	45	10	22.2%	6	13.3%
Mechanical	160	12	7.5%	11	6.9%
Mechatronics	116	9	7.8%	8	6.9%
Nanotechnology	83	13	15.7%	7	8.4%
Software	95	6	6.3%	6	6.3%
Systems Design	80	26	32.5%	2	2.5%
TOTAL	1165	211	18.1%	87	7.5%

4. Undergraduate Year One New Admissions, Fall 2014

	New Admissions			Total 1A Enrol't			% of	% of
Program	CPR	Int'l	Total	# Female	% Female	Total	total target	int'l target
Architecture	78	2	80	53	64.6%	82	105.3%	33.3%
Biomedical	41	0	41	23	54.8%	42	91.1%	0.0%
Chemical	103	29	132	72	49.0%	147	94.3%	145.0%
Civil	90	25	115	46	36.8%	125	92.0%	125.0%
Electrical & Computer	289	70	359	78	19.0%	410	99.7%	107.7%
Environmental	47	7	54	33	51.6%	64	77.1%	87.5%
Geological	30	8	38	9	28.1%	32	126.7%	266.7%
Management	59	27	86	40	46.0%	87	132.3%	270.0%
Mechanical	164	20	184	35	16.8%	208	87.6%	80.0%
Mechatronics	167	9	176	30	15.2%	197	106.7%	50.0%
Nanotechnology	103	12	115	29	25.0%	116	100.0%	120.0%
Software	112	20	132	21	15.6%	135	105.6%	133.3%
Systems Design	73	1	74	31	38.3%	81	82.2%	20.0%
TOTAL	1356	230	1586	500	29.0%	1726	98.1%	110.6%

5. Undergraduate Admissions by Entering Average Grade Range, 2014

	90-94%	>=95%
% of year one new admissions	46.0%	28.9%

6. Undergraduate Students:Faculty Ratio, 2014/15

Department	Student:Faculty Ratio
Architecture	15.0
Chemical	22.4
Civil & Environmental	20.0
Electrical & Computer	19.6
Management Sciences	9.6
Mechanical & Mechatronics	21.9
Systems Design	18.2
TOTAL	19.0

7. Undergraduate Degrees Granted:Faculty Ratio, 2014/15

Department	Degrees:Faculty Ratio
Architecture	3.1
Chemical	4.6
Civil & Environmental	4.5
Electrical & Computer	3.7
Management Sciences	1.8
Mechanical & Mechatronics	4.4
Systems Design	3.9
TOTAL	3.8

8. Co-op Employment, 2014

Discipline	Seeking Employment	Employed	Unemployed	% Employed	% Int'l Work Terms
Architecture	376	375	1	99.7%	37.9%
Chemical	851	802	49	94.2%	8.2%
Civil	698	684	14	98.0%	8.9%
Computer	920	905	15	98.4%	21.5%
Electrical	878	854	24	97.3%	13.9%
Environmental	273	258	15	94.5%	3.5%
Geological	109	102	7	93.6%	2.9%
Management	325	318	7	97.8%	13.1%
Mechanical	1155	1109	46	96.0%	9.6%
Mechatronics	744	725	19	97.4%	15.2%
Nanotechnology	556	541	15	97.3%	20.4%
Software	686	684	2	99.7%	33.1%
Systems Design	491	486	5	99.0%	15.8%
TOTAL	8062	7843	219	97.3%	16.1%

9. Co-op Earnings, 2014/15 ($ millions)

	Faculty of Engineering	University of Waterloo
Total Co-op Earnings	$119.4 M	$251.9 M

10. Undergraduate Exchange Participation, 2014

	Outgoing	Incoming
Total Exchange Terms	112	224

C. Graduate Studies Data Tables

1.Total Graduate Enrolment (Head Count), Fall 2014

Department	PhD	Rsch Master	Prof Master	Non Deg	Total	# Female	% Female	# Int'l	% Int'l
Architecture	n/a	129	n/a	1	130	78	60.0%	13	10.0%
Chemical	107	64	32	1	204	62	30.4%	124	60.8%
Civil & Environmental	129	83	21	1	234	64	27.4%	94	40.2%
Conrad	n/a	n/a	45	2	47	11	23.4%	21	44.7%
Electrical & Computer	266	166	152	8	592	105	17.7%	299	50.5%
Management Sciences	32	13	113	0	158	60	38.0%	64	40.5%
Mechanical & Mechatronics	146	126	47	5	324	49	15.1%	128	39.5%
Systems Design	63	47	22	1	133	28	21.1%	77	57.9%
TOTAL	743	628	432	19	1822	457	25.1%	820	45.0%

2. FTE Graduate Enrolment, 2014/15

Department	PhD	Rsch Master	Prof Master	Total	# Female	% Female	# Int'l	% Int'l
Architecture	n/a	97.5	n/a	100.8	57.5	59.0%	9.4	9.6%
Chemical	98.8	58.5	31.5	189.2	57.2	30.3%	123.4	65.4%
Civil & Environmental	117.2	68.4	9.9	195.8	51.4	26.3%	90.9	46.5%
Conrad	n/a	n/a	39.7	40.0	9.0	22.7%	16.7	42.0%
Electrical & Computer	239.4	143.6	89.7	476.1	89.6	18.9%	282.8	59.8%
Management Sciences	25.1	15.0	49.6	89.7	34.8	38.8%	46.5	51.9%
Mechanical & Mechatronics	131.8	107.8	25.0	266.5	39.5	14.9%	119.4	45.1%
Systems Design	59.3	38.7	17.2	115.8	23.6	20.5%	70.9	61.5%
TOTAL	671.6	529.4	262.5	1473.8	362.5	24.8%	759.8	51.9%

