Date: Monday 17 June 2013  
Time: 3:30 p.m.  
Place: Needles Hall, Room 3001

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<tr>
<th>Time</th>
<th>Consent Agenda</th>
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<tr>
<td>3:30</td>
<td><strong>Consent Agenda</strong></td>
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<td><strong>Motion:</strong> To approve or receive for information by consent items 1-5 below.</td>
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<td></td>
<td>1. Minutes of the 21 May 2013 Meeting</td>
<td>Decision</td>
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<td>2. Reports from Committees and Councils</td>
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<td></td>
<td>a. Executive Committee</td>
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<td>b. Graduate &amp; Research Council</td>
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<td>c. Undergraduate Council</td>
<td>Decision/Information</td>
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<td>3. Report of the President</td>
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<td>a. Recognition and Commendation</td>
<td>Information</td>
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<td>4. Reports from the Faculties</td>
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<td>5. Other Business</td>
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<td></td>
<td>a. Undergraduate Council Appointment</td>
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<th>Time</th>
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<tr>
<td>3:35</td>
<td>6. Business Arising from the Minutes</td>
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<td>7. Reports from Councils</td>
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<td>a. Graduate &amp; Research</td>
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<td>b. Undergraduate</td>
<td>Decision</td>
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<tr>
<td>3:40</td>
<td>8. Research Presentation: Professor Wendy Mitchinson, Department of History</td>
<td>Information</td>
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<tr>
<td>3:50</td>
<td>9. Report of the President</td>
<td>Information</td>
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<td>4:00</td>
<td>10. Q&amp;A Period with the President</td>
<td>Discussion</td>
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<tr>
<td>4:20</td>
<td>12. Report of the Vice-President, University Research</td>
<td>Information</td>
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<td>4:35</td>
<td>13. Report of the Chief Information Officer</td>
<td>Information</td>
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<td>4:55</td>
<td>14. Other Business</td>
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<td>5:05</td>
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<td>5:10</td>
<td>15. Minutes of the 21 May 2013 Meeting</td>
<td>Decision</td>
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<tr>
<td>5:15</td>
<td>16. Business Arising from the Minutes</td>
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<tr>
<td>5:20</td>
<td>17. Report from the Honorary Degrees Committee</td>
<td>Decision</td>
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JLA:tad  Logan Atkinson  
10 June 2013  Secretary of the University

Guests: Nello Angerilli, Kelly Anthony, Mario Coniglio, Donna Ellis, Peggy Jarvie, Jennifer Kieffer, Kelly McManus, Chris Read, Ellen Réthoré, Daniela Seskar-Hencic, Bud Walker, Dave Wallace, Nancy Weiner

Secretariat: Logan Atkinson, Tracy Dietrich


*regrets

Organization of Meeting: Feridun Hamdullahpur, chair of Senate, took the chair, and Logan Atkinson, secretary of Senate, acted as secretary. Atkinson advised that due notice of the meeting had been given, a quorum was present, and the meeting was properly constituted.

OPEN SESSION

Consent Agenda
Senate heard a motion to approve or receive for information by consent items 1-4 below.

1. MINUTES OF THE 15 APRIL 2013 MEETING
Senate approved the minutes of the meeting as distributed.

2. REPORTS FROM COUNCILS

Graduate & Research. Senate received the report for information.

Undergraduate Council
- Geomatics Option, Faculty of Science. Senate approved the option for students in the science and aviation plans as provided in the report.

- Honours Geography and Aviation (Regular), Geography & Environmental Management, Faculty of Environment. Senate approved the changes to the plan as provided in the report.

- Honours Science and Aviation, Science and Aviation, Faculty of Science. Senate approved the changes to the plan as provided in the report.
- **Withdrawing and Returning, Faculty of Engineering.** Senate approved the additional information to be added to the engineering section of the undergraduate calendar as provided in the report.

- **Transfer Credits, Planning and Knowledge integration, Faculty of Environment.** Senate approved lowering the external transfer credit grade requirement from 65% to 60% for planning and knowledge integration, effective 1 September 2014.

Senate received the remaining item in the report for information.

3. **REPORT OF THE PRESIDENT**
   - **Recognition and Commendation.** Senate received the report for information.

4. **REPORTS FROM THE FACULTIES**
   Senate received the reports for information.

Porreca and Busch. Carried.

**Regular Agenda**

5. **BUSINESS ARISING FROM THE MINUTES**
   There was no business arising from the minutes.

6. **REPORTS FROM COMMITTEES AND COUNCILS**
   **Finance Committee**
   - **2013-14 Operating Budget.** Following a summary by McBoyle of some of the assumptions relied on to prepare the budget, some of the challenges inherent in budget preparation given the current situation with respect to both the government grant and the tuition framework, and the highlights of the budget on both the revenues and expenses side, the floor was opened for questions.

   On differences in faculty complements, McBoyle indicated that much of the differences relate to retirements, faculty moving to new appointments elsewhere, and historical agreements on needs relative to strategic planning objectives and business plans on new programs. In response to a question on the expense reduction, McBoyle advised that each faculty will make its own decisions on how to meet their objectives.

   McBoyle explained the provincial government’s assessment on international students.

   Senate heard a motion to recommend that the Board of Governors give favourable consideration to the 2013-14 operating budget as provided in the report.

   McBoyle and Ramdev. Carried.

   **Long Range Planning Committee**
   - **University Strategic Plan.** Senate heard a motion to conduct an electronic vote following the meeting to measure support for the adoption of the strategic plan, and to recommend to the Board of Governors that it adopt the strategic plan as presented.

   Ramdev and Forstner.

   There was some comment that the version distributed to Senate was not the final version to be approved, and that the timing of the deliberations by Senate is inconsistent with the idea of Senate
due diligence. McBoyle summarized some of the major changes made since the most recent draft was circulated, and some of the challenges in being appropriately responsive to input received from the community.

Because aspects of the plan link the university’s focus to the identification of societal need, the question was posed about how needs in this respect are identified. McBoyle explained that this would be resolved through the committee process as a plan of execution is developed.

The motion carried.

Hamdullahpur thanked McBoyle and his committee for their exemplary service in preparing the strategic plan.

Graduate & Research Council
- **Psychology, Faculty of Arts.** Senate heard a motion to approve the revised numbering system, course inactivations, program description changes, new course and course revisions for courses in clinical psychology as provided in the report.

  Horton and Porreca. Carried.

Undergraduate Council
- **English for Academic Success (EFAS) Admission Requirements.** Senate heard a motion to approve changes to the EFAS minimum admission requirements as provided in the report.

  McMahon and Ramdev.

  An explanation was offered with respect to the differences in faculty standards for admission, and with respect to some of the wording used in the report.

  The motion carried.

- **Bachelor of Science, Materials and Nanoscience 2+2, Faculty of Science.** Senate heard a motion to approve a 2+2 program in materials and nanoscience with Beijing Jiaotong University as provided the the report.

  McMahon and Power. Carried.

- **Geomatics Option, Faculty of Environment.** Senate heard a motion to approve the inactivation of the plan.

  Roy and Brenning. Carried.

7. **TEACHING PRESENTATION**
Coniglio introduced Kelly Anthony, professor of public health & health systems. Anthony reported on her methods in experiential learning and shared sample class materials.

  Slides used in the presentation may be seen at

8. **REPORT OF THE PRESIDENT**
Hamdullahpur presented a broad report covering a number of items. New and continuing senators were welcomed by Hamdullahpur. It was reported that the provincial budget will pass in the legislature, according to reports, such that a summer election will be avoided.
Hamdullahpur reported on projects related to the status of international graduate students, including their status relative to domestic students and the graduate student assessment levied by the provincial government. The university is doing its best to negotiate change on these two items, but in the meantime will charge international students a portion of the assessment to function as an offset.

The university is also making representations on the changes in research funding by the federal government.

A short report was presented on the recently completed Executive Council retreat and the action plan to emerge from the retreat. A report will be provided in due course. Some of the items discussed included research impact, student entrepreneurship and experiential learning, budgetary issues, and advancement projects.

Hamdullahpur advised that he would soon be appointing two special advisors, one on entrepreneurship and one on women and gender issues.

9. Q&A PERIOD WITH THE PRESIDENT
Hamdullahpur answered a number of questions arising from his report.

He advised that other universities are dealing with the graduate student assessment in a way similar to the way it is being managed at this university.

At Hamdullahpur’s request, Haslett advised that the university no longer has a relationship with Access Copyright, such that its proposals to make changes in the tariff have no application to this university.

Hamdullahpur advised that the special advisor on women’s and gender issues and the new director of equity will work very closely together, but that the special advisor will focus exclusively on women’s and gender issues.

The federal plans to reduce research funding will have an impact on faculty work, and there is a “special research grant” available internally to meet special requirements.

Hamdullahpur suggested that there is no attempt at the provincial government level to divide universities against each other, despite the plans to force universities to differentiate from each other, initially through the strategic mandate agreements. There is a significant challenge here, compelling us to distinguish ourselves as a research intensive university without contributing to the emergence of a two-tiered system.

In response to a question, Hamdullahpur summarized the standard approaches the university takes in seeking change through government offices, relying on its own resources and the resources of collective efforts such as those through the Council of Ontario Universities and the Association of Universities and Colleges of Canada.

Hamdullahpur reaffirmed his position on the importance of academic freedom, and that statements from the Association of Universities and Colleges of Canada do not bind this institution.

10. REPORT OF THE VICE-PRESIDENT, ACADEMIC & PROVOST
Roster of Graduands. Senate heard a motion to delegate approval of the roster of graduands to the Executive Committee for its 3 June 2013 meeting.

McBoyle and Porreca. Carried
Undergraduate Admissions Update. On behalf of Lavigne, Nancy Weiner reported that almost 24,000 offers have been made to date (target is 6000 new students by 1 November) and final results will be presented at the June meeting.

Slides used in the presentation may be seen at https://uwaterloo.ca/secretariat/sites/ca.secretariat/files/uploads/files/admissions%20update.pdf

11. REPORT OF THE VICE-PRESIDENT, UNIVERSITY RESEARCH
   There was no report from the vice-president.

12. OTHER BUSINESS
   There was no other business.

Senate convened in Confidential Session.

Logan Atkinson
Secretary of the University

22 May 2013
FOR INFORMATION

Lists of Candidates for Degrees, Diplomas and Certificates
At its 3 June 2013 meeting, the Executive Committee, on behalf of Senate, approved the lists of candidates for degrees, diplomas and certificates as recommended by the faculty councils and the associate provost, graduate studies, and authorized the chair, the registrar and the associate provost, graduate studies to add to or change the lists of candidates for degrees, diplomas and certificates as approved at the meeting of the Senate Executive Committee on 3 June 2013.

Note: At its 21 May 2013 meeting, Senate delegated approval of the roster of graduands to the Executive Committee for its 3 June 2013 meeting.
Senate Graduate & Research Council met on 13 May 2013 and agreed to forward the following items to Senate for information. These items are recommended for inclusion in the consent agenda.

Further details are available at: www.adm.uwaterloo.ca/infosec/Committees/senate/sgrc.htm

FOR INFORMATION

PROGRAM REVIEWS

Senate Graduate & Research Council met on 13 May 2013 and Senate Undergraduate Council met on 9 April 2013 and 14 May 2013, and agreed to jointly forward the following items to Senate for information.

Faculty of Science – Program in Earth Sciences

On behalf of Senate, both councils approved an augmented academic review of the programs in Earth Sciences offered by the Department of Earth and Environmental Sciences in accordance with the university’s Institutional Quality Assurance Framework.

Based on the material presented in the Final Assessment Report (Attachment 1), and the report of the reading subcommittee formed by council to review the self-study and program materials in depth, as well as to request additional information and provide recommendations, the programs were found to be of good quality.

Faculty of Arts – Program in German and Slavic Studies

On behalf of Senate, both councils approved an augmented academic review of the programs in German and Slavic Studies offered by the Department of Germanic and Slavic Studies in accordance with the university’s Institutional Quality Assurance Framework.

Based on the material presented in the Final Assessment Report (Attachment 2), and the report of the reading subcommittee formed by council to review the self-study and program materials in depth, as well as to request additional information and provide recommendations, the programs were found to be of good quality.

Faculty of Engineering - Program in Management Sciences

On behalf of Senate, both councils approved an augmented academic review of the programs in Management Sciences offered by the Department of Management Sciences in accordance with the university’s Institutional Quality Assurance Framework.

Based on the material presented in the Final Assessment Report (Attachment 3), and the report of the reading subcommittee formed by council to review the self-study and program materials in depth, as well as to request additional information and provide recommendations, the programs were found to be of good quality.

RENEWAL OF CENTRES AND INSTITUTES

Centre for Advancement of Trenchless Technologies

Under the direction of Mark Knight, CATT addresses underground infrastructure needs faced by the public and private sector and end users through research, education and technology transfer activities related to the trenchless technologies. CATT was established in 1994 to help municipalities address their buried infrastructure challenges with specific reference to trenchless technologies.

CATT has grown its ranks of paying and supporting members, as well as its portfolio of activities including delivery of technology transfer programs, industrial contracts, fundamental research, and faculty and graduate student participation. CATT continues to develop and enhance its national and international reputation for excellence in buried infrastructure construction, location, condition assessment, renewal, education, and asset management and research.
CATT’s self-sustaining financial position and strong industry support, along with the recent advent of public, provincial and federal government awareness on the need to address the buried infrastructure deficit, has positioned CATT to realize significant growth and national/international exposure.

Recognizing the merits of CATT’s achievements and sound plans for the future, council approved its renewal for a five-year term ending May 2018, on behalf of Senate.

**Waterloo Institute for Nanotechnology**

Under the direction of Arthur Carty and Alain Francq, WIN was founded in 2008 and focuses on research, innovation and technology development in key areas of nanotechnology. The institute undertakes its work in a collaborative fashion, with research collaborations established with the world’s top universities and institutions in the field as well as industry partnerships that advance technology transfer and commercialization. WIN has had notable success in attracting the best and brightest into its ranks.

WIN is guided by an International Scientific Advisory Board charged with providing strategic advice, direction, and focus to the institute. Starting with 35 members in 2008, a groundswell of growth has occurred where there are now 70 members of WIN from nine departments, 20 Research Chairs, and hundreds of graduate and undergraduate students are or have been involved in the institute. Over the same period, WIN has successfully raised over $13 million in funding for member research.

Future plans for WIN include: increasing total research grants and contracts awarded to members by 30%; increasing industrial partnerships by 50% and doubling active international partnerships; recruiting new WIN Endowed Chairs; originating at least 5 new nanotechnology companies by 2018 via spin-off, start-up or licensing; and establishing a Nanotechnology Venture Capital Fund to commercialize WIN-derived technologies.

Recognizing WIN’s tremendous achievements and growth to date, and its importance to the university and to international research in the emerging field of nanotechnology, council approved its renewal for a five-year term ending May 2018, on behalf of Senate.

**Waterloo Institute for Sustainable Energy**

Under the direction of Jatin Nathwani, WISE serves as a focal point for energy research at the university. The institute actively works to create the best possible research platforms for faculty to test their ideas, engage with their peers, and partner with external organizations to accelerate the pace of research, development and deployment of practical solutions. WISE was founded in April 2008, building on the university’s longstanding strengths in engineering, science and environment. In only five years, WISE has grown to become Canada’s largest concentration of researchers in academia devoted to sustainable energy, growing its membership from 60 to 95 researchers representing all faculties, with over 500 graduate students involved in WISE activity.

Focusing on sustainable energy, WISE fosters the alignment of research capacity and seeks to advance multi-disciplinary research, and research initiatives developed at WISE are of an interdisciplinary nature spanning several faculties and departments. The institute has created positive relationships with senior energy leaders from all sectors and has generated significant opportunities for its members to advance energy research. The scope and scale of energy research activities is large and diverse, and includes: renewable energy; information science and systems; sustainable mobility; emissions management; and policy analysis. In addition, WISE facilitates a high volume of dialogue within its many disciplines as well as outreach on public policy through various means including workshops, conferences, and public lectures.

Future plans are informed by the three major directions identified by WISE: achieving a global low-carbon energy system; smart urbanization and growth of cities; and off-grid energy access. WISE will continue to expand upon its successes in research collaboration and outreach while playing an influential role in informing public policy nationally and internationally.

Recognizing WISE’s achievements and its importance to the university and Canada, council approved its renewal for a five-year term ending May 2018, on behalf of Senate.
CURRICULAR MODIFICATIONS
On behalf of Senate, council reviewed and approved curricular modifications and minor program revisions for the faculties of mathematics (combinatorics and optimization) and science (earth sciences).

SCHOLARSHIPS AND AWARDS
On behalf of Senate, Council approved the creation of: Bartholomew Entrepreneurship Scholarship; Norman Esch Graduate Scholarship; Nantes Graduate Award; Murray Martin Prize for the Best Research Paper by a Mathematics Graduate Student; and Lijiang Fang Graduate Scholarship in Computer Science.

Sue Horton
Associate Provost, Graduate Studies

George Dixon
Vice President, University Research
Final Assessment Report of the
Augmented Review of Earth Science
(BSc, MSc and PhD)
March 2013

Review Process

The self-study was commenced by the former graduate officer, included input from colleagues, staff assistance, and was finalized by the Chair and Associate Chair following a review by certain faculty, staff, and representatives of the undergraduate and graduate student societies.

The previous review of both undergraduate and graduate programs occurred in 2004/05, when the same reviewers provided separate reports on both the undergraduate and graduate programs. They did not have major concerns, other than recommending that the fields at the graduate level (which had been collapsed into two) should be expanded in number.

The current review was originally scheduled for 2011/12, but due to some extenuating circumstances was delayed one year. Eight years is the maximum that a program is permitted to continue without review by the Ontario Universities Council on Quality Assurance.

Characteristics of the Program

Program Objectives

The objective of the undergraduate plans is to provide high-quality training in the Earth Sciences that prepares graduates to enter directly into formal employment as professional geoscientists or to undertake advanced training and research in the geosciences as graduate students.

The objective of the two departmental graduate programs (MSc and PhD) is to provide advanced training in the geosciences to superior candidates in five fields: Foundation Earth Sciences, Hydrogeology, Aqueous and Organic Geochemistry, Isotope Hydrology and Geochemistry, and Atmospheric and Water Cycle Modelling. MSc Earth Sciences graduates are prepared for professional geoscience employment or further study at the doctoral level. PhD Earth Sciences graduates are prepared for professional geoscience employment or academic careers.

Specific Learning Outcomes

Detailed learning outcomes for the undergraduate program have been developed, along with a curriculum map. Detailed learning outcomes at the graduate level need to be developed.

Distinctiveness

The Department has a very strong research profile, as evidenced by the amount of grant funding received and the number of research chairs appointed. The Department has a
particular strength in groundwater research, and the recent arrival of a Canada Excellence Research Chair in Ecohydrology and the associated research group has further strengthened the national and international reputation in this area, such that there are few (if any) larger groups in this area in the world. The average annual external research funding received by the Department was $7.8m over the review period, with about half of this from Tri-Council and other peer-adjudicated sources, and the balance from contract and other sources. This is a very substantial record. The Department has substantial lab facilities, and the University of Waterloo Environmental Isotope Laboratory is one of the best-equipped such facilities in North America, with 12 highly qualified technician.

In terms of student numbers the Department trained 6% of the Bachelors graduates in Earth Sciences in Ontario, but 20% of the Masters and 14% of the PhDs in Ontario (as measured by numbers of graduates in the eight years from 2004 to 2010). Ontario in turn trains 33% of the undergraduate and about 40% of the graduate students in this discipline, nationally.

**Academic Programs Offered**

The undergraduate programs were first offered in 1965; the MSc beginning in 1969, and the PhD beginning in 1972.

The Department offers the following *undergraduate* programs:
- Honours BSc Earth Sciences (co-op and regular); within this Plan, three different specializations are available (Geology, Hydrogeology and Geophysics). An Atmospheric specialization will be deactivated shortly.
- Honours BSc Environmental Science (Geoscience option) (co-op and regular)

The Department also participates in programs with other Departments, including the BASc in Geological Engineering (offered by the Department of Civil and Environmental Engineering) and the BSc in Geochemistry (offered by the Department of Chemistry).

At the *graduate* level, the Department offers an MSc and a PhD, with five fields (Foundation Earth Sciences, Hydrogeology, Aqueous and Organic Geochemistry, Isotope Hydrology and Geochemistry, and Atmospheric and Water Cycle Modelling).

**Students: Undergraduate**

During the review period 42 different courses were offered in the undergraduate program including the two honours thesis courses (all Honours graduates in the Department are required to complete either a thesis) or a senior research project. There have been online course offered in the past, but there are non currently. However, it is expected that a first year online course will be reintroduced, and possibly others in future. There is a required field course for all students which is usually taken at end of the third year.

On average about 50 students per year whose grades exceed the minimum required apply for the undergraduate program, with a little over half of these applying for the Co-op stream.
About 8 students on average per year entered first year in the program over the 8 year review period, of which four-fifths were in co-op. The vast majority of these come from Ontario. Women constituted about 45% of this group. Since 2005, the Department has accepted students from China on 2+2 arrangement (students come in with the equivalent of 20 courses, and complete an additional 20 at Waterloo). These students do not enter the co-op stream. The numbers of such students has risen, and 12 graduated from this stream in 2011. On average about 17 students per year graduate from regular and co-op programs combined, hence the international students form a significant fraction of graduates with the Bachelor’s degree.

Co-op employers are generally very satisfied with co-op students, and 90% of them rate the students as “very good” or better; 97% of the co-op students rate their co-op placements as 7 or higher on a scale of 10 (10 being the best). Two-thirds of co-op jobs are with the public sector or with professional, scientific and technical services.

Departmental faculty receive above-average scores on course evaluations (relative to other Departments in the Faculty of Science), and an alumni survey of the Faculty suggested that the Departmental faculty also received above-average scores regarding their availability outside class time, and the interest they display in the active learning of their students.

**Students: Graduate**

Twenty-seven different graduate courses were offered in the three year period analyzed; however the majority of the enrolment was in five core courses. Masters students are required to take four courses plus a thesis (or six courses plus a major research paper), and doctoral students an additional four. Since students are accepted from a variety of undergraduate backgrounds, incoming graduate students may be required to make up missing background training by taking up to five undergraduate courses prior to proceeding to graduate study.

The five core courses have enrolments from between 10 to 30 students; other courses have smaller enrolments, and some of the 600-level courses are also open to undergraduate students.

Over the 8 year period, the PhD program admitted on average 7 students per year, of whom 60% were Canadian, and the Masters program admitted on average 23, of whom 70% were Canadian. The proportion of female students has risen to 40%, and the proportion of international students has likewise been rising. Masters students complete their program after between 2.3 to 2.7 years, and Doctoral take on average 6 or 7 years. The Department argues that the need for fieldwork, the need for additional qualifying undergraduate courses (for students entering from other disciplines), and the accepting of employment prior to completion, explain these relatively long completion times. Funding for graduate students is comparatively generous, with the average for Masters students exceeding $21,000/year in the 8 years considered, and for PhD students exceeding $27,000/year.
Graduates obtain employment with consulting firms, government agencies, or industry, in addition to those pursuing academic careers. The job market for geosciences is very strong, depending both on the economy and also on looming retirements for many current geoscientists.

Faculty

In 2010, the Department listed 15 faculty members whose primary graduate focus was in the Department (category 1) and another six who taught in the graduate program (but whose primary graduate appointment was elsewhere). These faculty members include two tier 1 Canada Research Chairs, one Canada Excellence Research Chair (in 2011 outside review period), one University Research Chair and several Research Professors. In addition, faculty include four distinguished professors emeritus and numerous adjunct appointees.

Other awards won by members (or former members) of the Faculty include:
- Order of Canada
- Fellowships in the Geological Association of Canada (3)
- Fellowship in the Canadian Academy of Engineering
- 3M Teaching Fellowship
- University of Waterloo Distinguished Teaching Awards (2)
- University of Waterloo Excellence in Graduate Supervision Award
- University of Waterloo Excellence in Research Award
- M. King Hubbert Award from the National Ground Water Association (4)
- O. E. Meinzer Award from the Geological Society of America (2)
- PREAs (3)

Six of the faculty are professional geoscientists, and four are professional engineers. About a third of the faculty are journal editors or members of editorial boards.

The Department has four administrative staff and another staff member responsible for laboratory teaching in large courses. Additional staff members are funded from research support.

Reviewers’ Report

1. Consistency with institution’s mission; are program requirements and learning outcomes clear?

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<th>Undergrad</th>
<th>Grad</th>
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<tr>
<td>No concerns: rich and diverse program</td>
<td>Quality of research environment and output of student research publications reaching the highest standards</td>
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2. Admission requirements: aligned with learning outcomes?

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<th>Undergrad</th>
<th>Grad</th>
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<td>No concerns re admission: see</td>
<td>Recruitment of students outside</td>
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### 3. Curriculum: current? Creativity? Mode of delivery appropriate?

**Undergrad:** Reviewers felt hydrology/hydrogeology geochemistry is cutting edge; Foundational Geology is under-represented and should be a hiring priority; advised cutting Geophysics Specialization and perhaps Geochemistry program; advice re 2+2, undergraduate research opportunities; see Recommendations 2 through 10

**Grad:** Curriculum is ready for an overhaul (Rec 12) to meet desired learning outcomes (which need to be established). A new multidisciplinary techniques course should be considered (Rec 13)

### 4. Teaching and Assessment: methods of assessment appropriate? Do means of assessment demonstrate achievement of learning objectives and DLE’s?

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<th>No concerns</th>
<th>No concerns: quality of student outcomes very high</th>
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### 5. Resources: effective use of human, physical and financial resources?

| Labs in hydrogeology and geochemistry are exceptional; current teaching labs near capacity, but expansion is underway | “..quality of water-related research facilities is unparalleled nationally....exceptional training environment” |

### 6. Quality Indicators: faculty, student and graduate?

| Faculty are internationally recognized experts; possible renewal needed in foundational geosciences; see Rec 11 re. links with alumni | Courses very high quality; Rec 14 discusses allocation of graduate teaching/supervisory load |

### 7. Quality of enhancement: initiatives to improve program quality, learning environment?

| Support the transition which occurred whereby environmental science moved from Dean’s Office to Department of Biology and Department of Earth and Environmental Sciences | Reviewers did not receive information relevant to this area, but reviewed the quality of the current program (see items 5 and 6 immediately above) |
8. Graduate program criteria: time to completion, quality/availability of supervision, program quality indicators for faculty, students, program, sufficiency of graduate-only courses

“lax administration of the students’ progress through their programs..”: see Rec 15 re earlier meetings of students with supervisory committees; see Rec 16 re reviewing program requirements and remedial courses.

9. Other issues (graduate)

Rec 17 re inefficiencies in graduate admissions process; Rec 18 re need for a new Graduate Student Handbook; Rec 19 re making students more aware of resources for instructional skills; Rec 20 re workforce review to reduce burden on staff

Reviewers’ Recommendations, and Departmental Responses

The review was very positive regarding the quality of training, but contained a number of recommendations. The Department felt that the report was thorough and fair, but noted that since the Self Study was completed, some additional changes had occurred. The specific recommendations and responses follow (recommendations are taken verbatim from the review report).

**REC 1**

*It is recommended that the Department and the University explore opportunities for recruitment from the Ontario college system through credit transfer agreements.*

Response: The Department is already engaged in evaluating transfer possibilities for Sir Sanford Fleming College, one of the few colleges with a geosciences program.

**REC 2**

*It is recommended that the Department ensure alignment of minimum program requirements with [Association of Professional Geoscientists of Ontario] APGO standards for professional registration, and communicate APGO standards clearly to students.*

It is only programs run outside the Department (e.g. Geochemistry) where there is the issue of not meeting APGO requirements. The Department invites in APGO representatives annually to talk directly with students about current licensure requirements.

**REC 3**

*It is recommended that the Department ensure that all undergraduate courses are integrated, and that faculty undertake to maintain an ongoing process of collaborative course renewal that ensures continuity while eliminating gaps and redundancy.*

Response: The Department is addressing these curricular issues in a thorough review of the undergraduate curriculum, scheduled to be completed in May 2013.

**REC 4**
It is recommended that the Department undertake to expand opportunities for undergraduate students to engage in undergraduate thesis, co-operative work terms, or other research or employment experiences within the analytical research facilities. Response: Agreed.

REC 5
It is recommended that the Geophysics [program] be discontinued if no additional faculty expertise can be recruited to support the program.
Response: Unless additional faculty resources can be obtained, the Department agrees with this recommendation.

REC 6
It is recommended that the Geochemistry Specialization be discontinued.
Response: The Department has ascertained that the program cannot be easily modified to fulfill CIC and APGO requirements, and accordingly is moving to discontinue the program.

REC 7
It is recommended that the Department identify essential core areas of foundational earth sciences as priorities in recruitment of faculty.
Response: Four recent hires (three replacements and one net new) have been in the core areas of Earth Sciences. However continued attention is necessary with additional likely retirements.

REC 8
We recommend expanding collaborative delivery of courses that meet the needs of both Geoscience and Ecology specializations within the Environmental Science program.
Response: Agreed, for discussion with Biology.

REC 9
It is recommended that all faculty be encouraged to take part in Honours Thesis supervision.
Response: Agreed.

REC 10
It is recommended that the University Administration re-evaluate admission and student-preparation practices for the China-Canada 2+2 program.
Response: Two of the relevant Associate Deans (International Programs, Undergraduate Studies) responsible for the 2+2 program are from Earth Sciences, which will help. However, as of April 1, 2013, there will only be the Associate Dean of Science, International Programs.

REC 11
It is recommended that the Department continue to build relationships with its alumni, development mechanisms for more effectively gathering student feedback on degree completion, and create a means for tracking careers of alumni.
Response: The Department is actively building and nurturing relationships with its alumni, as show by a recently mounted first class reunion, fundraising for two endowments for
scholarships from alumni, and alumni mentoring current students, so this suggestion is welcomed.

REC 12
Now is the time to realign graduate course offerings with the realities of existing Departmental complement and expertise, and with desired student learning outcomes.
Response: The Department recognizes the need to undertake a comprehensive review of the graduate curriculum in 2013.

REC 13
It is recommended that the new graduate curriculum include a multidisciplinary “techniques” course that exposes students to diverse, advanced analytical techniques in the earth and environmental sciences.
Response: The Department will consider carefully this suggestion. It is noted that a course on GIS and data analysis will be developed and offered in the near future.

REC 14
Graduate course delivery needs to be more equably distributed across the department.
Response: The graduate curriculum review will provide a basis to affirm that all faculty have the opportunity to teach courses, and to encourage the redesign of courses where enrolment has been low.

REC 15
It should be absolutely a requirement that students meet with their complete supervisory committee within weeks of arrival, in order to lay out the necessary program of study, courses and research.
Response: The Department undertakes to make sure all student committees meet at least once a year (but makes no specific response to the recommendation that this occur earlier during the student’s period of study).

REC 16
It is recommended that the requirement for remedial undergraduate training in Earth sciences [for new graduate students] be re-evaluated at this time in order to allow for consideration of the context of a student’s specific research plans, recognizing the increasingly interdisciplinary nature of earth science research and faculty specializations within the Department.
Response: For further examination.

REC 17
It is recommended that the graduate admissions processes be investigated, with a view to elimination of unnecessary procedures and inefficiencies, and to rapid turnaround of offers of admission.
Response: This is largely beyond control of the department. Expansion of support staff in the Dean of Science office is underway and will serve us greatly to alleviate any issues with admissions.
**REC 18**

*It is recommended that the Department place a high priority on preparing a new, comprehensive Graduate Student Handbook.*

Response: An updated handbook has been distributed in hard copy to students, and will soon be online.

**REC 19**

*It is recommended that the Department foster awareness of instructional support services available at the UofW, and work with the Centre for Teaching Excellence to create opportunities for graduate students to increase their instructional skills.*

Response: These materials will be handed out to incoming students.

**REC 20**

*It is recommended that the Department undertake a workforce review in order to seek efficiencies and eliminate unnecessary complexities in order to ease the burden on a dedicated and hard-working staff.*

Response: The department will endeavor to streamline activities as best it can with the resources it currently has.

**Two-Year Plan**

By August 31 2015, the Department will report on the following steps/issues:

**UNDERGRADUATE PROGRAM**

1. Any steps taken with regard to entry of students from cognate programs at colleges;
2. Outcomes of the undergraduate curriculum review scheduled to end in May 2013 (e.g. new courses, courses discontinued, fate of the Geophysics Specialization, fate of the Geochemistry program);
3. Numbers of co-op students employed in the Department in research positions in 2011/12, 2012/13, 2013/14 and 2014/15 years (individual academic year data, to see any trend);
4. Any decision taken regarding discontinuing the Geophysics specialization;
5. Since the program cannot readily be modified to meet CIC/APGO accreditation requirements, the specialization will be discontinued;
6. The number of retirements from July 2013 onwards, and how the areas of replacement faculty match with the essential core requirements of Earth Science;
7. The number of undergraduate projects/theses for each of the faculty members listed as Category 1 in the graduate program, for academic years 2012/13, 2013/14 and 2014/15 combined; and
8. Progress regarding the Alumni Reunion scheduled for the 2015 50th Anniversary.

**GRADUATE PROGRAM**

9. The Learning Outcomes established for the Masters and PhD programs; and following the curriculum review the number of courses which are discontinued, and the number of new courses/major course changes;
10. The Department's decision regarding whether or not to establish a techniques course;
11. The proportion of Masters students who meet with their full committee by end of term 2;
the proportion of PhD students who meet with their full committee by end of term 3; and
whether or not the Department wishes to change the PhD requirement to the end of term 2.
12. The average processing time for graduate applications for fall 2013 entry, compared to that
for fall 2015 entry (data can be obtained from GSO or OnBase).
13. The URL for the Graduate Student Handbook

Timelines

Review visit by Dr. Jim Basinger (University of Saskatchewan) and Dr. Andrew Miall (University
of Toronto) December 4-5 2012
Review report received by GSO December 7, 2012
Departmental response received by GSO February 21, 2013
Discussed at Senate Undergraduate Council April 24, 2013
Discussed at Senate Graduate and Research Council April 23, 2013
Received by Senate May 21, 2013
Review Process

The self-study was written by the Associate Chairs, in conjunction with the Chair and the administrative assistant. Faculty members participated in the curriculum mapping process, commented in Department meetings, and reviewed a copy of the draft. Undergraduate and graduate student representatives participated in Department meetings when the review was discussed; undergraduate students attended a focus group in February 2012, and graduate students were consulted via the Associate Chair, Graduate. An online survey was sent to alumni.

Characteristics of the Program

Program Objectives

The Self-Study does not identify individual goals for each program, but lists its departmental mission as:

- Maintaining a variety of degree-granting programs at the undergraduate and graduate levels;
- Maintaining individual, personalized and supportive instruction at all levels;
- Ensuring that all graduates are competent in the target language of their discipline and knowledgeable about it through the study of literature and culture;
- Maintaining a variety of programs at the undergraduate and graduate levels that respond to the interests and needs of students and society;
- Maintaining a commitment to international exchange and study abroad programs in Germany, Russia, and Croatia;
- Exploring and adopting ways to increase the transfer of applied knowledge and skills within our disciplines to the practical needs of society;
- Expanding activity in interdisciplinary studies; and
- Promoting the application of current educational technology, including computer-assisted and networked learning.