3. Graduate Degrees Granted, 2014

Department	PhD	Rsch Master	Prof Master	Total	# Female	% Female	# Int'l	% Int'l
Architecture	n/a	29	n/a	29	15	51.7%	1	3.4%
Chemical	22	26	31	79	24	30.4%	42	53.2%
Civil & Environmental	9	41	12	62	14	22.6%	16	25.8%
Conrad	n/a	n/a	32	32	7	21.9%	11	34.4%
Electrical & Computer	47	67	113	227	38	16.7%	108	47.6%
Management Sciences	5	11	61	77	33	42.9%	35	45.5%
Mechanical & Mechatronics	27	43	27	97	12	12.4%	24	24.7%
Systems Design	15	13	9	37	10	27.0%	19	51.4%
TOTAL	125	230	285	640	153	23.9%	256	40.0%

4. FTE Graduate Student Admissions, 2014

Department	Degree Type	CPR	Int'l	Total
Architecture	PhD	n/a	n/a	n/a
	Research Master	63.0	6.0	69.0
	Professional Master	n/a	n/a	n/a
	Total	63.0	6.0	69.0
Chemical	PhD	8.0	9.0	17.0
	Research Master	10.0	18.0	28.0
	Professional Master	3.3	17.0	20.3
	Total	21.3	44.0	65.3
Civil & Environmental	PhD	9.3	12.0	21.3
	Research Master	17.0	6.0	23.0
	Professional Master	7.5		7.5
	Total	33.8	18.0	51.8
Conrad	PhD	n/a	n/a	n/a
	Research Master	n/a	n/a	n/a
	Professional Master	24.0	21.0	45.0
	Total	24.0	21.0	45.0
Electrical & Computer	PhD	6.5	45.0	51.5
	Research Master	26.2	43.3	69.5
	Professional Master	29.1	40.3	69.4
	Total	61.8	128.6	190.4
Management Sciences	PhD	1.3	5.0	6.3
	Research Master	2.3	2.0	4.3
	Professional Master	12.2	17.3	29.5
	Total	15.8	24.3	40.1

Department	Degree Type	CPR	Int'l	Total
Mechanical & Mechatronics	PhD	8.0	28.0	36.0
	Research Master	37.2	14.0	51.2
	Professional Master	20.1	1.0	21.1
	Total	65.3	43.0	108.3
Systems Design	PhD	1.6	6.0	7.6
	Research Master	12.6	10.0	22.6
	Professional Master	4.0	17.0	21.0
	Total	18.2	33.0	51.2
TOTAL	PhD	34.7	105.0	139.7
	Research Master	168.3	99.3	267.6
	Professional Master	100.2	113.6	213.8
	TOTAL	303.2	317.9	621.1

5. Graduate Students:Faculty Ratio, 2014/15

Department	PhD	Rsch Master	Prof Master	Non Deg	All Students	Rsch Students
Architecture	n/a	5.4	n/a	0.2	5.6	5.4
Chemical	3.2	1.9	1.0	0.0	6.2	5.2
Civil & Environmental	3.3	1.9	0.3	0.0	5.5	5.2
Conrad	n/a	n/a	9.9	0.1	10.0	n/a
Electrical & Computer	2.9	1.7	1.1	0.0	5.7	4.6
Management Sciences	1.1	0.6	2.1	0.0	3.8	1.7
Mechanical & Mechatronics	2.7	2.2	0.5	0.0	5.4	4.9
Systems Design	2.4	1.6	0.7	0.0	4.7	4.0
TOTAL	2.5	2.0	1.0	0.0	5.5	4.5

6. Graduate Degrees Granted:Faculty Ratio, 2014/15

Department	PhD	Rsch Master	Prof Master	All Students	Rsch Students
Architecture	n/a	1.6	n/a	1.6	1.6
Chemical	0.7	0.9	1.0	2.6	1.6
Civil & Environmental	0.3	1.1	0.3	1.7	1.4
Conrad	n/a	n/a	8.0	8.0	n/a
Electrical & Computer	0.6	0.8	1.3	2.7	1.4
Management Sciences	0.2	0.5	2.6	3.3	0.7
Mechanical & Mechatronics	0.6	0.8	0.6	2.0	1.4
Systems Design	0.6	0.5	0.4	1.5	1.2
TOTAL	0.5	0.9	1.1	2.4	1.3

7. Graduate Proportion of Total FTE Enrolment, 2014/15

Department	FTE Graduate Students:All Students
Architecture	24.6%
Chemical	19.7%
Civil & Environmental	20.5%
Conrad	100.0%
Electrical & Computer	18.5%
Management Sciences	27.1%
Mechanical & Mechatronics	18.7%
Systems Design	19.4%
TOTAL	20.2%

8. Graduate Student Financial Support, 2014/15

Research Master's Students	Total Income	% of FTEs Supported	Avg $ Supported FTEs	% FTEs with GRS	% FTEs with TA	% FTEs with Ext Schlp
Architecture	$530,728	51.1%	$10,657	0.0%	15.4%	4.9%
Chemical	$1,567,033	92.3%	$29,037	70.6%	37.0%	19.9%
Civil & Environmental	$1,613,160	90.7%	$26,005	70.5%	29.7%	19.5%
Electrical & Computer	$4,120,914	95.1%	$30,190	76.5%	35.1%	20.0%
Management Sciences	$452,048	99.3%	$30,407	86.9%	65.3%	11.1%
Mechanical & Mechatronics	$2,707,140	95.0%	$26,437	73.6%	25.7%	25.1%
Systems Design	$1,110,551	92.9%	$30,877	65.7%	29.3%	28.4%
TOTAL	$12,101,575	86.0%	$26,566	59.9%	29.5%	18.5%