An overarching objective is the Department’s commitment to internationalization.

Specific Learning Outcomes

Detailed learning outcomes for the graduate and undergraduate programs have been developed, along with a curriculum map.

Distinctiveness
The Department offers one of the larger programs in German in Canada. The Department was founded in 1960, shortly after the foundation of the University in 1957, and the Masters programs in German and Russian commenced in 1964, along with the PhD in German. Over the past 50 or so years, the Department has graduated 400 Masters in German, 100 in Russian, 7 joint in German and Russian, and 48 PhDs in German. Waterloo offers one of only five doctoral programs in Canada in German, and one of only nine Masters programs. The Russian program (before its recent closure) was one of only four such Masters in Canada. Over the last 7 years, 30-40% of those completing graduate degrees in German in Canada came from University of Waterloo.

The Department’s offerings are also distinctive in that it opened a new Joint Master of Intercultural German Studies with Universität Mannheim in 2011. This program accepts both German and Canadian students who spend equal amounts of time at each university and receive a joint degree. There are only a handful of such joint programs between European universities and Canada which have been approved, and this is the only one in German. It is expected that this qualification will continue to grow in attractiveness and attract students from across Canada. Since this program was externally reviewed in order to get approval to commence, it is not reviewed in detail here.

At the time of the review, the Department had two highly acclaimed full Professors. The Department won a national competition for the Diefenbaker Memorial Chair in German Literary Studies ($2m endowment) and appointed John H. Smith from the University of California. The Department also succeeded in attracting Alice Kuzniar from the University of North Carolina, Chapel Hill, a renowned theorist of German cultural and film studies. There is also a Centre for German Studies, for which the department succeeded in fundraising an endowment of $3m and which enriches the Department’s programming and activities.

**Academic Programs Offered**

The undergraduate programs were first offered in 1965; the MSc beginning in 1969, and the PhD beginning in 1972. The programs currently offered include:

- BA Honours German (Arts and Business co-op and regular)
- BA Honours Russian and East European Studies (Arts and Business co-op and regular)
- Three and four year general degrees; joint honours; minors; and certificates in German, Russian, Dutch and Croatian language
- MA in German
- Joint MA in Intercultural German Studies with Universität Mannheim
- PhD in German (two fields: applied linguistics, and literary and film studies)

The Masters in Russian was discontinued recently, when the last faculty members retired and were not replaced; in their stead, the Department was given a definite-term 2-year lecturer position.

**Students: Undergraduate**
The language courses attract substantial enrolment (including online courses). Over the review period, the median number of new majors per year was 9. On average one student per year pursues the co-op stream. The department strongly encourages exchange experiences abroad, usually with Mannheim or Bamberg (and also invites non-majors to participate). 2-3 students per year participate in the exchanges. Students who enter the German program in second year generally complete the program (attrition is low), and they generally complete in four or five years. The alumni survey suggested that some graduates stay in humanities-related careers (libraries, education, translation, writing) while others go into the business sector.

In addition to majors, the Department provides language instruction to a large number of students, including a surprisingly large enrolment in online courses. Instruction is provided not only in German, but also Russian, Croat, Dutch and Polish.

**Students: Graduate**

Students in the regular Masters take one year, and in the Joint Masters two years. They are supported in the amount of $15,000/year. Doctoral students receive $22,000/year for four years. Part of this support (in two terms a year) comes from teaching, teaching assistantship, or research assistantship positions.

The regular Masters requires either 8 courses, 7 courses and a research paper, or 5 courses and a thesis. The Joint Masters requires 10 seminars/courses plus a thesis, and requires 3 terms in Waterloo and 3 in Mannheim.

The PhD is offered in two fields, applied linguistics, and literature and film studies. PhD students are required to take 6 courses.

Graduate students are encouraged to complete the Fundamentals of University Teaching (Masters students) and Certificate in University Teaching (PhD) offered by the Centre for Teaching Excellence. The Department has also worked with the Centre for Teaching Excellence to implement a Certificate in University Language Teaching. Students are also encouraged to attend and present in seminars and talks offered by the Department and the Waterloo Centre for German Studies.

The regular Masters takes 8-10 students per year. The Department encourages them to complete the course-based model, as it is hard to do courses, teaching assistantships and a thesis in 3 terms. The Doctoral program takes 1-2 students a year and those completing take 4-5 years. The future plan is to take 2-4 students in the regular Masters, 1-2 in the PhD, and 6-10 in the Mannheim Joint program.

Most of the PhD students have published either a journal article or a substantial chapter in addition to lively participation in national and international conferences. Of the six PhD
students who have graduated over the past seven years, five have academic jobs (including one in a tenure-track job), and the sixth in a non-profit playwright centre.

Faculty

The Department currently has nine faculty in the tenure stream, and one lecturer. There are additional faculty on short term/sessional contracts. Doctoral students can also have the opportunity to teach courses. The faculty are actively involved in editorial positions with journals, refereeing for journals, and community service. They are supported by 1.5 FTE administrative staff.

The faculty publish actively, and over the seven year period brought in just over $500,000 in research funding, the majority of this coming from the Tri-Councils.

Reviewers’ Report

1. Consistency with institution’s mission; are program requirements and learning outcomes clear?

   Undergraduate and Graduate: The Department enhances the university's mission by its strong international programs (Joint program with Mannheim; lecturer funded by Croat government). Program and learning requirements clear and consistent with DLEs for both undergraduate and graduate programs.

2. Admission requirements: aligned with learning outcomes?

   Undergraduate and Graduate: Yes, at both levels.


   Undergraduate and Graduate: Curriculum is cutting-edge, and better than any Department in North America “has begun to forge an intellectually and pedagogically-coherent program around…” “Translingual and Transcultural Competence””. Several “impressive, highly successful initiatives” include the Joint Masters, fundraising for the Center and the Diefenbaker Chair with outreach to the community, the combination of in-class and online instruction at undergraduate level, and successfully bringing together literary studies with linguistics both for undergraduates and graduate students.

4. Teaching and Assessment: methods of assessment appropriate? Do means of assessment demonstrate achievement of learning objectives and DLE’s?

   Graduate and Undergraduate: Assessment is aligned with the innovative curriculum; “many language programmes would do well to take this Department as a model”.
5. **Resources: effective use of human, physical and financial resources?**

Graduate and undergraduate: “A vibrant academic unit full of new and innovative initiatives”; recommend a hire in Slavic, and giving the Department a CRC.

Recommend small additional resources: scholarships to encourage students to go on exchange; film budget; better classrooms with media resources; better computers for sessional faculty, and progress on the “language commons” space under discussion.

6. **Quality Indicators: faculty, student and graduate?**

Graduate and undergraduate: “..outstanding faculty, several of truly international stature..” “efficient structuring” of the MA and PhD programmes allows timely completion; excellent retention rates; employment of co-op students is very good, and of graduate students excellent.

7. **Quality of enhancement: initiatives to improve program quality, learning environment?**

See under 3 above

8. **Graduate program criteria: time to completion, quality/availability of supervision, program quality indicators for faculty, students, program, sufficiency of graduate-only courses**

“Both the undergraduate and graduate students enthusiastically confirm that the professors’ unconditional availability and regular mentoring... has been the most rewarding academic and personal experience at the University” and the graduate supervision is “extraordinary”; “the external evaluators are impressed with the scholarly output of the students”.

9. **Other issues (graduate)**

None

**Reviewers’ Recommendations**

The reviewers did not have other recommendations in addition to those above.

**Departmental Response**

1. The Department enthusiastically embraces the organizing principle of “multilingualism” with a translingual/transcultural perspective. This is a good fit for a Department which offers instruction in various languages, as well as courses in English, and is consistent with the existing fields offered.
2. The Department will require assistance from the Faculty in marketing its revamped programs. The theme may broaden the appeal of the programs to additional students, for example heritage language students interested in translingual and transcultural studies. In order to increase the appeal of programs, more faculty need to teach first year courses. This has to be balanced with giving graduate students opportunities to teach and also receive financial support.

3. The Department agrees with the Reviewers’ suggestions regarding setting up a “language commons” to encourage interaction, and with their suggestions regarding the need to improvement of media technology in the smaller classrooms used for teaching in the language departments.

Two-year Plan (and beyond).

The Department will report on progress of all items at the two-year report back (September 1 2015)

<table>
<thead>
<tr>
<th>Primary Recommendation</th>
<th>Secondary Recommendation</th>
<th>Timeline</th>
<th>Responsibility</th>
<th>Resources Required</th>
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<tbody>
<tr>
<td>Multilingualism</td>
<td>Remapping and aligning departmental programs</td>
<td>By 2015-16</td>
<td>Chair/Department</td>
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<td></td>
<td>International multilingualism conference</td>
<td>2015 or 2016</td>
<td>Chair/Department</td>
<td>Some funding by department/ Dean, in addition to SSHRC application</td>
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<td></td>
<td>Explore links with other departments</td>
<td>Ongoing</td>
<td>Chair/Dean</td>
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<td></td>
<td>Extend current Russian 2-year position ending 2014</td>
<td>By 2014/15</td>
<td>Dean/Provost</td>
<td>Funding for position</td>
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<td></td>
<td>Canada Research Chair in Multilingualism Studies</td>
<td>unknown</td>
<td>Dean/Provost</td>
<td>Funding for position</td>
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<tr>
<td>Marketing and recruitment</td>
<td>Recruitment activities, e.g. website renewal with recruitment videos</td>
<td>By 2014/15</td>
<td>Chair</td>
<td>Some personnel help for design/implementation; some funding</td>
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<td>Links with international units, e.g. Cotutelle agreement w/</td>
<td>By 2015/16</td>
<td>Chair</td>
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<tr>
<td>Space and equipment</td>
<td>Mannheim, explore 2plus2 with e.g. China</td>
<td>Language commons</td>
<td>unknown</td>
<td>Dean/Provost</td>
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**Timelines**

Review visit by Dr. Agatha Schwartz, University of Ottawa and Dr. Joseph Salmons, University of Wisconsin November 29-30 2012
Review report received by GSO December 10, 2012
Departmental response received by GSO March 27, 2013
To be discussed at Senate Undergraduate Council May 14 2013
To be discussed at Senate Graduate and Research Council May 13, 2013
To be received by Senate June 17, 2013
Review Process
The Self Study was produced in the context of Engineering’s Vision 2015 planning exercise. Subcommittees of faculty members worked on different aspects such as undergraduate, graduate, research, funding, etc. The Chair of the Department met with staff to identify weaknesses and strengths. Graduate and undergraduate students met with the Chair, corresponding Associate Chairs and administrators to discuss and identify strengths that should be maintained and challenges that should be addressed.

The review was undertaken by Dr. Oded Berman, Sidney Cooper Chair in Business and Technology, Rotman School, University of Toronto and Dr. Mark Daskin, Clyde W. Johnson Collegiate Professor of Industrial and Operations Engineering and Department Chair, University of Michigan. The site visit occurred on February 7-8, 2013. The site visit on the 7th went as planned: the site visit on the 8th required last-minute changes due to a major snowstorm which closed the university. At very short notice, the meetings for that day were changed to teleconferences. However luckily the reviewers had already had chance to make their site visit the previous day.

The previous OCGS Program Review (2004) at the Graduate level for Management Science noted that much progress had been made since the 1998 review, but commented on nine different issues, to which the Department responded in 2006. OCGS requested a further two-year report, which was submitted in 2009. Issues raised included:

- Integration of the three research areas (Applied Operations Research - AOR, Information Systems - IS, Management of Technology - MOT)
- Achieving Growth Targets
- Admission
- Distribution of Supervision
- The Co-op option
- Graduate Level Course Offerings
- Research Seminar Series
- Re-energizing WATMIMS (WATerloo MAnagement of Integrated MANufacturing Systems)
- Positioning of Management Sciences

The undergraduate option was reviewed around the same time, and the Department responded in 2005 and also produced a two-year progress report in 2007. There were two main issues at the undergraduate level, namely enrolment in courses other than organizational
behavior (enrolment increased 18%), and improvements in the course scheduling system to make it easier to enroll (this was also addressed, and the university has since built more classrooms holding over 100 students, which removed some of the constraints on scheduling).

Characteristics of the Program

Program Objectives

The main objective of the graduate program in Management Sciences is to train graduate students to study, analyze, and solve management problems within organizations related to the flow and efficiency of processes, socio-technical systems, and information technology.

The master’s program is designed for students with an analytical background to prepare them for management positions in technology dependent organizations or staff or advisory positions in organizations which utilize the disciplines represented in the program.

The focus of the MASc is on a thesis master’s program. The MMSc is a course work program. For those working in industry or government who wish to obtain an MASc or MMSc on a part-time basis, enrolment in the day classes at the university is possible. Full-time master's students may, if they wish, obtain their degree by means of a cooperative program of study described further below.

There is also a distance education MMSc in the area of management of technology (MMSc Online). It is a full cost-recovery, part-time, degree. Delivery of MMSc Online is by an enhanced distance learning method, with the additional element of optional tutorials delivered by the Internet.

The PhD program is directed to persons who seek university teaching and/or research positions. Its content, which is quite flexible, reflects the research interests of the various members of our faculty.

The objective of the undergraduate option is to provide exposure to management sciences for students enrolled in other undergraduate Engineering programs.

Specific Learning Outcomes

The undergraduate option has four learning outcomes: these are not mapped to the UUDLES since there are no DLEs for options. The graduate programs all share three common core courses, which have associated learning outcomes. Each individual program also has additional learning objectives, which are mapped to the GDLEs, as detailed in the Self Study.

Significant strengths of program
While Management Engineering programs exist in various schools in the US, they are less common in Canada. University of Toronto and McMaster both offer undergraduate options in management within the Faculty of Engineering, however these require additional courses outside those normally required for the Bachelors. The online Master of Management Science is a relatively unique offering within Canada (there are competing online MBA programs, however these offer a different set of skills than a MMSc).

There has been a surge of hiring in the past seven years, and hence the faculty are relatively junior. One full Professor holds the Ontario Research Chair in Public Policy and Sustainable Energy (he is also cross-appointed to another Department in Engineering, as well as a Department in the Faculty of Environment). He is also the Executive Director of WISE, the Waterloo Institute for Sustainable Energy, one of about ten university-funded research centres/institutes.

The reviewers commented that overall they found the programs to be very strong, and the faculty, staff and students to be happy with the department and its degree offerings. They noted the three areas of strength in the department, stated “We see this diverse set of backgrounds to be a major source of strength” and commented that few Engineering Departments would have such diversity. The Department already has many recent appointments, has five positions advertized this year, and several of the senior faculty are likely to retire prior to the next review. They commented that this “creates an environment in which there are many dynamic and exciting junior faculty members” and that “the department is poised to have significant impact and to become a world recognized leader in many of these areas.”

Academic Programs Offered

At the undergraduate level, programs offered include:
- BASc in Management Engineering (the undergraduate review is occurring in conjunction with the accreditation review, and hence not included in this review)
- Option in Management Sciences

Graduate programs include:
- MMSc
- MMSc (online) in management of technology
- MASc (co-op and regular)
- PhD

There are 3 approved fields in the research programs, as follows:
- Applied Operations Research
- Information Systems
- Management of Technology
Students: Undergraduate
The undergraduate option does not restrict entry (other than being open only to Engineering students, although a large number of students from other Faculties also take these courses). Graduation with this option has increased over the seven years which form the subject of the review, from almost 140 in 2007, to around 200/year in 2011/12. The Department also does a large amount of service teaching to students from all other Faculties.

Students: Graduate

The relatively junior status of the majority of the faculty is an important explanatory factor as to the modest numbers of research students per faculty member in the Department (1.13 per faculty for the MASc, and 1.27 for the PhD). The Department admitted around 16 MASc students per year over the review period, around 32 MMSc students per year, 30 (part-time) MMSc online students, and 7 Doctoral students.

The MASc students finish on average in 2.3 years; the PhD in 4.8; MMSc students typically complete in 4 terms (1.33 years), and online MMSc students in 8 (2.66). The MASc and MMSc students typically complete around 1 term after the envisaged length of the program; and the completion times for the PhD are longer than is usually desired (and above the average for the Faculty) in Engineering.

The self study provides data for the 2010 entering students (55 of them), of whom 60% were Canadian/permanent resident. The split by individual programs is approximately 50:50 in all programs except the online master’s, where almost all the students are Canadian/permanent residents. (Currently although the University of Waterloo offers half-a-dozen online programs, they are predominantly marketed to Canadian students). About 40% of the master’s students are women (except for the online program, where only 20% are women, perhaps because these students are later in their careers), and about 25% of the PhD students.

Around 85% of the research students are funded (percentages are similar for both master’s and PhD). Students who have passed time limits (2 years for master’s, 4 for PhD) typically receive either no or reduced funding, which explains the unfunded students. Funded PhD students receive an average of $37,000/student/year, and funded research master’s students around $16,000. Note that these amounts include university scholarships which cover the international fee differential fully (for doctoral) and partially (for master’s) students, and hence the amount remaining to cover domestic tuition and living expenses is somewhat less generous. About a third of the on-campus MMSc students are funded, and for these the average is around $13,000/student/year.