Doctoral Students	Total Income	% of FTEs Supported	Avg $ Supported FTEs	% FTEs with GRS	% FTEs with TA	% FTEs with Ext Schlp
Chemical	$3,475,562	95.9%	$36,701	64.5%	26.1%	35.8%
Civil & Environmental	$3,944,874	97.4%	$34,554	68.4%	29.9%	33.0%
Electrical & Computer	$9,014,722	96.7%	$38,929	75.3%	38.5%	27.2%
Management Sciences	$982,605	91.9%	$42,599	67.7%	47.7%	27.9%
Mechanical & Mechatronics	$4,751,589	95.6%	$37,711	79.0%	37.7%	27.3%
Systems Design	$2,119,788	96.0%	$37,255	70.8%	42.1%	30.9%
TOTAL	$24,289,140	96.3%	$37,576	72.5%	35.7%	29.8%

D. Research Data Tables

1. Total Sponsored Research Funding, 2014/15

Department	Tri-Council	Federal (excl Tri-Council)	Provincial	Industry	Other	Total
Architecture	$154,893	$9,950	$0	$7,500	$44,000	$216,343
Chemical	$2,558,974	$792,632	$730,062	$1,527,031	$1,028,659	$6,637,359
Civil & Environmental	$3,282,711	$796,964	$1,379,924	$577,295	$1,851,271	$7,888,166
Conrad	$56,500	$0	$220,176	$0	$410,763	$687,439
Electrical & Computer	$7,064,426	$2,295,934	$2,999,385	$2,578,057	$2,142,799	$17,080,602
Management Sciences	$481,204	$251,006	$0	$76,000	$165,845	$974,055
Mechanical & Mechatronics	$3,159,382	$5,853,303	$2,412,818	$2,829,562	$1,483,754	$15,738,820
Systems Design	$1,313,301	$3,540,966	$2,599,354	$3,348,742	$2,621,461	$13,423,823
Administrative Units	$600,935	$458,170	$0	$0	$418,541	$1,477,646
TOTAL	$18,672,327	$13,998,926	$10,341,720	$10,944,188	$10,167,093	$64,124,254

2. Total Tri-Council Funding, 2014/15

Department	CIHR	SSHRC	NSERC	Total
Architecture	$0	$154,893	$0	$154,893
Chemical	$0	$0	$2,558,974	$2,558,974
Civil & Environmental	$0	$0	$3,282,711	$3,282,711
Conrad	$0	$56,500	$0	$56,500
Electrical & Computer	$0	$0	$7,064,426	$7,064,426
Management Sciences	$0	$76,669	$404,535	$481,204
Mechanical & Mechatronics	$0	$0	$3,159,382	$3,159,382
Systems Design	$0	$0	$1,313,301	$1,313,301
Administrative Units	$0	$0	$600,935	$600,935
TOTAL	$0	$288,062	$18,384,265	$18,672,327

3. NSERC Funding by type, 2014/15

Department	Discovery	RTI	Strategic	Industry	Other	Total
Architecture	$0	$0	$0	$0	$0	$0
Chemical	$1,045,794	$133,353	$368,343	$1,011,484	$0	$2,558,974
Civil & Environmental	$914,000	$87,660	$421,653	$1,859,398	$0	$3,282,711
Conrad	$0	$0	$0	$0	$0	$0
Electrical & Computer	$2,641,366	$680,581	$1,464,826	$2,062,653	$215,000	$7,064,426
Management Sciences	$354,535	$0	$0	$50,000	$0	$404,535
Mechanical & Mechatronics	$1,361,750	$80,716	$119,896	$1,577,020	$20,000	$3,159,382
Systems Design	$606,000	$0	$159,817	$347,484	$200,000	$1,313,301
Administrative Units	$0	$0	$0	$0	$600,935	$600,935
TOTAL	$6,923,445	$982,310	$2,534,536	$6,908,039	$1,035,935	$18,384,265

4. Share of NSERC in Engineering Subject Groups, 2014/15

	Share of Awards	Share of Funding
Faculty of Engineering	6.9%	7.9%

5. Provincial Funding by type, 2014/15

Department	OCE	ERA	ORF:RE	ORF:RI	Other	Total
Architecture	$0	$0	$0	$0	$0	$0
Chemical	$480,922	$117,320	$0	$131,820	$0	$730,062
Civil & Environmental	$210,256	$65,786	-$58,698	$3,061	$1,159,520	$1,379,924
Conrad	$220,176	$0	$0	$0	$0	$220,176
Electrical & Computer	$859,426	$152,180	$1,255,019	$387,760	$345,000	$2,999,385
Management Sciences	$0	$0	$0	$0	$0	$0
Mechanical & Mechatronics	$249,656	$28,000	$1,798,006	$0	$337,157	$2,412,818
Systems Design	$344,497	$26,694	$0	$2,228,163	$0	$2,599,354
Administrative Units	$0	$0	$0	$0	$0	$0
TOTAL	$2,364,933	$389,980	$2,994,327	$2,750,804	$1,841,677	$10,341,720