The Department aims to have all research master’s students publish at least one research article, and all PhD students publish at least two, upon completion. The Department’s data on publications of graduates is very incomplete (and relies on information on articles co-published with faculty, likely an underestimate). Over half of graduates publish at least one article. Some of the others take non-academic jobs and have less incentive to publish.
Faculty were surveyed as to the employment of graduates from the seven years under review. The data are incomplete, and are also available only for research and professional programs combined. We assume that these data are primarily for the on-campus students (professional students are already employed prior to enrolment). Of the on-campus students, approximately 60% of the entering class are professional, and 40% are in the research programs. It is also likely that faculty have better data on employment of the research students (who are on campus for longer, and who co-publish with faculty). About 60% of graduates were employed in industry, 25% in academia, and 15% went on to further graduate study. Three-quarters of those employed in industry were working in Canada; half of those taking academic positions remained in Canada, and all but one of those going on to further academic study did so in Canada. It is desired to encourage all Departments to undertake alumni surveys for future reviews, to get better data on post-graduation outcomes.

Faculty

The program has 27.3 faculty (tenure stream and lecturers) of whom 17 have been hired since 2007 with the inception of the BASc Management Engineering program (which is being reviewed separately). Hence, the program has a relatively young faculty (of the 24.3 tenure stream faculty, half are Assistant Professors). One faculty member (who is also cross-appointed to another Department in Engineering as well as to the Faculty of Environment) holds the Ontario Research Chair in Public Policy and Sustainable Energy. Despite their relatively junior profile, 7 faculty members are on journal editorial boards or are journal editors.

The Department currently has 8 staff, 6 in administrative positions (supporting the Chair and the academic programs, and 2 staff involved in systems administration.

Reviewers’ Recommendations/Departmental response regarding program enhancements

The reviewers were very positive (as quoted above), and offered a number of suggestions for possible improvements, listed below, along with the Departmental responses. These are summarized below (recommendation in italics: along with response).

1. More financial support for MASc and PhD students: the Department sees three possibilities: additional research funds (as the more junior faculty become established), funding from industrial partnerships (with the help of the Industrial Liaison colleague), and funding from teaching of professional students.
2. Resist increasing grad numbers at expense of quality: there has been a large increase in international applications for the MMSc: the Department is moderating the number of international students taken, in order to increase quality.
3. Reduce teaching loads to allow more time for research: for those faculty with large supervision loads, the class teaching load is reduced to three (the same as for rest of
Engineering): once the five open positions are filled, it may be possible with these resources to extend the lower teaching load to more faculty. It is noted however that, unlike other Engineering departments, Management Science has a large fraction of its faculty in SSHRC disciplines (about 25%), with the rest in NSERC disciplines, and the teaching expectations and role of graduate students in faculty research are not the same in both areas.

4. **Consider having foundational courses in summer before fall entry:** the Department does not wish to offer additional graduate courses in spring term; however they will study the possibility of allowing incoming students to take undergraduate foundations courses which are offered in spring.

5. **Offer more advanced versions of the foundational courses for PhD:** this is not possible as the PhD class is too small. However two sections of each of the three foundations courses may be offered (class size is now too large).

6. **Reduce formal course requirements for MASc (relative to MMSc requirements):** it is intended to reduce the requirement to five (from the current eight required for the MMSc): change was approved by the Department April 1 2013.

7. **Additional course work at the PhD level:** currently PhD students take between 3 and 6 courses (those who took the foundations courses in the master’s program take only 3). There are no plans to increase this number.

8. **Offer a greater diversity of graduate courses:** this is happening, as the newly-hired faculty move towards teaching a full load. Rules were changed to permit MASc students to take one (500-level) undergraduate course, and MMSc students to take two: this also increases course diversity. The Calendar offerings also understate course availability, as many faculty offer reading courses to suit individual students interests.

9. **Create a PhD internship program:** Students are encouraged to take Mitacs internships.

10. **Develop comparative measures and metrics of student success (jobs at 1,5, 10 years after graduation):** this would be valuable information, but staff support is not currently sufficient to do surveys to measure this.

11. **Integrate the three areas, in**
   - *healthcare*
   - *sustainable energy and smart grids*
   - *data or business analytics*

   The Department agrees that making students aware of areas of application, which integrate skill from all three areas, could be valuable.

12. **Re: Option: Have some stochastic modeling and simulation in MSCI 331, and less optimization.** While the Department sees the advantages of this (since option students do not all take MSCI 431, on stochastic modelling), the disadvantage is the MSCI 331 is a requirement also in the BASc program which requires this material, and therefore has to be taught every term. It is not feasible to provide separate courses, because BASc students who failed the course and needed to repeat, would not be able to take the option course.

13. **Partner with Psychology and other disciplines for MoT area (Management of Technology):** the Department already works informally with Sociology, Psychology and Economics for example; but does not plan to make this more formal.
14. **Provide more information about courses for grad students, e.g. place course outlines online, hold information sessions:** the Department agrees and plans to change more “topics” courses to regular courses (with defined course descriptions), as well as to post past course outlines on the web.

15. **Expand availability and integrate databases (Quest, OFIS) to enhance support by staff:** will pursue, in conjunction with Graduate Studies Office.

**Two-Year Plan**

By August 31 2015, the Department will report on the following steps/issues:

1. Additional funding for research students, coming from industrial projects, and from revenue from additional professional students (recommendation 1).
2. Report on average number of courses taken by MASc and PhD students: by offering the option of enrolling in undergraduate courses (MSCI 211, MSCI 263, MSCI 331) in spring for students requiring these foundational skills, this should decrease courses taken as graduate students (and could assist with time to completion) (recommendation 4).
3. Greater diversity of graduate courses (recommendation 8).
4. Create a PhD internship program (recommendation 9).
5. List employment of graduates on website (recommendation 10).
6. Suggest groupings of courses into domains of interest on website (recommendation 11).
7. Change some topics courses to regular courses with course descriptions, to provide greater clarity for students (recommendation 14).

Further progress on recommendation 1, and progress on recommendations 3 and 15 will occur after September 2015, and will be reported on at the next cyclical review. Items 2, 6 and 13 are already in progress; items 5, 7 and 12 will not be actioned (reasons explained briefly above).

The Department has recommended the actions to be taken in response to the review, has received approval of the Dean, and this will be discussed at Senate Graduate and Research Council/Senate Undergraduate Council or both (as relevant) and received at Senate. The Department is responsible for follow-up; any resources required not available in the Department need to come from the Dean.

**Timelines**

Review visit  February 7-8 2013.
Review received by GSO February 9 2013
Departmental response received by GSO April 29 2013
Dean’s response received April 29 2013
For discussion at Senate Undergraduate Council May 14 2013
For discussion at Senate Graduate and Research Council May 13 2013
For information at Senate June 17 2013
Senate Undergraduate Council met on 14 May 2013 and on behalf of Senate, approved changes to academic plans, new courses, course changes and course inactivations. Council agreed to forward the following items to Senate for approval and information. Council recommends that these items be included in the consent agenda. The item recommended for inclusion in the regular agenda is contained in a separate report.

Further details are available at: uwaterloo.ca/secretariat/committees-and-councils/senate-undergraduate-council.

FOR APPROVAL

UNDERGRADUATE ADMISSION REQUIREMENTS FOR 2014

1. Motion: Council recommends approval of the undergraduate admission requirements for 2014 as provided in Attachment #1.

ACADEMIC PROGRAM CHANGES  [effective 1 September 2014]

Faculty of Mathematics

Degree Requirements

2. Motion: To approve the change to the failure limit for Mathematics Honours to 2.0 units, except for Mathematical Studies plans, in which the failure limit will be 4.0 units as follows (Note: new text = bold; deleted text = strikethrough):

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Four-Year Honours Plans</th>
<th>Double Degree Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Co-op</td>
<td>Regular</td>
</tr>
<tr>
<td>Minimum course units (excluding PD courses and co-op work-term courses)</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Minimum co-op work-term course units</td>
<td>2.5*</td>
<td>0</td>
</tr>
<tr>
<td>Minimum PD course units</td>
<td>2.5</td>
<td>0</td>
</tr>
<tr>
<td>Minimum work reports</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Minimum non-math units</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>Minimum Cumulative Average (CAV)</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Minimum Major Average (MAV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All AMATH and PMATH plans, including Mathematical Physics</td>
<td>65%</td>
<td></td>
</tr>
<tr>
<td>ACTSC plans, including Mathematical Finance</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>All other plans</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Maximum failed or excluded course units (excluding PD courses and co-op work-term courses)</td>
<td><strong>3.0 2.0</strong>*</td>
<td><strong>3.0 2.0</strong></td>
</tr>
<tr>
<td>Maximum unusable course attempts</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>Maximum allowed units of course attempts (excluding PD courses and co-op work-term courses)**</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Minimum number of full-time terms</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>English Writing Skills</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The minimum co-op work term course units for the Chartered Accountancy and Teaching plans are 2.0.
** This requirement may be waived at the discretion of the student’s academic advisor.
*** Students in Mathematical Studies plans are permitted up to 4.0 units of failed or excluded courses.
**Rationale:** More than 90% of honours graduates from the Faculty of Mathematics over the past six years have had at most 2.0 units of failure on their record when they graduate. Students who get into academic trouble usually wait until they are forced to confront their problems before getting help. If the faculty reduces the failure maximum in most of the honours mathematics plans, then students will be forced to address their academic problems two failures earlier than currently, hopefully resulting in a better success rate. By increasing the failure maximum in Mathematical Studies, the faculty gives the remaining students a plan from which to graduate, and increases their chances to graduate with an honours degree.

**Averages**

3. **Motion:** To approve the following changes to mathematics averages: a) redefine the major average for most plans; b) change the minimum major average (MAV) for all statistics plans; c) add a special major average (SMAV) for all actuarial science plans as presented below (Note: new text = **bold**; deleted text = strikethrough):

<table>
<thead>
<tr>
<th>Major/Plan</th>
<th>Averages</th>
<th>Relevant Courses</th>
<th>Minimum required average</th>
<th>Minimum courses for MAV or SMAV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Actuarial Science</strong></td>
<td>MAV</td>
<td>ACTSC 231, 232, STAT 230/240, 231/241, and all 300/400 level math courses</td>
<td>20%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SMAV</td>
<td>ACTSC 231, 232, STAT 230/240, 231/341, and all 300/400 level math courses</td>
<td>70%</td>
<td>3</td>
</tr>
<tr>
<td><strong>Applied Mathematics, Pure Mathematics, Mathematical Physics, Statistics</strong></td>
<td>MAV</td>
<td>300/400 level All math courses</td>
<td>65%</td>
<td>3</td>
</tr>
<tr>
<td><strong>Bioinformatics</strong></td>
<td>MAV</td>
<td>Same as Computer Science plans (below)</td>
<td>60%</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>SMAV</td>
<td>All BIOL courses</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td><strong>Computing and Financial Management</strong></td>
<td>MAV</td>
<td>All math courses</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SMAV</td>
<td>All courses from the Faculty of Arts</td>
<td>70%</td>
<td>3</td>
</tr>
<tr>
<td><strong>Computer Science</strong></td>
<td>MAV</td>
<td>CS 136, 138, 146, all subsequent CS major courses, as well as CS courses numbered 600 and higher, and CO 487, STAT 440, ECE 222 and 429, SE 212, 240, 382, 463, 464, and 465</td>
<td>60%</td>
<td>2</td>
</tr>
<tr>
<td><strong>Information Technology Management</strong></td>
<td>MAV</td>
<td>All 300/400 level math courses</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SMAV</td>
<td>All BUS, COMM, MSCI or STV courses</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td><strong>Mathematics/Business Administration</strong></td>
<td>MAV</td>
<td>All 300/400 level math courses</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SMAV</td>
<td>All 300/400 level math courses with subjects of AFM, BUS, COMM, ECON, HRM, MSCI, or MTHEL</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td><strong>Mathematics/Chartered Accountancy Accounting</strong></td>
<td>MAV</td>
<td>All 300/400 level math courses</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>SMAV</td>
<td>All AFM, COMM, ECON, or MSCI courses (including courses cross-listed with these labels)</td>
<td>70%</td>
<td>*</td>
</tr>
<tr>
<td><strong>Mathematical</strong></td>
<td>MAV</td>
<td>All 300/400 level math courses</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td>Major/Plan</td>
<td>Averages</td>
<td>Relevant Courses</td>
<td>Minimum required average</td>
<td>Minimum courses for MAV or SMAV</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------</td>
<td>-----------------------------------</td>
<td>--------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Economics</td>
<td>SMAV</td>
<td>All ECON courses</td>
<td>75%</td>
<td>3</td>
</tr>
<tr>
<td>Mathematical Finance</td>
<td>MAV</td>
<td>300/400 level All math courses</td>
<td>70%</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics/Financial Analysis and Risk</td>
<td>MAV</td>
<td>All 300/400 level math courses</td>
<td>60%</td>
<td>3</td>
</tr>
<tr>
<td>Management</td>
<td>SMAV</td>
<td>All courses with subjects of AFM, ACTSC, COMM, or ECON</td>
<td>70%</td>
<td>3</td>
</tr>
<tr>
<td>All plans not listed above</td>
<td>MAV</td>
<td>300/400 level All math courses</td>
<td>60%</td>
<td>3</td>
</tr>
</tbody>
</table>

*The special major average in Mathematics/Chartered Accountancy Accounting is calculated after the 1B term.

**Rationale:** The proposed changes make the major average simpler, more robust, and calculated earlier to make it easier to identify underperforming students sooner. Data shows that there is a .92 correlation between the proposed new average and the current major average for the faculty as a whole, and for each academic unit individually. Progression rules will be otherwise unaffected by the proposed changes, and some bizarre artifacts of the current major average will be eliminated by this change. Third and fourth year statistics courses are oversubscribed. The Department of Statistics and Actuarial Science wished to increase the MAV requirement to that of other mathematics plans; the math faculty recommends changing the MAV to include all math courses since ACTSC is such a large and accredited program and the faculty needs to keep control over numbers; creating a SMAV to better assess the department’s students will allow this.

**FOR INFORMATION**

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**Academic Program Review Reports**

- **Earth and Environmental Sciences; German and Slavic Studies; Management Sciences** – Please see the reports in the consent agenda from Senate Graduate & Research Council.
- **Medieval Studies** – Please see Attachment #2.
- **Peace and Conflict Studies** – Please see Attachment #3.

**CURRICULAR MODIFICATIONS**

Changes to academic plans, new courses, course changes and course inactivations were approved for the faculties of: arts (anthropology, arts, classical studies, digital arts communication, economics, fine arts, French studies, Greek, Latin, medieval studies, philosophy, political science, religious studies, speech communication); engineering (chemical engineering, mechanical engineering, nanotechnology engineering); mathematics (actuarial science, applied mathematics, mathematics, statistics); and science (biotechnology/economics, earth sciences, general science, psychology/science, science and business/earth science specialization).

/kjj Mario Coniglio
18 May 2013 Associate Vice-President, Academic
Memo

To: Senate Undergraduate Council  (For approval)

From: Nancy Weiner, Associate Registrar, Admissions

Date: May 14, 2013

Re: Undergraduate Admission Requirements for 2014

For your consideration and approval, the 2014 admission requirements:

1. Faculty of Arts - Accounting and Financial Management

   i) Current - Two entry programs:
      Accounting and Financial Management – Business and Finance Co-op
      Accounting and Financial Management – CA Co-op

   Revised - One entry program:
      Accounting and Financial Management, Co-op

   Rationale:
      Canadian accounting professions are in the midst of a unification initiative that has resulted in the new CPA (Chartered Professional Accountant) designation. In response to these changes as well as changes that have taken place over the last several years regarding accredited experience, two entry programs are no longer needed as opportunities for accredited co-op experience are expanding.

   ii) Current requirements:
      Any grade 12 U English. A final grade of at least 75% is required.
      Advanced Functions. A final grade of at least 70% is normally required.
      Calculus and Vectors. A final grade of at least 70% is normally required.

   Notes: Applicants are selected to complete the Accounting and Financial Management Admissions Assignment (AFMAA) on the basis of grade 11 final marks and any interim or final grade 12 marks available at the time the AFMAA invite selection occurs. Those selected to complete the AFMAA are invited and expected to come to the University when the Assignment is scheduled. Arrangements will be made for applicants who cannot write the AFMAA on campus. Admission is based on secondary school or any post-secondary school achievement, the results of the AFMAA, and the Admissions Information Form.

   Revised requirements:
      Any grade 12 U English. A final grade of at least 75% is required.
      Advanced Functions. A final grade of at least 75% is normally required.
      Calculus and Vectors. A final grade of at least 75% is normally required.
Note: Admission is based on secondary school or any post-secondary school achievement, the results of the AFMAA, and the Admissions Information Form.

Rationale:

A. Raising min grade required for each of the math courses:
Analysis of 1st year performance within the AFM program has shown that numeracy is critical for success. Raising the min required grade, will not only promote success within the AFM program, but also better align the min 12 U Math requirement with the min 12 U English grade requirement already established.

B. Accounting and Financial Management Admissions Assignment (AFMAA) – on campus to online delivery
The online AFMAA format would provide AFM applicants with more flexibility and convenience in completing this required component within the comfort of the applicant's home. By delivering the AFMAA as an online component, the AFM Admissions Committee would be in a better position to implement a rolling admissions strategy as well as enhance our existing conversion strategies.

2) Faculty of Environment – International Development, Regular

Current requirements and recommended courses:
Any grade 12 U English. A final grade of at least 70% is required.
At least one Grade 12 U Science or Mathematics course. A final grade of at least 70% is normally required.
Four other U or M courses

Recommended: At least one Grade 12 U course in a second language

Revised requirements and recommended courses:
Any grade 12 U English. A final grade of at least 70% is required.
Five other U or M courses

Recommended:
At least one Grade 12 U Science or Mathematics course
At least one Grade 12 U course in a second language

Rationale
The change to make the requirement of at least one Grade 12 U Science or Mathematics course to a recommended course will align the admission requirements with those of other universities offering similar programs. It will also bring international development into line with current practice across most programs in the Faculty of Environment, particularly those with which international development is closely aligned in the delivery of core and recommended courses.