6. Industry Funding by source, 2014/15

Department	Canada	USA	Int'l	Total
Architecture	$7,500	$0	$0	$7,500
Chemical	$944,946	$123,528	$458,557	$1,527,031
Civil & Environmental	$470,552	$106,743	$0	$577,295
Conrad	$0	$0	$0	$0
Electrical & Computer	$1,920,905	$517,003	$140,149	$2,578,057
Management Sciences	$76,000	$0	$0	$76,000
Mechanical & Mechatronics	$1,366,431	$1,366,691	$96,440	$2,829,562
Systems Design	$530,859	$2,817,883	$0	$3,348,742
Administrative Units	$0	$0	$0	$0
TOTAL	$5,317,194	$4,931,848	$695,146	$10,944,188

7. Total Sponsored Research Funding:Faculty Ratio, 2014/15

Department	Research Funding/TTS Faculty
Architecture	$12,019
Chemical	$217,618
Civil & Environmental	$220,648
Conrad	$171,860
Electrical & Computer	$203,340
Management Sciences	$41,877
Mechanical & Mechatronics	$321,200
Systems Design	$551,740
TOTAL	$238,522
Excluding Architecture & Conrad	$256,119

8. Total Sponsored Research Funding:Budget Ratio, 2014/15

	Faculty of Engineering Total	Excluding Architecture & Conrad
Research Funding:Budget	0.79	0.84

9. Research Chair Holders, 2015

Department	Cda Rsch Chair	Endowed Chair	NSERC Chair	Other Chair	Univ Rsch Chair	Univ Prof	Total
Architecture						1.0	1.0
Chemical	3.0				2.0	2.0	7.0
Civil & Environmental	2.0	1.5	2.0				5.5
Conrad							0.0
Electrical & Computer	6.0	3.0	2.0		5.0		16.0
Management Sciences	2.0	0.5					2.5
Mechanical & Mechatronics	3.0		2.0		3.0		8.0
Systems Design	4.0					1.0	5.0
TOTAL	20.0	5.0	6.0	0.0	10.0	4.0	45.0

Research Chair Holders, 2015

Canada Research Chairs, Tier 1

Chair Holder	Title
Carl Haas, CEE	CRC in Infrastructure Construction and Management
Amir Khajepour, MME	CRC in Mechatronic Vehicle Systems
Amir Khandani, ECE	CRC in Wireless Systems
Raafat Mansour, ECE	CRC in Micro and Nano Integrated RF Systems
John McPhee, SDE	CRC in **Biomechatronic System Dynamics**
Alexander Penlidis, CHE	CRC in Engineering of Polymers with Tailor-made Properties
Catherine Rosenberg, ECE	CRC in the Future Internet
Michael Worswick, MME	CRC in Light Weight Materials under Extreme Deformation: Forming and Impact
En-hui Yang, ECE	CRC in Information Theory and Multimedia Data Compression
Weihua Zhuang, ECE	CRC in Wireless Communication Networks

Canada Research Chairs, Tier 2

Chair Holder	Title
Hossein Abouee Mehrizi, MSCI	CRC in Health-Care Operations Management
Pu Chen, CHE	CRC in Nano-Bio-Materials
Ehab El-Saadany, ECE	CRC in Energy Systems
Chris Eliasmith, SDE	CRC in Theoretical Neuroscience
Lukasz Golab, MSCI	CRC in Data Analytics for Sustainability
Frank Gu, CHE	CRC in Advanced Targeted Delivery Systems
Sriram Narasimhan, CEE	CRC in Smart Infrastucture
Carolyn Ren, MME	CRC in Lab-on-a-Chip Technology
Alexander Wong, SDE	CRC in Medical Imaging Systems
John Yeow, SDE	CRC in Micro and Nano Devices

NSERC Chairs

Chair Holder	Title
Adrian Gerlich, MME	NSERC/TransCanada Industrial Research Chair in Welding for Energy Infrastructure
Peter Huck, CEE	NSERC Chair in Water Treatment
Amir Khandani, ECE	NSERC/Nortel Chair in Advanced Telecommunications Technologies
Steve Lambert, MME	NSERC Design Chair in Collaborative Design
Mahesh Pandey, CEE	NSERC/UNENE Chair in Risk-Based Life Cycle Management of Engineering Systems
Ali Safavi-Naeini, ECE	NSERC/Research in Motion Chair in Intelligent Integrated Radio/Antenna Systems

Endowed Chairs

Chair Holder	Title
Claudio Canizares, ECE	Hydro One Research Chair
Sujeet Chaudhuri, ECE	Val O'Donovan Chair in RF/Microwaves and Photonics
Jatin Nathwani, CEE/MSci	Ontario Research Chair in Public Policy and Sustainable Energy Management
Susan Tighe, CEE	Norman W. McLeod Professor in Sustainable Pavement Engineering

University Research Chairs and University Professors

University Research Chairs	University Professors
Rick Culham, MME	Keith Hipel, SDE
Shesha Jayaram, ECE	Flora Ng, CHE
Mohamed Kamel, ECE	Garry Rempel, CHE
Fakhri Karray, ECE	Robert Jan van Pelt, ARCH
Xianguo Li, MME	
Mark Matsen, CHE	
Ravi Mazumdar, ECE	
Manoj Sachdev, ECE	
Michael Tam, CHE	
Norman Zhou, MME	

10. University of Waterloo Documents in Engineering, Materials Science or Computer Science Publications Indexed by Thomson Reuters, 2010-2014

	Engineering	Materials Science	Computer Science
Indexed Documents	2087	681	1237

11. Category-Normalized Citation Impact of University of Waterloo Documents in Engineering, Materials Science or Computer Science Publications Indexed by Thomson Reuters, 2010-2014

	Engineering	Materials Science	Computer Science
Category-Normalized Citation Impact	1.20	1.40	1.14

12. Percentage of University of Waterloo Documents in Engineering, Materials Science or Computer Science Publications Indexed by Thomson Reuters that are in the Top 10%, 2010-2014