3) Faculty of Mathematics – Mathematics/Chartered Accountancy Co-op

Change to program description:

Current: Mathematics/Chartered Accountancy Co-op

Revised: Mathematics/Accounting Co-op
-AND -

Faculty of Science – Biotechnology/Chartered Accountancy Co-op

Change to program description:

Current: Biotechnology/Chartered Accountancy Co-op

Revised: Biotechnology/Accounting Co-op

**Rationale**
The accounting profession in Canada is undergoing major changes. The CA designation is being replaced by the new Certified Professional Accounting (CPA) designation, and the CA and the CMAs are essentially merging. These changes are to align the plan with the new CPA body of knowledge. The name change to the generic “Accounting” is in alignment with the terminology used in the School of Accounting and Finance.

4) There are no changes for the Faculties of Applied Health Sciences or Engineering (including Software Engineering and Architecture).

5) There are no changes on this chart for Optometry, Pharmacy, or Social Work.

If you have any questions, please do not hesitate to contact me at ext. 32265 or at nweiner@uwaterloo.ca.
Ontario Secondary School Applicants presenting the Ontario High School Curriculum

Ontario secondary school (OSS) students who will be completing the Ontario high school curriculum must present the Ontario Secondary School Diploma (OSSD) including a minimum of six grade 12 U or M courses. These courses must include all required courses as specified for each program.

An overall average of 80% on the best six grade 12 courses including the required courses is normally the minimum for consideration. Higher averages are required for admission to programs in which the demand for places by qualified applicants exceeds the number of places available. The actual minimum averages required for these programs are determined each year on the basis of the number and qualifications of applicants and the number of available spaces.

In some programs, applicants may be considered for early conditional admission based on factors that include their grade 11 academic record, their grade 12 record to date, and other factors noted under "Other Documentation" in the chart.

The University reserves the right to withdraw conditional offers of admission if the applicant fails to meet the requirements specified above or any specific conditions stated on the offer of admission.
## Admission Requirements and Recommendations for Year One Programs 2014

<table>
<thead>
<tr>
<th>Faculty/Program</th>
<th>Requirements</th>
<th>Recommendations</th>
<th>Other Documentation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Undergraduate first-year entry programs:</strong></td>
<td>All required courses are OSS Grade 12 U courses unless otherwise specified and must be included in the required set of 6. Required courses are included in the calculation of the admission average.</td>
<td>Undergraduate first-year entry programs: Courses listed are OSS Grade 12 U courses unless otherwise specified and are <strong>not required for admission</strong> but are recommended because students may find this preparation useful during their university studies. Program requiring prior university studies: Requirements are as listed.</td>
<td>Information which is used in addition to course requirements is detailed below when applicable. The appropriate information will be requested when an application is acknowledged.</td>
<td></td>
</tr>
<tr>
<td><strong>Undergraduate first-year entry programs:</strong></td>
<td>Courses listed are OSS Grade 12 U courses unless otherwise specified and are <strong>not required for admission</strong> but are recommended because students may find this preparation useful during their university studies. Program requiring prior university studies: Requirements are as listed.</td>
<td>Information which is used in addition to course requirements is detailed below when applicable. The appropriate information will be requested when an application is acknowledged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Admission Information Form (AIF) is required.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Admission Information Form (AIF) is required.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Applied Health Sciences

**All Programs**

All programs require six Grade 12 U or M courses including specified courses.

**Health Promotion Regular and Co-op**

- Any Grade 12 U English
- A final grade of at least 75% is normally required.
- Additional U or M courses for a total of six.

**Health Studies Regular and Co-op**

- Biology
- Chemistry
- A final grade of at least 70% is normally required in each of the above required courses.
- Additional U or M courses for a total of six

**Kinesiology Regular and Co-op**

- Advanced Functions
- Chemistry
- One of Biology or Physics
- A final grade of at least 70% is normally required in each of the above required courses.
- Additional U or M courses for a total of six

**Recreation and Leisure Studies Regular and Co-op**

- Any Grade 12 U English
- A final grade of at least 70% is normally required.
- Additional U or M courses for a total of six

For all students:
- From Arts, Business Studies, Canadian and World Studies, Classical Studies, French as a Second Language, Interdisciplinary Studies, International Language, or Social Sciences and Humanities courses.
- For students considering the Therapeutic Recreation program:
  - Biology or Exercise Science
- For students considering the Recreation and Business program:
  - Grade 12 M Principles of Financial Accounting

Those not admitted to the co-op program are automatically considered for the corresponding regular program. Limited admission to co-op is also available in Year Two. The first co-op work term begins in Year Two.

Special consideration is given on the basis of strength in Biology and Chemistry. Those not admitted to the co-op program are automatically considered for the corresponding regular program. The first co-op work term begins in Year Two.

Special consideration is given on the basis of strength in Advanced Functions, Chemistry, and Biology or Physics. Those not admitted to the co-op program are automatically considered for the corresponding regular program. The first co-op work term begins in Year Two.

Applicants should be aware that, although this is a social science program, courses in research methods and statistics are included in the curriculum. Writing skills are important. Involvement in extracurricular activities is an important factor in admission decisions. Those not admitted to the co-op program are automatically considered for the corresponding regular program. Limited admission to co-op is also available in Year Two. The first co-op work term begins in Year Two.
## Admission Requirements and Recommendations for Year One Programs 2014

<table>
<thead>
<tr>
<th>Faculty/ Program</th>
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<th>Other Documentation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate first-year entry programs: All required courses are OSS Grade 12 U courses unless otherwise specified and must be included in the required set of 6. Required courses are included in the calculation of the admission average.</td>
<td>Undergraduate first-year entry programs: Courses listed are OSS Grade 12 U courses unless otherwise specified and are not required for admission but are recommended because students may find this preparation useful during their university studies.</td>
<td>Information which is used in addition to course requirements is detailed below when applicable. The appropriate information will be requested when an application is acknowledged.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arts (All Programs)</td>
<td>All programs require six Grade 12 U or M courses including a Grade 12 U English.</td>
<td>For Social Science programs such as Anthropology; Economics; Political Science; Psychology; Sexuality, Marriage, and Family Studies; Social Development Studies; or Sociology: • Mathematics of Data Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honours Arts Regular</td>
<td>In addition to the requirement for all Arts programs specified above, a final grade of at least 70% in any Grade 12 U English is required.</td>
<td>For Economics: Calculus and Vectors is also recommended; however, students may decide to take an introductory calculus course in first year to acquire additional background.</td>
<td>Admission Information Form (AIF) is strongly recommended.</td>
<td>Entry to General or Honours major programs, including departmental co-op, occurs following Year One, and is based on academic performance in Year One in relevant courses in the prospective major. Honours Arts Regular is offered through the University of Waterloo, Renison University College, and St. Jerome’s University.</td>
</tr>
<tr>
<td>Arts and Business Regular and Co-op</td>
<td>In addition to the requirement for all Arts programs specified above, a final grade of at least 70% in any Grade 12 U English is required.</td>
<td>• Mathematics of Data Management is strongly recommended</td>
<td>Admission Information Form (AIF) is strongly recommended.</td>
<td>Selection of the Honours major which is to be combined with Arts and Business occurs following Year One and is based on academic performance in the prospective major in Year One. Honours Arts and Business is offered through the University of Waterloo, Renison University College, and St. Jerome’s University. Those not admitted to the Co-op program are automatically considered for the corresponding Regular program.</td>
</tr>
<tr>
<td>Global Business and Digital Arts Regular</td>
<td>In addition to the requirement for all Arts programs specified above, a final grade of at least 75% in any Grade 12 U English is required.</td>
<td>• Mathematics of Data Management</td>
<td>Admission Information Form (AIF) is strongly recommended.</td>
<td></td>
</tr>
<tr>
<td>Social Development Studies Regular Renison University College</td>
<td>In addition to the requirement for all Arts programs specified above, a final grade of at least 70% in any Grade 12 U English is required.</td>
<td>• Mathematics of Data Management</td>
<td>Admission Information Form (AIF) is strongly recommended.</td>
<td>Those not admitted to Social Development Studies in Year One are automatically considered for Honours Arts Regular through Renison University College. Based on academic performance in Year One, admission to General or Honours Social Development Studies at the Year Two level is possible.</td>
</tr>
</tbody>
</table>
### Undergraduate First-Year Entry Programs

**Requirements:**
- All required courses are OSS Grade 12 U courses unless otherwise specified and must be included in the required set of 6. Required courses are included in the calculation of the admission average.

**Programs Requiring Prior University Studies:**
- Requirements are as listed.

### Arts (Continued)

#### Accounting and Financial Management
- **Business and Finance Co-op**
- **Accounting and Financial Management - CA Co-op**

#### Admission Information
- Admission Information Form (AIF) is required.

#### Other Documentation
- Information which is used in addition to course requirements is detailed below when applicable. The appropriate information will be requested when an application is acknowledged.

#### Notes
- Applicants are selected to complete the Accounting and Financial Management Admissions Assignment (AFMAA) on the basis of grade 11 final marks and any interim or final grade 12 marks available at the time the AFMAA invite selection occurs. Those selected to complete the AFMAA are invited and expected to come to the University when the assignment is scheduled. Arrangements will be made for applicants who cannot write the AFMAA on campus.

Admission is based on secondary school or any post-secondary school achievement, the results of the AFMA, and the Admission Information Form.

#### Arts and Mathematics

#### Computing and Financial Management Co-op
- Admission Information Form (AIF), which includes a teacher reference, is strongly recommended. All applicants are encouraged to write the Euclid Mathematics Contest. Applicants not currently attending an Ontario Secondary School are strongly advised to write the Euclid contest to demonstrate that they have sufficient mathematical background.
- The Canadian Computing Competition is recommended.

In addition to a strong academic background, other factors considered in the admission process include performance in contests such as the Euclid Mathematics Contest and the Canadian Computing Competition, the number and variety of courses taken, involvement in extracurricular activities in the school and/or the community, and teacher recommendations.

Those not offered admission to Computing and Financial Management may be considered for alternative programs in the Faculty of Mathematics.
### Admission Requirements and Recommendations for Year One Programs 2014

#### Engineering (Co-op)

- **Architecture Co-op**
  - English (ENG4U). A final grade of at least 75% is normally required.
  - Advanced Functions
  - Calculus and Vectors
  - Physics
  - A final grade of at least 70% is normally required in each of these courses.
  - Two other U or M courses

- **Chemical Civil Computer Electrical Environmental Geological Management Mechanical Mechatronics Nanotechnology Systems Design Co-op**
  - Advanced Functions
  - Calculus and Vectors
  - Chemistry
  - English (ENG4U)
  - Physics
  - A final grade of at least 70% is normally required in each of these courses.
  - One other U or M course

- **Engineering and Mathematics Software Engineering Co-op**
  - Advanced Functions
  - Calculus and Vectors
  - Chemistry
  - English (ENG4U)
  - Physics
  - A final grade of at least 70% is normally required in each of these courses.
  - One other U or M course

### Notes

- Applicants are selected for the interview on the basis of grade 11 marks and any interim or final OSS grade 12 marks available at the time interview selection occurs. Those selected for an interview are expected to come to the University. Admission is based on the results of the interview, the portfolio, the English précis-writing exercise, and secondary school achievement.

- In addition to a strong academic background, other factors which will be considered in the admissions process include involvement in extracurricular activities in school and/or in the community; evidence of an interest in engineering; and strong performance in mathematics, science, or engineering-related competitions. Those not offered admission to their first-choice program may be considered for other engineering programs that they specify on the Admission Information Form.

- In addition to a strong academic background, other factors which will be considered in the admissions process include involvement in extracurricular activities in school and/or in the community; evidence of interest in software engineering, additional OSS Grade 12 courses; and participation in mathematics, science, engineering, or programming competitions. All applicants are encouraged to write the Euclid Mathematics Contest. Those not offered admission to Software Engineering may be considered for alternate engineering programs or for computer science; applicants specify their preferences for alternate programs on their Admission Information Form.
## Admission Requirements and Recommendations for Year One Programs 2014

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### Environment

**Environment and Business Co-op**
- Any Grade 12 U English. A final grade of at least 70% is normally required.
- Five other U or M courses
- One Grade 12 U Mathematics
- One Grade 12 U Science
- Grade 12 M Principles of Financial Accounting
- Analysing Current Economics Issues (where offered)

**Admission Information Form (AIF)**
- Those not admitted to Honours Environment and Business Co-op are automatically considered for Honours Geography and Environmental Management. The first co-op work term begins in Year Two.

### Environment and Resource Studies Regular and Co-op

- Any Grade 12 U English. A final grade of at least 70% is normally required.
- Five other U or M courses
- At least one Grade 12 U or M course from each of
  - Canadian and World Studies or Social Sciences and Humanities or the Arts
  - Mathematics or Science

**Admission Information Form (AIF)**
- In accordance with the trans-disciplinary nature of ERS, we value flexibility and breadth of learning and experience.
- Those not admitted to the co-op program are automatically considered for the corresponding regular program.
- Limited admission to co-op is also available in Year Two. The first co-op work term begins in Year Two.

### Geography and Aviation Regular

- Any Grade 12 U English. A final grade of at least 70% is normally required.
- A Grade 12 U Mathematics. A final grade of at least 70% is required.
- Four other U or M courses
- One or more Grade 12 U or M Geography courses are strongly recommended.
- A second Grade 12 U Mathematics
- Earth and Space Science

**Admission Information Form (AIF)**
- Program Briefing Session
- Transport Canada Category 1 Medical Certification
- Those not admitted to Honours Geography and Aviation are automatically considered for Honours Geomatics Regular.

### Geography and Environmental Management Regular and Co-op

- Any Grade 12 U English. A final grade of at least 70% is normally required.
- Five other U or M courses
- One or more Grade 12 U or M Geography courses are strongly recommended.
- A Grade 12 U Mathematics
- Earth and Space Science

**Admission Information Form (AIF)**
- Those not admitted to the co-op program are automatically considered for the corresponding regular program.
- Limited admission to co-op is also available in Year Two. The first co-op work term begins in Year Two.
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<td>Environment (cont’d)</td>
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<tr>
<td>Geomatics Regular and Co-op</td>
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<td>Admission Information Form (AIF)</td>
<td>Those not admitted to the co-op program are automatically considered for the corresponding regular program. Limited admission to co-op is also available in Year Two. The first co-op work term begins in Year Two.</td>
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<tr>
<td>International Development Regular</td>
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<td>Admission Information Form (AIF) is required.</td>
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<tr>
<td>Knowledge Integration Regular</td>
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<td>Admission Information Form (AIF) is required.</td>
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<tr>
<td>Planning Co-op</td>
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### Mathematics

| Mathematics/Accounting | Co-op, Mathematics/Computer Science, Co-op, Mathematics/Financial Analysis and Risk Management, Co-op, Business Administration and Mathematics Co-op, Business Administration and Computer Science Double Degree Co-op | • Advanced Functions | Admission Information Form (AIF) which includes a teacher reference. The AIF is required for Math/Accounting, Math/Business Admin., Math/Financial Analysis and Risk Mgmt, Business Admin/Math, Double Degree. For all other programs, the AIF is strongly recommended, especially for co-op programs. All applicants are encouraged to write the Euclid Mathematics Contest. Applicants not currently attending an Ontario Secondary School are strongly advised to write the Euclid Contest to demonstrate that they have sufficient mathematical background. For those applying to Bioinformatics, Computer Science, Business Administration and Computer Science Double Degree, the Canadian Computing Competition is recommended. | All Mathematics programs are offered through the University of Waterloo and St. Jerome's University. The decision to register at St. Jerome's occurs after admission. In addition to a strong academic background, other factors considered in the admissions process include performance in contests such as the Euclid Mathematics Contest and the Canadian Computing Competition, the number and variety of courses taken, involvement in extracurricular activities in the school and/or the community, and teacher recommendations. Those not offered admission to their first choice program will be considered for other Mathematics programs. The Faculty administers the English Language for Academic Studies program for those with exceptional mathematics skills who do not meet normal English language requirements. Admission to the Mathematics/Teaching Co-op program occurs in Year Two after successful completion of Year One in either Honours Co-op Computer Science or Honours Co-op Mathematics. Honours Business Administration and Mathematics Co-op is a double degree program offered jointly by Wilfrid Laurier University and Waterloo leading to BBA and BMath degrees. Honours Business Administration and Computer Science Co-op is a double degree program offered jointly by Wilfrid Laurier University and Waterloo leading to BBA and BCS degrees. |

| Computer Science Regular and Co-op | Mathematics Regular and Co-op | • Calculus and Vectors | | |
| Mathematics Regular and Co-op | • University of Waterloo and St. Jerome's University. The decision to register at St. Jerome's occurs after admission. In addition to a strong academic background, other factors considered in the admissions process include performance in contests such as the Euclid Mathematics Contest and the Canadian Computing Competition, the number and variety of courses taken, involvement in extracurricular activities in the school and/or the community, and teacher recommendations. Those not offered admission to their first choice program will be considered for other Mathematics programs. The Faculty administers the English Language for Academic Studies program for those with exceptional mathematics skills who do not meet normal English language requirements. Admission to the Mathematics/Teaching Co-op program occurs in Year Two after successful completion of Year One in either Honours Co-op Computer Science or Honours Co-op Mathematics. Honours Business Administration and Mathematics Co-op is a double degree program offered jointly by Wilfrid Laurier University and Waterloo leading to BBA and BMath degrees. Honours Business Administration and Computer Science Co-op is a double degree program offered jointly by Wilfrid Laurier University and Waterloo leading to BBA and BCS degrees. |