	Engineering	Materials Science	Computer Science
Percentage in Top 10%	11.26%	13.80%	11.80%

E. Women in Engineering Data Tables

1. Women in Engineering, 2014

	#	%
Undergraduate First-year Class	447	27.2%
All Undergraduate Students	1418	20.8%
Undergraduate Degrees Granted	179	16.2%
All Graduate Students	379	22.4%
All Graduate Degrees Granted	138	22.6%
PhD Degrees Granted	26	20.8%
Faculty Members	40	14.7%

2. Women in Architecture, 2014

	#	%
Undergraduate First-year Class	53	64.6%
All Undergraduate Students	216	58.7%
Undergraduate Degrees Granted	32	51.6%
All Graduate Students	78	60.0%
All Graduate Degrees Granted	15	51.7%
Faculty Members	9	45.0%

F. Internationalization Data Tables

1. International Students, 2014

	#	%
Undergraduate New Admissions	230	14.5%
All Undergraduate Students	883	12.3%
Undergraduate Degrees Granted	87	7.5%
Undergraduate Co-op Work Terms	1270	16.1%
Outgoing Exchange Terms	112	n/a
Incoming Exchange Terms	224	n/a
All Graduate Students	820	45.0%
All Graduate Degrees Granted	256	40.0%

G. Space Data Tables

1. Space Holdings (nasm), 2014

	2014/15
Existing Space	55,613
Additional Space Constructed	0
Total Holdings, May 1	55,613

H. Advancement Data Tables

1. Waterloo Engineering Total Alumni, 2014

	#	% reachable*
Architecture	2,169	88.2%
Chemical	4,857	89.3%
Civil & Environmental	7,018	88.4%
Conrad	456	99.6%
Electrical & Computer	11,445	91.3%
Management Sciences	1,831	86.4%
Mechanical & Mechatronics	8,294	90.1%
Systems Design	3,423	91.9%
TOTAL	39,493	90.0%

2. Engineering Alumni Donating to University of Waterloo, 2014

	#	% **
Architecture	66	3.4%
Chemical	246	5.7%
Civil & Environmental	369	5.9%
Conrad	7	1.5%
Electrical & Computer	517	4.9%
Management Sciences	93	5.9%
Mechanical & Mechatronics	417	5.6%
Systems Design	172	5.5%
TOTAL	1,886	5.3%

3. Engineering Alumni Donating to University of Waterloo, lifetime

Department	# Donating	% Donating
Architecture	624	32.6%
Chemical	1903	43.9%
Civil & Environmental	2901	46.8%
Conrad	38	8.4%
Electrical & Computer	3803	36.4%
Management Sciences	515	32.6%
Mechanical & Mechatronics	3430	45.9%
Systems Design	1451	46.1%
TOTAL	14,665	41.2%

4. Funds Raised for the Faculty of Engineering, 2014/15

	Cash Received	New Pledges Received
Funds Raised	$9,723,058.0	$17,720,448

5. Educating the Engineer of the Future Campaign Progress to May 1, 2015

Priority Project	Goal	$ Raised	% of Goal
Facilities	$45.0	$37.2	82.7%
Graduate Scholarships	$3.5	$0.9	25.7%
Chairs	$10.0	$0.2	2.0%
Student Experience	$11.5	$4.5	39.1%
Other	n/a	$8.6	n/a
TOTAL	$70.0	$51.4	73.4%

6. Alumni Attending Selected Class Reunions, 2014

Department	5	10	15	20	25	30	35	40	45	50
Chemical	0.9%	0.0%	0.0%	9.0%	17.3%	0.0%	9.0%	1.7%	5.7%	12.5%
Civil & Environmental	0.0%	1.1%	0.0%	8.0%	6.2%	13.6%	1.4%	5.3%	6.3%	30.8%
Electrical & Computer	91.0%	0.8%	0.0%	0.6%	5.1%	7.1%	0.0%	0.9%	7.6%	8.3%
Mechanical & Mechatronics	0.0%	9.0%	0.0%	2.3%	7.2%	0.5%	2.8%	0.7%	10.6%	12.5%
Systems Design	0.0%	1.0%	3.6%	9.5%	8.5%	7.0%	16.4%	12.9%	0.0%	0.0%
OVERALL PARTICIPATION	0.4%	2.4%	0.4%	4.6%	7.6%	4.2%	3.7%	2.7%	7.7%	19.0%

7. Alumni Events, 2014

Event	City	Date	Attendance*
Waterloo Engineering Alumni & Friends Reception at TRB	Washington, DC	01/14/14	146
Cocktail Reception with Infusion	New York City, NY	01/15/14	120
Waterloo Engineering Alumni Ski Day	Collingwood, ON	01/24/14	242
Waterloo Engineering Alumni Reception at Twitter	San Francisco, CA	02/11/14	130
Entrepreneurship Lunch	Palo Alto, CA	02/12/14	13
Entrepreneurship Dinner	San Francisco, CA	02/12/14	19
Waterloo Engineering Alumni Reception at LinkedIn	Mountain View, CA	02/13/14	102
Entrepreneurship Dinner	Ottawa, ON	04/30/14	15
Waterloo Engineering Alumni Vodka Tasting Event	Ottawa, ON	05/01/14	45
Waterloo Architecture (and Civil) Alumni Reception at the Ontario Association of Architects Conference	Montreal, QC	05/08/14	70
Engineering Class of 2014 Post-Convocation Receptions (2)	Waterloo, ON	06/14/14	3600
Reunions	Waterloo, ON	09/27-28/14	375
Engineering Class of 2015 Post-Convocation Reception	Waterloo, ON	10/25/14	785
Entrepreneurship Dinner	Vancouver, BC	10/30/14	24