| **Mathematics/Accounting** | Co-op, Mathematics/Computer Science, Co-op, Mathematics/Financial Analysis and Risk Management, Co-op, Business Administration and Mathematics Co-op, Business Administration and Computer Science Double Degree Co-op | • Any Grade 12 U English | | |
| Co-op, Mathematics/Computer Science, Co-op, Mathematics/Financial Analysis and Risk Management, Co-op, Business Administration and Mathematics Co-op, Business Administration and Computer Science Double Degree Co-op | • University of Waterloo and St. Jerome's University. The decision to register at St. Jerome's occurs after admission. In addition to a strong academic background, other factors considered in the admissions process include performance in contests such as the Euclid Mathematics Contest and the Canadian Computing Competition, the number and variety of courses taken, involvement in extracurricular activities in the school and/or the community, and teacher recommendations. Those not offered admission to their first choice program will be considered for other Mathematics programs. The Faculty administers the English Language for Academic Studies program for those with exceptional mathematics skills who do not meet normal English language requirements. Admission to the Mathematics/Teaching Co-op program occurs in Year Two after successful completion of Year One in either Honours Co-op Computer Science or Honours Co-op Mathematics. Honours Business Administration and Mathematics Co-op is a double degree program offered jointly by Wilfrid Laurier University and Waterloo leading to BBA and BMath degrees. Honours Business Administration and Computer Science Co-op is a double degree program offered jointly by Wilfrid Laurier University and Waterloo leading to BBA and BCS degrees. |

| Computer Science Regular and Co-op | Mathematics Regular and Co-op | • One other Grade 12 U course. | | |
| Mathematics Regular and Co-op | • University of Waterloo and St. Jerome's University. The decision to register at St. Jerome's occurs after admission. In addition to a strong academic background, other factors considered in the admissions process include performance in contests such as the Euclid Mathematics Contest and the Canadian Computing Competition, the number and variety of courses taken, involvement in extracurricular activities in the school and/or the community, and teacher recommendations. Those not offered admission to their first choice program will be considered for other Mathematics programs. The Faculty administers the English Language for Academic Studies program for those with exceptional mathematics skills who do not meet normal English language requirements. Admission to the Mathematics/Teaching Co-op program occurs in Year Two after successful completion of Year One in either Honours Co-op Computer Science or Honours Co-op Mathematics. Honours Business Administration and Mathematics Co-op is a double degree program offered jointly by Wilfrid Laurier University and Waterloo leading to BBA and BMath degrees. Honours Business Administration and Computer Science Co-op is a double degree program offered jointly by Wilfrid Laurier University and Waterloo leading to BBA and BCS degrees. |

| Computer Science Regular and Co-op | Mathematics Regular and Co-op | • Two other U or M courses. | | |
### Admission Requirements and Recommendations for Year One Programs 2014

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<td><strong>Science</strong></td>
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<tr>
<td>Biotechnology/Accounting Co-op</td>
<td>Six Grade 12 U or M courses including</td>
<td>● Biology&lt;br● Chemistry&lt;br● Grade 12 M Principles of Financial Accounting</td>
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<tr>
<td>Biotechnology/Economics Co-op</td>
<td>● Any Grade 12 U English.&lt;br● Advanced Functions&lt;br● Calculus and Vectors</td>
<td>● Biology&lt;br● Chemistry&lt;br● Earth and Space Science&lt;br● Physics</td>
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</tr>
<tr>
<td>Honours Science Regular</td>
<td>A final grade of at least 70% is normally required in each of these courses.</td>
<td>● Chemistry&lt;br● Earth and Space Science&lt;br● Physics</td>
<td>Admission Information Form (AIF) is strongly recommended.</td>
<td>Where an entry program is available in both co-op and regular, those not admitted to co-op are automatically considered for the corresponding regular program.</td>
</tr>
<tr>
<td>Environmental Science Regular and Co-op</td>
<td></td>
<td>● Chemistry&lt;br● Earth and Space Science&lt;br● Physics</td>
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<td>In some programs, limited admission to co-op is possible in Year Two.</td>
</tr>
<tr>
<td>Life Sciences Regular and Co-op</td>
<td>Two of● Biology</td>
<td>● Biology&lt;br● Chemistry&lt;br● Physics</td>
<td></td>
<td>The first co-op work term begins in Year Two for all Faculty of Science students.</td>
</tr>
<tr>
<td>Physical Sciences Regular and Co-op</td>
<td>● Chemistry&lt;br● Earth and Space Science&lt;br● Mathematics of Data Management&lt;br● Physics</td>
<td>● Chemistry&lt;br● Earth and Space Science&lt;br● Physics</td>
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<tr>
<td>Science and Aviation Regular</td>
<td>One additional U or M course.</td>
<td>● Chemistry&lt;br● Earth and Space Science&lt;br● Physics</td>
<td>Admission Information Form (AIF) is strongly recommended.</td>
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</tr>
<tr>
<td>Science and Business Regular and Co-op (All specializations)</td>
<td></td>
<td>● Chemistry&lt;br● Grade 12 M International Business Fundamentals</td>
<td>Admission Information Form (AIF) is strongly recommended.</td>
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</tr>
<tr>
<td>Optometry Regular</td>
<td>Successful completion of at least three full years of university-level science with specific course requirements.</td>
<td>● Optometry Admissions Test (OAT)&lt;br● Autobiographical Sketch&lt;br● Essay&lt;br● Optometrist and Academic References</td>
<td></td>
<td>Please refer to the School of Optometry website regarding required and recommended university-level courses.</td>
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**Pharmacy Co-op**

- Successful completion of at least two full years of university-level science with specific course requirements.

**Independent Studies**

- Successful completion of at least one full year of university undergraduate with an overall university average of C (65%) or a minimum two years of community college studies with an overall average of B (75%) and a minimum of 70% in Grade 12 U English (or equivalent) is required.

**Social Work - Regular Renison University College**

- Successful completion of either a three-year or a four-year undergraduate university degree with a B average and at least 6.0 units in the social sciences, including 10 specified courses from the Renison curriculum or their equivalents.

**Social Work**

- Letter of reference and personal statement which demonstrates sufficient practical experience and personal suitability are required.

Please refer to the Social Work website regarding required university-level courses.
Final Assessment Report of the Medieval Studies program (BA)
May 2013

Previous review and review process
This was the second formal review of the Medieval Studies (BA) program. The first review was in 2003 as part of the program review of the Department of Classical Studies. The program was also included in the Department’s two-year progress report issue in 2006. The Medieval Studies program is housed jointly within the Department of Classical Studies at the University of Waterloo (UW) and the History Department at the St Jerome’s University (SJU). Co-directors of the program are housed in each of the above departments.

The self-study was a group effort involving the program’s co-directors, students, faculty, staff, and alumni. The self-study was submitted July 4, 2011; the site visit occurred January 12-13, 2012; the review team’s report was received January 20, 2012; and the program’s response, Dean of Arts’ approval and Academic Dean of St. Jerome’s University’s approval were received May 1, 2013.

Characteristics of the Program

Historical Review
The Medieval Studies program, UW’s oldest interdisciplinary program and the oldest medieval Studies program in Canada, was established in 1967. Although the program is jointly administered, it is supported by many academic units spread over UW, SJU and Conrad Grebel University College (CGUC). Departments involved are Classical Studies, English, Fine Arts, French Studies, Germanic and Slavic Studies, History, Italian Studies, Music, Philosophy, Religious Studies, and Spanish and Latin American Studies. The review team considered Medieval Studies to be a “high quality niche program”.

Program Objectives
Medieval Studies looks at the ideas and events from the fall of the Roman Empire to the beginning of the modern era (i.e. between about 500 and 1,500 CE). This interdisciplinary field of study seeks to unite knowledge from different disciplines, explain new areas of study and revisit neglected topics. The reviewers were of the opinion that “while the necessarily complicated institutional framework can introduce headaches for the co-directors, instructors, and students, the benefits far outweigh the drawbacks”.

The undergraduate Medieval Studies program shares the following set of goals:

- to give students significant knowledge about the medieval world and its modern legacy
- to expose students to the history, languages, and cultures of medieval Europe
- to educate students in primary source research, analysis, and criticism
- to grapple with how modern societies construe and construct the distant past, filter knowledge of it, and draw meaning from it
- to enhance students’ written and oral communication skills
- to train independent researchers and problem solvers
- to foster in students open and inquisitive minds
- to nurture critical thinkers and engaged citizens

**Academic Plans Offered**

- Three-year General BA in Medieval Studies;
- Four-year General BA in Medieval Studies;
- Honours BA in Medieval Studies;
- Honours BA in Medieval Studies (Arts and Business, co-op and regular).

Relative to nine other Medieval Studies programs in Canada, UW has the fewest number of mandatory courses – MEDVL 105 and 206.

The program and courses align well with the OCAV UDLEs. Certain gaps that need strengthening were identified. These are: more focus on methodologies, application of knowledge, oral presentations, and group work.

**Students**

Medieval Studies, like most programs in the Faculty of Arts, is a second entry program. Over the period 2004/05 to 2011/11 inclusive, an annual average of four students entered the program. The high was 7 students in 2008/09 and the low was the next year with two students. The co-op Arts and Business program in Medieval Studies has historically attracted few students. However, the review team suggested that it be maintained for the small number of students who wish to pursue this degree and to work out on an *ad hoc* basis accommodation of their needs.

The entrance grades from high school for students enrolled in the Medieval Studies program is in the range of 80 to 85% for General students and 75 to 95% for Honours students. On average, Honours students account for two-thirds of those entering the program.

The annual average enrolment in Medieval Studies, from 2004/05 to 2010/11 inclusive, has been 43 students with a high of 49 in 2006/07 to a low of 31 in 2004/05.
Students take most of their courses in other departments, mostly in Classical Studies, History, and English with average annual enrolments of Medieval Studies students of 187, 138, and 62 respectively. Nine other departments attract annual enrolments in total of 158 Medieval Studies students. It would appear that the great majority of contributing departments to Medieval Studies are only peripherally involved in the training of Medieval Studies students.

Medieval Studies courses, MEDVL 105, 205, 260, and 304, had class limits of 104, 60, 40, and 35, respectively, for the academic year 2010/11.

To sustain and enhance student engagement and quality, the program encourages students to explore opportunities for a study abroad. In addition, each year several students attend the Congress on Medieval Studies, hosted by Western Michigan University in Kalamazoo.

Most students graduate from the program within five years. From 2003 to 2010 inclusive, 24 students graduated with a degree in Medieval Studies - 62.5% with an Honours designation. Only one student has graduated from the Arts and Business program in Medieval Studies in the last seven years. The per cent of students on the Dean’s Honours List varies from year to year. In 2006 it was zero while in 2004, 2005, and 2010 it was 50%.

Skills imparted to students in Medieval Studies include: oral and written communication, research ability, critical thinking, analysis and problem solving, and the ability to apply these skills to new domains outside the discipline.

Today, individuals with a degree in Medieval Studies from UW are employed in the following fields: journalism, software development, human resources management, and library and information science.

**Faculty**

There are no positions solely dedicated to the Medieval Studies program. The Medieval Studies program is made possible by the collaboration of numerous colleagues actively involved in teaching classes related to the program -- six full professors, 19 associate professors and three assistant professors, spread over eight departments at UW, four departments at SJU and two departments at CGUC. All contributing faculty members are evaluated by their home departments.

The co-directors, between 2003 and 2011 inclusive, published 11 refereed articles or book chapters, six book reviews, 30 conference presentations and have garnered $85,500 from seven research grants including SSHRC and the Canada Foundation for Innovation. The average quality of teaching by the co-directors, 4 to 4.5 out of a possible 5, lies well above the average for either the Faculty of Arts or SJU. This observation is consonant with the nomination in 2010 of
one co-directors and the award to the other of UW’s Distinguished Teacher Award in 2011. Both co-directors have been involved in external reviews and are involved as elected officials in the Canadian Historical Association, the Canadian Society of Medievalists, and Societas Magica.

Concerns and opportunities for improvement (program perspective)
The self-study articulate several goals for the program:

- the hiring an historian of Science -- a need recognized by department heads and the Deans of Arts -- and hiring of an expert in the origins and spread of Islam
- further encouraging opportunities for experiential learning for the program’s undergraduates (e.g., Medieval Studies Congress, International Student Exchange Program, special guest lectures)
- facilitating the process of searching for availability of suitable program electives
- making HIST 402A and HIST 402B (Medieval Europe) capstone courses for obtaining the Honours degree, as well as other curricular changes
- acquiring a dedicated reading room in a new SJU facility and dedicated administrative support for the program.

External reviewers’ recommendations and program response
The review team wrote:

“Both the University of Waterloo and St Jerome’s University, along with the Department of Classics, can be assured that their modest investments of time and resources are paying dividends in terms of high quality education, excellent learning outcomes, and student satisfaction. Our recommendations would only serve to strengthen what is already and strong program.”

A series of 12 recommendations were made.

Recommendation 1: That the list of courses available for the program be pruned to remove those courses that have not been offered for several years or no longer have sufficient medieval content.

Program response: This recommendation is entirely reasonable and was included on the “to-do” list in our own self-study report. The co-directors have already begun to act on it.

The recent move to create required introductory courses for the program with the MDVL designation is applauded. The reviewers encouraged the development of a similar senior course to bookend the learning experience for students and to reinforce esprit de corps among the cohort.
Following from the above, the reviewers recommended:

**Recommendation 2:** That a required capstone course at the 400-level be developed.

Program response: This recommendation is an excellent one that we had also mentioned in our own self-study report. We will propose making HIST 402A/B capstones.

The reviewers further suggested the more flexibility in the program may be introduced by the creation of MDVL special topic courses, in order to fill out lacunae in the program from year to year to take account of leaves, etc. Therefore they recommended:

**Recommendation 3:** That “Topics in Medieval Studies” at the various levels (MDVL 29X, MDVL 39X, and MDVL 49X) be created.

Program response: This recommendation is excellent and will allow the program co-directors greater flexibility in offering special topics courses to interested students. It will also give Medieval Studies majors greater flexibility in meeting program requirements.

The Medieval Studies program is minimally resourced in terms of human, physical, and financial resources. The review team recommended:

**Recommendation 4:** That both co-directors be given some course release, commensurate with the administrative work this program involves, e.g. the remission of a course every third year.

Program response: This recommendation cites what was already current practice at SJU for the co-director based there. On the UW side, the Dean of Arts in coordination with the co-director based in Classical Studies has agreed that a research account for the Medieval Studies program be established to the value of 1/3 of a course release per annum in lieu of actual reduced teaching loads. This recommendation has already been implemented.

The reviewers were of the opinion that the program would benefit immeasurably from the provision of sessional stipends to cover sabbatical leaves and to add richness and diversity to the curriculum. Therefore they recommended:

**Recommendation 5:** That Medieval Studies be provided with two or three sessional stipends annually for program courses.

Program response: This recommendation is very desirable as it would give the co-directors some leverage with the host departments at whose mercy this interdisciplinary program operates. If the co-directors identify a need for a course to be taught, this recommendation
allows them to approach chairs in host departments to negotiate offering that course. At SJU, the dean has committed funding for two sessional stipends per budget year. This funding will be used for the first time in January 2013 to appoint a sessional instructor to teach two courses. At UW, the dean indicated that it may not be possible due to funding constraints.

Medieval Studies students have a shared space with the Classics students in the Classics reading room and lounge. There is no corresponding space at St. Jerome’s. The review team recommended:

**Recommendation 6:** That a space be assigned for the use of Medieval Studies students at St. Jerome’s University.

Program response: The Dean of SJU has indicated that, while space is limited, he will work with us to investigate whether a space might be located for Medieval Studies students.

The reviewers considered that the program is well supported by the Classical Studies Department. They consider that it would be helpful for some administrative support was also available from St. Jerome’s. The review team recommended:

**Recommendation 7:** That Medieval Studies be assigned administrative support at St. Jerome’s University.

Program response: The Dean of SJU has agreed to make limited dedicated administrative support available.

The review team was informed that the University’s database system could not generate lists of Medieval Studies students. The review team recommended:

**Recommendation 8:** That the student data management system be amended so that Medieval Studies students can be tracked.

Program response: This is an essential recommendation that requires coordination with the Undergraduate Office and the Registrar’s office. The Dean of Arts has assured the co-directors that it is possible and UW has begun the implementation of the modification in Fall of 2012.

The webpage for Medieval Studies is text-heavy, and may not be appealing to first-year students considering their options. The review team recommended:

**Recommendation 9:** That the broader expertise within the University in web design be tapped to work with the co-directors to redevelop the website.
Program response: This is another good recommendation that fits well with our desire to continue to raise the program’s profile. Discussions with Graphics Services and Arts Undergraduate Recruitment have begun in the Fall term of 2012.

The review team is of the opinion that Medieval Studies attracts a unique student body and that the program will succeed best as a focused specialist program, and thus the co-directors should avoid attempts to expend for the sake of expansion. However, a few program entrance scholarships could help increase enrolment. The review team recommended:

**Recommendation 10:** That efforts be made by the Faculty of Arts and St. Jerome’s to enhance scholarships and awards available to students in Medieval Studies through their respective Advancement Offices.

Program response: Donor gifts are the best way to maintain Medieval Studies student awards and prizes. Although we have benefitted from the generosity of emeritus faculty, we recognize that more efforts could be deployed to harness the 40+ years of alumni from the program (which has been in existence since 1967 – the oldest program of its kind in the country). Discussions with Advancement have begun in the Fall term of 2012.

The review team is of the opinion that an advisory committee for the program would enhance communication between core faculty members and Medieval Studies and would serve to raise the profile of the program across campus. Therefore the team recommended:

**Recommendation 11:** That a Medieval Studies Advisory Committee be formed, comprising members of relevant departments with a strong interest in Medieval Studies.

Program response: Discussions have already been initiated, and the first meeting of a Medieval Studies Advisory Committee has held its first coordinating meeting in the Fall term of 2012.

There are unique challenges for a program that relies on other departments to mount most of its curriculum. It is critical that there be consistent communication regarding course offerings and about curricular changes in contributing departments that affect the program. Medieval Studies has representation on the Faculty of Arts Undergraduate Affairs group; it would also, in the opinion of the review team, be helpful for the program to have representation on St. Jerome’s University Academic Committee. Therefore the review team recommended:

**Recommendation 12:** That the Medieval Studies program has a seat on the St. Jerome’s University Academic Committee.
Program response: The Dean of SJU is aware of this request and has promised to consider it as he assesses the Academic Committee’s role in relation to the newly-formed SJU Senate Committee.

In order to implement all of the recommendations, UW and SJU have committed the following:

1. SJU has allocated an annual operating budget of $19,450 to cover the annual lecture series, receptions, and student travel grants for conferences and study abroad opportunities, and two full sessional stipends. SJU, moreover, releases its co-director from teaching one course every three years, and pays him one-half a sessional stipend once in three years.

2. The Dean of Arts at UW has committed to giving an annual research stipend to the UW co-director of equivalent value to one course release every three years. Also, $1,000 will be allocated for students to participate on the annual trip to the Medieval Congress in Kalamazoo, MI and $500 for promotional materials for the program.

Implementation strategy with timelines, responsibilities and resources required

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Recommendations</th>
<th>Responsibility</th>
<th>Resources Required</th>
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<tbody>
<tr>
<td>Ongoing</td>
<td>1 That the list of courses available for the program be pruned to remove courses</td>
<td>co-directors</td>
<td>Admin support</td>
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<td></td>
<td>that have not been offered for several years or no longer have sufficient</td>
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<td>medieval content.</td>
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<tr>
<td>Ongoing</td>
<td>2 That a required capstone course at the 400-level be developed.</td>
<td>co-directors</td>
<td>Admin support</td>
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<tr>
<td>Ongoing</td>
<td>3 That &quot;Topics in Medieval Studies&quot; at the various levels (MDVL 29X, MDVL 39X,</td>
<td>co-directors</td>
<td>Admin support</td>
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<td></td>
<td>and MDVL 49X) be created.</td>
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<tr>
<td>Implemented</td>
<td>4 That both co-directors be given some course release, commensurate with the</td>
<td>• Arts dean</td>
<td>Establish research account to the value of 1/3 of a course release per annum in lieu</td>
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<td></td>
<td>administrative work this program involves, e.g. the remission of a course</td>
<td>• co-director (CS(^1))</td>
<td>of actual reduced teaching loads</td>
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<td></td>
<td>every third year.</td>
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<tr>
<td>Implemented</td>
<td>5 That Medieval Studies be provided with two sessional stipends annually for</td>
<td>• co-directors</td>
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<td></td>
<td>program courses at SJU.</td>
<td>• chairs</td>
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\(^1\) Classical Studies
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<tr>
<th>Year</th>
<th>Number</th>
<th>Proposal</th>
<th>Responsible Party</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>2013-2014</td>
<td>5.1</td>
<td>That UW matches the two sessional stipends provided by SJU for Medieval Studies.</td>
<td>Arts dean</td>
<td>Funding for additional sessional positions</td>
</tr>
<tr>
<td>Ongoing</td>
<td>6</td>
<td>That a space be assigned for the use of Medieval Studies students at St. Jerome's University.</td>
<td>SJU dean</td>
<td>Space availability</td>
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<tr>
<td>Implemented</td>
<td>7</td>
<td>That Medieval Studies be assigned administrative support at St. Jerome's University.</td>
<td>SJU dean</td>
<td></td>
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</tbody>
</table>
| Ongoing    | 8      | That the student data management system be amended so that Medieval Studies students can be tracked. | • Undergraduate Office  
• Registrar’s Office  
• Arts dean        | Time from people in the Registrar’s Office  |
| Ongoing    | 9      | That the broader expertise within the University in web design be tapped to work with the co-directors to redevelop the website. | • co-directors,  
• Graphics Services  
• Arts Undergrad Recruitment |                                                 |
| Ongoing    | 10     | That efforts be made by the Faculty of Arts and St. Jerome's to enhance scholarships and awards available to students in Medieval Studies through the respective Advancement offices. | • co-directors  
• UW and SJU advancement offices |                                                 |
| Ongoing    | 11     | That a Medieval Studies Advisory Committee be formed; made up of members of relevant departments (e.g. Classics, History, English, Philosophy, Études Françaises) with a strong interest in medieval studies. | co-directors       |                                                 |
| 2013-2014  | 12     | That the Medieval Studies program have a seat on the St. Jerome's University Academic Committee. | SJU dean          |                                                 |

Review Process
This was the second program review of the Peace and Conflict Studies (PACS) programs. The first review was in 2005, just prior to the program launch of the BA in PACS. The first review resulted in 21 recommendations covering issues in: administration and internal governance (3); program coherence and curriculum (6); field studies and applied opportunities (1); program profile at the University of Waterloo (UW) and beyond (5); and others (6). All the recommendations have been discussed and many have been acted upon. Three have not been actively pursued: possible partnership with the Department of English; possible sequencing of grouping of courses into emphases; and consideration of other means of differentiating Four Year General students from Honours students other than their terminal grades.

The present self-study, organized by the Director and his administrative assistant, but involving all PACS faculty members together with student input via focus groups and surveys as well as the results of an alumni survey, was completed in July, 2012. The site visit was conducted November 12-13, 2012; the review team report was submitted January 16, 2013. The responses and implementation plan from the Acting Director of PACS, the Academic Dean (Conrad Grebel University College [CGUC]) were received April 11, 2013. The responses are embedded in the text where appropriate; an implementation strategy with timelines, responsibilities and resource needs assessment is found at the end of this report.

Characteristics of the Program

Historical overview and distinctiveness
In 1970, Conrad Grebel University College (CGUC) began offering courses related to peace studies. In 1977, UW approved the Peace and Conflict Studies program. This was the first peace studies program at a Canadian University and was initially offered as an undergraduate Minor, a General degree, and an Honours Option. In fall 2005, the BA major plans in PACS were added. Today, students can pursue PACS as an Honours degree, a Three- or Four-Year General degree, as a Joint Honours degree and as a Minor. Students can combine PACS with cooperative education through the Arts and Business stream. In fall 2011, a Master degree in PACS was approved and the first cohort of students enrolled in Fall 2012.

The PACS program compares very well to other similar programs in Ontario and Canada. It offers a wide variety of PACS courses and approved courses that is adequate for student needs, and which accomplish the objectives of the program. PACS is different from what could be seen as the most similar other large Canadian program, the Conflict Resolution Studies Program offered at the University of Winnipeg by Menno Simons College, in that PACS has a broader mandate than conflict resolution. Instead, PACS seeks to educate students about how peace principles can contribute towards the development of a peaceful world in a way that is applicable to most every discipline, most every vocation, and most every avocation. Based on this understanding of the definition of peace studies, it is reasonable to suggest that PACS would be the
strongest undergraduate peace studies program in Canada. It compares well to similar programs internationally in terms of core courses offered, students enrolled, and breadth of topical coverage as evidenced by the number of departments genuinely contributing courses to the program.

**Program Objectives**

The PACS program is a collaborative venture between CGUC and UW for which CGUC has assumed administrative responsibility. Within the parameters of the mission of CGUC (“to seek wisdom, nurture faith, and pursue justice and peace in service to church and society.”) PACS’ mission is the following:

“In a manner consistent with Mennonite Anabaptist beliefs, the mission of PACS is to educate students to pursue peace and justice in the context of diverse investigations into the origins and nature of conflict and violence. The program strives to educate, invigorate and mobilize students to make use of conceptual and/or practical models to imagine and build a culture of peace between individuals, in our communities, among nations and around the world.”

Furthermore, the purpose of the PACS program is to explore why conflict and violence occurs, and to understand how conflict can be transformed by "collaborative decision-making" to accomplish constructive ends.

In the opinion of the review team the PACS program clearly is in alignment with these goals and serves as an excellent example of a church-sponsored affiliated college bringing to UW a unique contribution arising from the college’s traditions.

Within this mission and purpose PACS has 10 learning objectives that provide day-to-day guidance. These are:

1. Support the development of a broad cohort of peace workers.
2. Analyze the peace and conflict aspects of relationships, intangible structures of society and political choices.
3. Apply peace theory to interpersonal, inter-group and international relationships with specific emphasis on working through civil society.
4. Explore individual philosophical, ethical, or spiritual motivations for engagement as responsible citizens and agents of change.
5. Understand the potential that all key actors in society have to contribute toward building a culture of peace and justice in the world.
6. Identify the vision and leadership needed by society to shape and influence just and peaceful responses to conflict issues.
7. Promote an ethic of engagement in peace and conflict issues.
8. Harness conflict’s potential as a force for creative, just, and peaceful social change.
9. Effectively carry out research into issues of peace and conflict with a goal to developing responsive programming.
10. Demonstrate a theoretical and practical understanding of the holistic nature of a culture of peace.

The reviewers indicate that the learning objectives appear implemented through appropriate teaching strategies and assessments.
Academic Programs Offered

PACS is an interdisciplinary program that requires a combination of PACS core courses (currently PACS offers three 200-level courses; 22 300-level courses; and two 400-level courses) and PACS approved courses (which normally include 50% content related to a PACS theme) from other disciplines and programs at UW. The reviewers agree that the PACS curriculum is one of the most comprehensive in北美, providing a mix of skills, theoretical courses and applications through field experience.

The following plans are offered:

- Three-Year General BA
- Four-Year General BA
- Honours BA
- Honours (Arts and Business [Co-op and Regular]) BA
- Joint Honours BA with X Department
- Minor
- Option
- Diploma
- Certificate with three concentrations

In addition, PACS courses are highly valued by other departments as evidenced by the PACS courses that are included in the curricula of other disciplinary plans.

Students

PACS is a second year entry program. Students enroll in the Faculty of Arts for their first year.

Over the period 2005 to 2011 inclusive, 127 students enrolled in PACS; an average of 18 each year. The annual entry to regular plans varied from two in 2005 to a high of 29 in 2010. For those seeking the co-op stream over the same time period, the annual average number of students was four, ranging from a low of two in 2006 to eight in 2010.

The majority of students who enrolled in the regular stream entered with a high school average between 80 and 89%. The average entry grade was slightly higher for those in the co-op stream – and ranged between 85 and 89%. Most of the students who have entered the program since 2005 were Canadian (96%).

Overall the total enrolment in PACS courses has increased from 783 to 1,287 between 2005/2006 and 2011/2012 inclusive, an increase of 64%. Enrolment in the three 200-level courses increased from 508 in 2005/2006 to 896 in 2011/2012. Interestingly, although the overall enrolment trend for enrolment in PACS 201 is up, the trend of the on-campus and the online versions of PACS 201 is inconsistent – with enrolment for one rising while the other one falls. Total enrolment in 300-level courses from 2005/2006 to 2011/2012 inclusive, has risen from 267 to 367. A similar trend is also noticeable for the 400-level courses where enrollments have increased from eight students in 2005/2006 to 35 in 2010/2011.

Students evaluate PACS highly, especially affirming the practical application of peace theory. A strong majority of students (88%) surveyed cited learning practical skills as being very important or important. Small class size at the upper level was highly appreciated. The diversity of student interests was seen as an
advantage because it facilitates student exposure to new perspectives and ideas. The vast majority of students report that the academic quality of the program meets or exceeds their expectations. The primary concern reported by students relates to scheduling (too many three-hour block courses) and availability (difficult to get into some courses due to high demand). The philosophical approach of PACS is highly affirmed. Although students expressed strong appreciation for what they are learning, there is a clear need, based on student input and the reviewers’ consideration of the curriculum, to revisit the arrangement and sequencing of specific courses in the current curriculum especially since the structure of the curriculum emerged in the years that PACS was only offered as a Minor or Option, and this basic structure was retained and used for the various Bachelor’s degrees that are now offered.

There are no PACS-numbered courses offered at the first year level. As was recommended in the 2005 program review, the review team re-recommends introducing a PACS core course in the first year of the university curriculum. Offering one or more first-year courses would serve two purposes:

- It would increase visibility of the PACS program among first-year students. As is common with many newer interdisciplinary programs, students often complain that they do not learn about the existence of the program until they are in their second or third year or study.
- It would allow introductory courses to be taught as introductory courses. One of the concerns voiced by students is that the 200-level courses tend to be taught like 100-level courses. In contrast the 300-level courses are taught like third-year courses, which means that currently there is a significant leap in teaching style and expectations from 200-level courses to 300-level courses.

Recommendation 1: that PACS introduce a core course in the first year of the university curriculum.

Program response: We agree with this recommendation, and have proposed a new course, PACS 101, “Peace Is Everybody’s Business.” The proposal was approved by Conrad Grebel’s College Council (March 1, 2013) and by the Arts Undergraduate Affairs Group (April 4, 2013). The course will be taught for the first time in Fall 2014.

The content of several upper-year courses builds upon the material in PACS 202. However, students expressed a concern that third-year and fourth-year courses did not build upon material from PACS 201 and 203. Therefore, it was not clear to students why these latter courses are included in the list of required courses.

As indicated in the 2005 review, there should be prerequisites for 300-level courses. Also consideration should be given to having one or more required courses at the 300-level. This would:

- Allow greater sequencing of content from one year to the next
- Because classes become smaller at the 300-level, having a required class would help students in the program to learn to know one another, and build a sense of being part of a cohort. Current students indicated that they were often unaware of who was majoring in PACS until they were together in the required 400-level course.
- Address the sense among students that although the various 300-level courses do not contain duplicate material, they are in some way variations upon a theme.
Recommendation 2: that the 200-level and 300-level courses be reorganized to provide more deliberate sequencing of material, meaningful prerequisites, and required content at the 300-level.

Program Response: We recognize the need for further curriculum review and plan to focus on this recommendation as well as various other external review recommendations relating to the PACS curriculum with CTE staff during meeting on May 1, 2013. The PACS Director will organize subsequent meetings as necessary.

As proposed in the 2005 review, there should be more 400-level Core PACS-numbered courses for a BA program.

- Students who are applying to graduate schools benefit from having a significant number of 400-level courses on their transcripts. The current PACS curriculum structure results in students having most courses in their major field at the 300-level.

Recommendation 3: that there should be more 400-level core PACS-numbered courses for the BA program.

Program Response: PACS has budgeted for an additional section of PACS 401 during the 2013-2014 academic year. In past years PACS 401 was taught once each year, during the Fall term. PACS 401 will now be taught during both the Fall and Winter terms.

The PACS program will examine options for making additional 400-level courses available to students during the larger curriculum review process that will commence with the CTE-facilitated meeting on May 1.

Students who apply for, or who enter, graduate programs without any background in research methods are at a disadvantage. It may not be necessary for PACS to offer its own research methods course(s); existing courses in the Faculty of Arts could be approved, assuming that PACS can ensure that its students will have access to seats in them.

Recommendation 4: that there should be a research methods requirement in the four-year BA plans.

Program Response: An assessment of current research methods content in PACS courses will be incorporated into the planned curriculum review process. While we question the need and capacity of the program to offer its own required research methods course, we will consider augmenting research methods content in existing courses and/or recommending appropriate research methods courses offered by other departments.

Recommendation 5: that there should be more content on peace and justice issues related to indigenous peoples in Canada.

Program Response: This recommendation is welcomed, and is consistent with feedback from students who have expressed interest in the “Idle No More” movement and related topics. In response, we approved two History courses (HIST 269, “Aboriginal History of Canada”; HIST 271, “Global Indigenous Issues”) for use in PACS degree programs. PACS faculty members will continue to discuss ways of integrating more content on indigenous peoples into existing courses as well as the possibility of developing new courses related to this topic.
Students value theory and analysis, but they also want to make sure they are developing the skills to obtain and succeed at employment. Representatives of community NGO partners indicated that it would be helpful if going into a field study placement students have some understanding of how non-profit organizations work, what type of advocacy work is appropriate by a registered charity, etc.

**Recommendation 6:** that consideration should be given to encouraging more students to complete the field studies course, as well as to identifying and either recommending or requiring a set of approved courses that foster skills (in addition to conflict resolution) that typically are valued in the workplace.

This recommendation is consistent with an existing consensus within the program that more can and should be done to promote field studies and skills content. The recent addition of a staff position dedicated particularly to undergraduate field studies, graduate internships, and student advising now enables the program to approach this task more systematically. These steps are part of our plan:

1) develop more detailed informational materials about field studies and post them online in PDF format;
2) design a short video promoting field studies, and post it on the PACS website;
3) promote field studies once each term in all 200- and 300-level PACS courses;
4) conduct a survey of students on the subject of field studies, with the intent of gaining greater insight into cost/benefit considerations from a student-centric perspective;
5) survey local and regional organizations to assess interest in providing consistent field studies opportunities for students who are hesitant to travel to distant locations; and
6) explore the feasibility of supplementing the standard Field Studies course (PACS 390) with more intensive pre-departure training and post-return reflection modules, for .25 academic credits (a measure that could enhance the overall field study experience while also providing a greater academic incentive).