*attendance includes alumni and guests

I. Data Notes

Acronyms and Abbreviations

Acad	Academic Unit (department, school or academic centre)
Admin	Administrative Unit or Administrative Staff
ARCH	Architecture (school or program)
Assoc Prof	Associate Professor
Asst Prof	Assistant Professor
BME	Biomedical Engineering (program)
CEE	Civil & Environmental Engineering Department
CFI	Canada Foundation for Innovation
CHE	Chemical Engineering (department or program)
CIHR	Canadian Institutes for Health Research
CIVE	Civil Engineering (program)
CE	Computer Engineering (program)
Conrad	Conrad Business, Entrepreneurship & Technology Centre
CPR	Canadian or Permanent Resident
Def Term	Definite Term
DOE	Dean of Engineering Office
ECE	Electrical & Computer Engineering Department
EE	Electrical Engineering (program)
Enrol't	Enrolment
ENVE	Environmental Engineering (program)
ERA	Early Researcher Award (formerly Premier's Research Excellence Award or PREA)
Ext	External
FOE	Faculty of Engineering
FTE	Full-time equivalent
GENE	Undergraduate students not registered in an academic program (e.g. exchange students and students registered in the Qualifying Program for Readmission)
GEOE	Geological Engineering (program)
GRS	Graduate Research Studentship
Int'l	International
Lect	Lecturer
ME	Mechanical Engineering (program)
MCTR	Mechatronics Engineering (program)
MGMT	Management Engineering (program)
MME	Mechanical & Mechatronics Engineering Department
MSCI	Management Sciences Department
MTCU	Ministry of Training, Colleges and Universities
NANTE	Nanotechnology Engineering (program)
nasm	Net assignable square metre
Non-Deg	Non-degree (for graduate students, includes diploma and certificate students)
NSERC	Natural Sciences and Engineering Research Council
OCE	Ontario Centres of Excellence
ORF	Ontario Research Fund (RE = Research Excellence & RI = Research Infrastructure)
PostDoc	Post-doctoral Fellow
Prof	Professor
Prof Master	Professional Master (i.e. coursework; without a thesis)
Rsch Assoc	Research Associate
Rsch Master	Research Master (i.e. with a thesis)
Rsch Prof	Research Professor
RTI	Research Tools and Instruments (NSERC Program)
Schlp	Scholarship
SDE	Systems Design Engineering (department or program)
SE	Software Engineering (program)
SSHRC	Social Sciences and Humanities Research Council
TA	Teaching Assistant
Tech	Technical Staff
TTS	Tenured and tenure-stream faculty
UAE	United Arab Emirates (where Waterloo formerly had a campus, in Dubai)
Univ	University

Notes on Tables

1 Key Metrics
Space Holdings excludes Architecture and Conrad
In May 2014 previous space holdings calculations, which included projections for space under construction, were updated with actual figures. Baseline and previous year data have been restated with actuals.

2 Key Performance Indicators
Undergraduate Students/Faculty excludes CSTV faculty (included elsewhere in Systems Design) and excludes proportion of students in joint programs with other Faculties.
Graduate Students/Faculty includes only tenured and tenure-stream faculty.
Space Holdings/Student, Sponsored Research Funds/Faculty and Sponsored Research Funds/Budget exclude Architecture and Conrad.
Budget/Student is widely considered an acceptable measure of the richness of a unit's educational program and is not intended to represent the amount of money spent directly on each student.

3 Institutional Context
Source for each metric is consistent with its measurement described below.

4 Provincial and National Context
Source: Engineers Canada enrolment and degrees report (most recent available)
Per Engineers Canada guidelines, excludes Architecture and new programs yet to be accredited.

Data Definitions and Sources

A1 Total Regular Faculty
Source: Dean of Engineering Office | As of: May 1
Excludes definite-term, research and visiting professors and definite-term lecturers with appointments less than 2 years; excludes faculty members in full-time senior university administrative positions (e.g. president); excludes positions not yet filled on May 1
Systems Design includes CSTV

A2 Distribution of Regular Faculty by PEng Status
Source: Engineering Co-operative Education & Professional Affairs Office | As of: May 1
Excludes faculty in Architecture, Conrad and CSTV; ineligible=degree(s)from a discipline ineligible for PEng

A3 Distribution of Regular Faculty by Age
Source: Dean of Engineering Office | As of: May 1

A4 Distribution of TTS Faculty by PhD School
Source: Dean of Engineering Office | As of: May 1
Excludes faculty who do not hold a PhD

A5 Total Non-regular and Non-faculty Appointments
Source: Dean of Engineering Office | As of: May 1
Count of current appointments on May 1(note: a small number of individuals hold multiple appointments)

A6 Selected Major Faculty Awards and Honours
Source: Dean of Engineering Office | As of: Dec. 31

A7 FTE Staff
Source: Waterloo Human Resources | As of: May 1
Full-time equivalent filled positions paid from the operating budget
Research institutes include WatCAR, WIN and WISE; in previous years' reports, Graduate, Research and Outreach Offices were included in Dean's Office-admin; Undergraduate Office includes Teaching Office and Student Design Centre staff
Excludes positions which were under recruitment/not yet filled on May 1

A8 Distribution of FTE Staff by Age
Source: Waterloo Human Resource | As of: May 1

A9 Staff Awards and Honours
Source: Dean of Engineering Office | As of: Dec. 31

A10 Faculty:Staff Ratios
Total regular faculty/FTE staff paid from the operating budget
Faculty Total includes staff and faculty in administrative units (e.g. Dean's Office, Machine Shop, Undergraduate Office, etc.); Academic Units Only excludes support units

B1 Total Undergraduate Enrolment (head count)
Source: Waterloo Institutional Analysis and Planning Office | As of: Nov.1
All undergraduates registered in the fall term (in class or on co-op) on MTCU count date
Includes students on official co-op work term; includes all students in programs offered jointly with other faculties (i.e. software and nanotechnology); excludes part-time students; excludes students in GENE

B2 FTE Undergraduate Enrolment
Source: Waterloo Institutional Analysis and Planning Office | As of: March 1
Equivalent student registrations in two academic terms in a year; this counters the impact of our co-op program, due to which a proportion of students will have 2 work terms and 1 academic term in a given year
Annual FTE= (spring + fall + winter registrations, excluding students on co-op)/2
Includes all students in programs offered jointly with other faculties (i.e. software and nanotechnology); excludes part-time students; excludes students in GENE

B3 Undergraduate Degrees Granted
Source: Waterloo Institutional Analysis and Planning Office | As of: Dec. 31
Total engineering undergraduate students graduating in the calendar year
Includes all students in programs offered jointly with other faculties (i.e. software and nanotechnology); count by first major (double-major degrees are counted only once)

B4 Undergraduate Year One New Admissions
Source: Waterloo Institutional Analysis and Planning Office | As of: Nov. 1
Total new engineering undergraduates registered in the fall term on MTCU count date
Includes all students in programs offered jointly with other faculties (i.e. software and nanotechnology); Total 1A Enrolment includes continuing students returning to 1A

B5 Undergraduate Admissions by Average Grade Ranges
Source: Waterloo Registrar's Office | As of: Nov. 1
Average based on best final 6 U or M courses; averages with .5% are rounded up (e.g.94.5% to 94.9% are included in 95%)

B6 Undergraduate Students:Faculty Ratio
FTE undergraduate students/regular faculty members
Regular faculty here excludes CSTV faculty (included elsewhere in Systems Design); FTE students here exclude ½ of software students and ⅓ of nanotechnology students; mechatronics students are allocated 3/5 to MME, 1/5 to ECE and 1/5 to SDE; biomedical students are allocated 1/10 to CHE, 1/10 to ECE, 1/10 to MME and 7/10 to SDE.

B7 Undergraduate Degrees Granted:Faculty Ratio
Engineering undergraduate degrees granted/regular faculty members
Regular faculty here excludes CSTV faculty (included elsewhere in Systems Design); degrees here exclude ½ of software students and ⅓ of nanotechnology students; mechatronics students are allocated 3/5 to MME, 1/5 to ECE and 1/5 to SDE; biomedical students are allocated 1/10 to CHE, 1/10 to ECE, 1/10 to MME and 7/10 to SDE.

B8 Co-op Employment
Source: Waterloo Co-operative Education & Career Action Office | As of: Dec. 31
Excludes students who advised CECA that they were not seeking employment or who did not participate in the interview process and did not provide information on their status
% international placements is share of "employed" terms outside of Canada

B9 Co-op Earnings
Source: Waterloo Co-operative Education & Career Action Office | As of: May 1
Total student earnings are estimated using average salaries
Does not include wages earned internationally

B10 Undergraduate Exchange Participation
Source: Engineering International Office | As of: Dec. 31
Count of student terms spent on exchange in the calendar year.
Outgoing: Waterloo students on exchange elsewhere; Incoming: students studying at Waterloo on exchange

C1 Total Graduate Enrolment (head count)
Source: Waterloo Institutional Analysis and Planning Office | As of: Nov.1
All graduate students registered in fall term (full-time or part-time) on MTCU count date
Nanotechnology students are counted in the department in which they are registered; includes non-degree students (which include diploma and certificate programs)

C2 FTE Graduate Enrolment
Source: Waterloo Institutional Analysis and Planning Office | As of: May 1
FTE = (SpringFTE+FallFTE+WinterFTE)/3 | Each term's FTE = FT+(PT*0.3)
Nanotechnology students are counted in the department in which they are registered; non-degree students are excluded

C3 Graduate Degrees Granted
Source: Waterloo Institutional Analysis and Planning Office | As of: Dec. 31
Total engineering graduate students graduating in the calendar year
Nanotechnology students are counted in the department in which they are registered; count by first major (double-major degrees are counted only once)

C4 FTE Graduate Student Admissions
Source: Waterloo Institutional Analysis and Planning Office | As of: Nov.1

Total of FTE (FT+(PT*0.3)) of all new graduate student admissions in 3 terms (calendar year)
Nanotechnology students are counted in the department in which they are registered; non-degree students are excluded; coursed-based master are included with professional master prior to 2012

C5 Graduate Students:Faculty Ratio
FTE graduate students/tenured and tenure-stream faculty members
All Students includes non-degree students; Research Students includes PhD+Research Master students only; totals might not add precisely due to rounding

C6 Graduate Degrees Granted:Faculty Ratio
Graduate degrees granted/TTS faculty members

C7 Graduate Proportion of Total FTE Enrolment
FTE graduate students/(FTE graduate students+FTE undergraduate students)

C8 Graduate Student Financial Support
Source: Waterloo Graduate Studies Office | As of: May 1

D1 Total Sponsored Research Funding
Source: Waterloo Office of Research | As of: May 1
Research funding data presented in multi-year graphs are the most up-to-date data available, and include Office of Research corrections made to previous years' funding after the final report for that year. Tabular data are not restated.

D2 Total Tri-Council Funding
Source: Waterloo Office of Research | As of: May 1

D3 NSERC Funding by type
Source: Waterloo Office of Research | As of: May 1
Discovery includes Accelerator Supplements; Partnerships was formerly called Industry

D4 University of Waterloo Share of NSERC Funding and Awards in Engineering Subject Groups
Source: NSERC Awards Database | As of: May 1
Includes NSERC awards and funding earned by any University of Waterloo researcher in 19 NSERC research subject areas (comprised of 157 subjects) identified as related to engineering (Agricultural Eng, Artificial Intelligence, Biomedical Eng, Chemical Eng, Civil Eng, Design&Manufacturing, Electrical&Electronic Eng, Environmental Eng, Fluid Mechanics, Forest Eng, Fuel&Energy Tech, Industrial Eng, Information Tech, Materials Sci&Tech, Mechanical Eng, Mining&Mineral Processing, Nuclear Eng, Robotics, Structural Eng)

D5 Provincial Funding by type
Source: Waterloo Office of Research | As of: May 1
Other includes Ministry, FedDev and Ontario Research Chair funding

D6 Industry Funding by source
Source: Waterloo Office of Research | As of: May 1

D7 Total Sponsored Research Funding:Faculty Ratio
Sponsored research funds/tenured and tenure-stream faculty members

D8 Total Sponsored Research Funding:Budget Ratio
Sponsored research funds/permanent recurring budget

D9 Research Chair Holders
Source: Engineering Research Office & Dean of Engineering Office | As of: May 1

D10 University of Waterloo Documents in Engineering, Materials Science or Computer Science Publications Indexed by Thomson Reuters
Source: InCites™, Thomson Reuters. Report Created: 17-June-15 | Data Source: Web of Science ®
Limited to documents in publications indexed by Thomson Reuters. Includes publications by all researchers affiliated with the University of Waterloo in publications classified by Thomson Reuters Essential Science Indicators as engineering, materials science, or computer science. Includes all documents published in each five-year period.

D11 Category Normalized Citation Impact (for each of the categories Engineering, Materials Science and Computer Science) of University of Waterloo Documents in Publications Indexed by Thomson Reuters
Source: InCites™, Thomson Reuters. Report Created: 17-June-15 | Data Source: Web of Science ®
Category Normalized Citation Impact =Impact (citations per paper) of an institution in a subject area relative to the impact of all institutions in the subject area overall, normalized for subject year and document type. Publications and citations are both limited to Thomson Reuters-indexed publications.

D12 % of University of Waterloo Documents in Engineering, Materials Science or Computer Science Publications Indexed by Thomson Reuters that are in the Top 10%
Source: InCites™, Thomson Reuters. Report Created: 17-June-15 | Data Source: Web of Science ®
Percentage of total Waterloo documents in the given subject area that are in the top 10% of all papers in that subject area, based on citations by category, year and document type. Publications and citations are both limited to Thomson Reuters-indexed publications.

E1 Women in Engineering Disciplines and Women in Architecture

& Undergraduate year one new admissions excludes continuing students, Nov. 1

E2 All undergraduate students = head count, Nov. 1
Undergraduate degrees granted in the calendar year, Dec. 31
All graduate students = head count, Nov. 1
Graduate degrees granted for the calendar year, Dec. 31
Professors = regular faculty, May 1

F1 International Students
Undergraduate year one new admissions excludes continuing students, Nov. 1
All undergraduate students = head count, Nov. 1
Undergraduate degrees granted in the calendar year, Dec. 31
Undergraduate Co-op Work Terms = # and % of “employed” terms outside Canada, Dec. 31
All graduate students = head count, Nov. 1
Graduate degrees granted for the calendar year, Dec. 31
Outgoing Exchange Students =Terms spent by Waterloo students on exchange elsewhere, Dec. 31
Incoming Exchange Students = Terms spent by students studying at Waterloo on exchange, Dec. 31

G1 Space Holdings
Source: Waterloo Institutional Analysis and Planning Office | As of: May 1
Space Holdings excludes Architecture and Conrad
In May 2014 previous space holdings calculations, which included projections for space under construction, were updated with actual figures. Baseline and previous year data have been restated with actuals.

H1 Total Alumni
Source: Waterloo Office of Alumni Affairs | As of: Dec. 31
Total of all alumni who have graduated with a degree from Waterloo Engineering
Includes all Architecture, Conrad, and software engineering alumni; includes deceased and honorary alumni; count by preferred major (each alumnus is counted only once)

H2 Engineering Alumni Donating to the University of Waterloo in the year
Source: Waterloo Office of Alumni Affairs | As of: Dec. 31
Includes donations by alumni in the given calendar year

H3 Engineering Alumni Donating to the University of Waterloo in their lifetime
Source: Waterloo Office of Alumni Affairs | As of: Dec. 31
Includes donations by alumni at any time before December 31 of the current year

H4 Funds Raised for the Faculty of Engineering
Source: Waterloo Office of Development | As of: May 1
Cash Received includes all cash, gifts-in-kind and other gifts received (including payments on pledges counted in previous years); New pledges includes all pledges, cash, gifts-in-kind and other gifts raised (including those not paid this year)

H5 Campaign Progress to Date
Source: Waterloo Office of Development | As of: May 1
Educating the Engineer of the Future Campaign target set and progress tracked from May 1, 2013 onward

H6 Alumni Attending Selected Class Reunions
Source: Engineering Alumni Office | As of: Dec. 31
Includes only departments with an undergraduate program in the given reunion year

H7 Alumni Events
Source: Engineering Alumni Office | As of: Dec. 31

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