The question of practical skills will be addressed during the ongoing curriculum review. In addition to considering the possibility of a new course, we will generate a list of useful skills (e.g. professional writing, public education and fundraising coordination) and discuss ways of teaching them more intentionally within existing courses. We will also reflect on progress toward greater involvement of undergraduate students in training workshops taught by the PACS program’s professionally oriented Conflict Management Certificate Program.

PACS offers a reflective approach to conflict transformation recognizing that the individual who would transform the conflict of others must also be self-aware and able to address their own internal conflict and personal development needs. Although this is an implicit component of one or more courses, it is worth considering developing a course that focuses specifically on intra-personal conflict and inner peace.

**Recommendation 7:** that consideration be given to developing a course that focuses specifically on intra-personal conflict and peace.

**Program Response:** Although the PACS program excels in addressing the social aspects of conflict, we recognize the legitimacy of this topic. We also note that there is relevant content on intra-personal aspects of conflict and peace in a number of existing courses. This content explores a range of related themes, including peace through personal transformation, the thinking of peace movement leaders,
the role of religion and spirituality in peacemaking, trauma/healing, reconciliation, and reflective peace practice. The PACS program currently lacks the teaching resources to offer a full course dedicated specifically to this topic, and is of the opinion that it is better to integrate these perspectives into a variety of courses rather than to address them primarily through a separate course.

It is common for students to actively participate with faculty members in the self-governance functions of an academic program. In the case of PACS the reviewers noted that students have no direct role in the decision-making for PACS.

**Recommendation 8:** that consideration be given to affording students a greater role in the governance of PACS.

**Program Response:** We agree with this recommendation and will take steps to integrate student representation. We have already requested guidelines from the Political Science department on how they have structured student involvement in program governance.

Students generally evaluate PACS courses (overall evaluation of instructor and overall evaluation of course) to be above the average of the Faculty of Arts.

For the period 2005-06 to 2011-12 inclusive, the student ratings for the 200-level courses were 4.32 for instructors and 4.09 for instructors on a five point scale where five is excellent. The same ratings for the 300- and 400-level courses were 4.47 for instructors and 4.25 for courses. Current students and alumni expressed to the reviewers their high regard for their instructors both full-time faculty members and sessional instructors.

The number of PACS degrees granted annually averaged 15 over the period 2005-06 to 2011-12 inclusive. This ranged from a low of five in 2005-06 to 32 in 2011-12. Of these gradating, 28.3%, on average, annually, were on the Dean’s Honours List. This percentage has varied from a low of 14.3% in 2011 to 44.4% in 2008.

For both six- and two-years after graduation PACS graduates were working in a wide variety of fields and at a diverse set of organizations, ranging from educational institutes to non-governmental community development organizations, municipal governments, environmental organizations, agriculture, and financial services.

Finally, the 2005 review discussed the fact that the only difference between the PACS Honours degree and the Four-year General BA is the student’s terminal GPA. This appears to be in keeping with a trend in a number of other programs at UW. Nevertheless, the review team find this approach of conflating “graduating with honours” with completion of an Honours program of study to be problematic in terms of how Honours programs are generally understood at other universities. The review team also note that a Glossary posted on the UW website describes an Honours program as “an undergraduate program usually leads to a Bachelor’s degree. Honours programs are more demanding than General programs, both with regard to content and the number of required courses.”
If the PACS approach to an Honours program is indeed consistent with other programs at UW, then perhaps no further differentiation is needed, but the apparent inconsistency with the Glossary should be addressed.

**Faculty**

At the time of writing the self-study, there were five permanent full-time faculty members in PACS: a director; one full professor, who retired 1 July, 2012 and was replaced by an assistant professor on the same date; two associate professors; and one assistant professor. In addition, there were nine sessional instructors who taught multiple times during the review period.

The normal teaching load of a full-time instructor in PACS is five courses per academic year, whereas within the Faculty of Arts at UW the norm is four courses. Of the five permanent instructors only three are engaged full-time in PACS core courses. The others have responsibilities in other disciplines.

The research foci of the five faculty members are many. The following is a sample of interests: Anabaptist theology; church apologies; martyrdom; history of peace; gender in war and peace; Mennonite history; human rights in the market place; the use and misuse of law – law as a sword, law as a shield; human security; North American Islamic relations; conflict and peacemaking in the Middle East; how peace and conflict are portrayed in literature; music, the environment and peace.

The permanent faculty members have published over the period of the review three books; one edited book; nine book chapters; nine refereed conference articles; and 25 conference presentations. To assist them in their research and presentations funds have been obtained from the Canada Council, Canada Federation of the Humanities, the Schneider Foundation and SSHRC.

PACS faculty members have been active in their disciplines and associations. Faculty members have served as: journal and granting agency reviewers; editors for two journals; members of four editorial boards and four advisory boards; guest editors and a literary editor. In addition, they have held or hold positions in the Canadian Theology Society; the Canadian Peace Research Association; Project Ploughshares and the International Alliance for Women in Music.

The review team noted that in the past three years, 55%, 43%, and 55% of PACS core courses have been taught by sessional instructors. Also the percentage of students in upper-year courses who are taught by sessional instructors in each of the last three years was 46%, 55%, and 60%. These percentages cause concern to the review team. These sessional instructors are skilled educators who generally garner positive reviews from students. Many of them have taught courses for the PACS program over many years, and are significantly invested in the success of the program and its students. However, now that PACS is a major, rather than a minor, students benefit from forming relationships with faculty mentors in a way that is difficult to do with sessional instructors. This becomes even more important when students or graduates are applying for graduate school or major scholarships and need faculty references. The conclusion is that there are insufficient full-time faculty members.

**Recommendation 9:** that PACS be given the authority to hire at least one additional full-time faculty member to reduce the number of courses taught by sessional instructors.
Program Response: The PACS program and the administration of the College agree that it is important to address the need for additional full-time PACS faculty, especially in view of continued strong enrollments in the undergraduate program, the need to create a better balance between courses taught by full time and sessional faculty, and the recent introduction of a graduate PACS program. The rationale, budget, and profile for such a position will be developed in 2013-14.

Other Issues
Affiliated College Dynamics: Along with other members of the Federated University and Affiliated University Colleges (FUAC), CGUC operates under an equity formula that sets out revenue sharing and service agreements between the FUAC and UW. The equity formula was last revised 20 years ago. The presence of this formula came up repeatedly in conversations with the review team as placing barriers on programmatic growth and innovation. The review team notes with concern that this formula restricts the capacity and incentive to properly resource programs like PACS that are experiencing strong enrolment growth. Presumably in today’s environment it is in both UW’s and the FUAC’s interests to have policies in place that support innovative programs that are successful in attracting students to the campus.

Interdisciplinary Program Dynamics: PACS is formally constituted as an interdisciplinary program, but is widely seen as functioning more like a department. The interdepartmental PACS Faculty Group that carries formal ownership for the academic program rarely meets, and in the view of the review team, essentially rubber stamps what the smaller PACS Administrative Group at the College recommends.

The review team noted that the previous program review recommended that the role of the PACS Faculty Committee should be enhanced. It would appear, however, that in the intervening years the role of this group of representatives from participating departments on campus had actually declined. In the absence of a functioning interdisciplinary committee, it is difficult to call PACS a bona fide interdisciplinary program. Given the lack of a real role for the PACS Faculty Group, and the introduction of the Master’s degree, the review team suggests that it is time to formally structure PACS as a department. This should not preclude maintaining strong inter-departmental linkages and preserving interdisciplinary content by continuing to recognize approved courses as part of the PACS curriculum.

Recommendation 10: that PACS be re-structured as a Department.

Program Response: This conversation is underway between the administration of Conrad Grebel and the University of Waterloo. This involves clarifying the process of transforming a “program” into a “department” and identifying the practical implications of such a change in nomenclature and structure.

Religious Dynamics: As a church College that is affiliated with a public University, CGUC operates “within and between two worlds.” Consistent with this reality, CGUC faculty members endeavour to reflect the values and principles of the College’s religious tradition, while teaching courses in a manner that is non-sectarian and reflects the University’s commitment to education in a pluralistic milieu that continuously questions and challenges orthodoxy and convention.

A program like PACS, which deals centrally with questions of conflict and justice, experiences this tension even more acutely than some other academic fields. Many destructive conflicts around the world have
significant religious overtones. How then can PACS draw upon the Mennonite Christian peacemaking heritage, teach in a pluralistic classroom, and give space and voice to students who are either indifferent to religion, or have religious beliefs other than Christianity?

This is no easy task, but the review team’s impression is that PACS is handling this on-going creative tension well. Students indicate that they are not compelled to think a certain way in PACS courses, and some welcome the opportunity to grapple explicitly with religious dimensions of the social phenomena being studied. Other students see religion as irrelevant, and simply do not understand why this material should be given any space in a University curriculum.

**Implementation strategy**

The PACS program administrators will work to integrate specific issues raised by the reviewers, taking full advantage of resources available through the University of Waterloo’s Centre for Teaching Excellence (CTE). A CTE Instructional Developer will provide facilitation for a special meeting of the PACS Administrative Group (PACS AG) on May 1, 2013, after which PACS faculty and staff will continue to address various recommendations of the reviewers described above. The curriculum review is expected to be completed during the 2013/2014 academic year, and implementation of changes is expected to occur by the end of the Winter 2015 term.
## Implementation Strategy, with Timeline, Responsibilities, and Resource Needs Assessment

This table addresses each recommendation in the order presented by the program reviewers.

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Aspect of the Program</th>
<th>Reviewers’ Recommendations</th>
<th>PACS Response</th>
<th>Responsibility for Action</th>
<th>Resources Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-15</td>
<td>Curriculum</td>
<td>1. Introduce first-year PACS core course</td>
<td>Now implementing</td>
<td>Course design: Director PACS AG(^1) Introduction of course: PACS Faculty</td>
<td>PACS full-time faculty. The program will need to compensate for this reallocation of a faculty member’s time through additional full-time or sessional appointments.</td>
</tr>
<tr>
<td>2013-15</td>
<td>Curriculum</td>
<td>2. Reorganize 200- and 300-level courses for sequencing, prerequisites, and content</td>
<td>Under consideration</td>
<td>Director PACS AG</td>
<td>None; consultation and support for curriculum review provided by Centre for Teaching Excellence.</td>
</tr>
<tr>
<td>2013-15</td>
<td>Curriculum</td>
<td>3. Offer additional 400-level courses</td>
<td>Agree to add at least one additional course section, and consider special topics course</td>
<td>PACS AG</td>
<td>Need to provide additional faculty resources (either sessional or full-time).</td>
</tr>
<tr>
<td>2013-15</td>
<td>Curriculum</td>
<td>4. Include a research methods requirement</td>
<td>Explore various means of enhancing research methods content</td>
<td>Director PACS AG</td>
<td>None; options for augmenting content will be explored during curriculum review.</td>
</tr>
<tr>
<td>2013-15</td>
<td>Curriculum</td>
<td>5. Include more content on indigenous peoples</td>
<td>Affirmed</td>
<td>PACS AG</td>
<td>None; curriculum review process will provide a framework for greater integration of such content into existing courses.</td>
</tr>
<tr>
<td>2013-15</td>
<td>Curriculum</td>
<td>6. Encourage field studies course and foster skills</td>
<td>Affirmed</td>
<td>Director PACS AG PACS Staff</td>
<td>Increased staff time is now dedicated to field study promotion and support.</td>
</tr>
<tr>
<td>--</td>
<td>Curriculum</td>
<td>7. Consider course on intra-personal conflict/peace</td>
<td>Not an immediate priority</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2013-14</td>
<td>Administration</td>
<td>8. Add student representation to governance structures</td>
<td>Affirmed</td>
<td>PACS AG Director</td>
<td>None</td>
</tr>
<tr>
<td>2013-15</td>
<td>Faculty</td>
<td>9. Hire additional faculty member(s)</td>
<td>Affirmed</td>
<td>PACS AG Grebel Dean</td>
<td>1 FTE appointment</td>
</tr>
<tr>
<td>2013-14</td>
<td>Administration</td>
<td>10. Structure PACS as a department</td>
<td>Exploring</td>
<td>Grebel Dean</td>
<td>None</td>
</tr>
</tbody>
</table>

\(^1\)PACS AG = PACS Administrative Group
FOR INFORMATION

Recognition and Commendation
Professor James Forrest of the Department of Physics and Astronomy has won the prestigious Brockhouse Medal, along with Professor Kari Dalnki-Veress from McMaster University, in recognition of their shared accomplishments in the field of soft condensed matter physics. “This award acknowledges Professor Forrest’s commitment to excellence, and is indicative of both importance of his work and the respect he has of other scientists in his field,” said Terry McMahon, dean of the Faculty of Science. “The Faculty of Science appreciates his contribution, and I congratulate him on this notable recognition.” The Brockhouse Medal, which is sponsored jointly by the Division of Condensed Matter and Materials Physics and the Canadian Association of Physicists (CAP), recognizes excellence in research contributions to condensed matter and materials physics. It is named in honour of Professor Bertram Brockhouse, whose outstanding contributions to research in condensed matter physics in Canada were recognized with the 1994 Nobel Prize for Physics. Both professors will be presented with the 2013 CAP Brockhouse Medal at the 2013 CAP Congress taking place in Montreal from 27 May through 31.

The University of Waterloo Nanorobotics Group (UW_NRG) took first prize in the Mobile Microrobotics Challenge (“in which microrobots on the order of the diameter of a human hair face off in tests of autonomy and mobility”) at the 6-10 May IEEE International Conference on Robotics and Automation held in Karlsruhe, Germany. This is the second time the team, made up of undergraduate students from nanotechnology engineering supported by colleagues in computer science and arts, has won the competition, beating graduate and post-doctoral candidates from top international institutions. The team used “advanced micro-scale technology” to control the speed and agility of its competitive microrobot “with unmatched precision,” finishing three runs with a final average time of .33 seconds. “The implications of this performance can lead to progressive leaps in the development of micro-scale applications from targeted drug delivery and minimally invasive surgery to advanced electronics manufacturing,” says a statement from UW_NRG. [16 May 2013 Daily Bulletin]
A. APPOINTMENTS

Definite-term Appointment

WILLIAMS, Diane, Lecturer, School of Public Health and Health Systems, July 1, 2013 – June 30, 2016. B.S., Electrical Engineering and Computer Science, Massachusetts Institute of Technology, 1992, Ph.D., Speech and Hearing Bioscience and Technology, Harvard-MIT Division of Health Sciences and Technology, Massachusetts Institute of Technology, 2003. Dr. William’s biology background will complement the school in the area of biomedical health which is consistent with the strategic plan and future needs of the school.

Adjunct Appointments

Graduate Supervision

HILBRECHT, Margo, Lecturer, School of Public Health and Health Systems, May 1, 2013 to April 30, 2014.

Graduate Supervision and Research

MANHELL, Roger, Professor, Department of Recreation and Leisure Studies, September 1, 2013 to June 30, 2016.

STEWART, Shannon, Assistant Professor, School of Public Health and Health Systems, May 1, 2013 to April 30, 2014.

Graduate Supervision and Research and Graduate Instruction

VIEHBECK, Sarah, Assistant Professor, School of Public Health and Health Systems, February 1, 2013 to December 31, 2016.

Graduate Instruction

CRIZZLE, Alexander, Assistant Professor, School of Public Health and Health Systems, May 1, 2013 to August 31, 2013.

Postdoctoral Fellow to Research Appointment

VAN OOTEGHEM, Karen, Department of Kinesiology, April 1, 2013 to August 30, 2013.

Cross Reappointment

BROWN, Stephen, Professor, Department of Statistics and Actuarial Science, Faculty of Mathematics to School of Public Health and Health Systems, Faculty of Applied Health Sciences, June 1, 2013 to June 30, 2016.

B. ADMINISTRATIVE APPOINTMENT

RUSH, James, Associate Dean, Applied Health Sciences, Faculty of Applied Health Sciences, July 1, 2013 to June 30, 2016.

Susan J. Elliott
Dean, Applied Health Sciences
A. APPOINTMENTS

Probationary-term Appointment

MACDONALD, Shana (BFA Ryerson University 2001, MA York University 2005, PhD York University expected 2013), Assistant Professor, Department of Drama and Speech Communication, July 1, 2013 to June 30, 2016. Ms MacDonald’s degrees are in film and media studies, and she will soon complete her doctoral work in the Communication and Culture program at York University. Her areas of research and creative expertise include feminist art and aesthetics, performance and communication, and media studies. She is an accomplished media and installation artist. In the Department of Drama and Speech Communication, she will teach communication courses including gender, public communication, and performance theory, as well as advanced courses in her area of expertise.

Continuing Lecturer Appointments

CALLAGHAN, Gerald (BA Concordia University 1991, MA 1993 and PhD 2000 University of Western Ontario), Lecturer, Department of Philosophy, January 1, 2014. Dr. Callaghan’s research specialization is in the history of analytic philosophy, especially its roots in developments in logic and philosophy of language going back to the early modern period. After proving himself to be an excellent classroom teacher over a number of years working as a sessional instructor at Waterloo and in nearby philosophy departments, the Waterloo philosophy department hired him as a contract lecturer in 2009 to serve as its extended learning coordinator. Since then, Dr. Callaghan has been systematically upgrading the department’s EL offerings (starting with the most dated and problematic courses), implemented improvements in the administration of the courses, and improved the training of graduate student EL instructors. As a continuing lecturer, he will be central to the pursuit of various longer-term goals of the department, such as online honours and master’s programs.

HARTLING, Shannon (PhD University of Waterloo 2003), Lecturer, Department of Drama and Speech Communication, September 1, 2013. Dr. Hartling’s interests include interpersonal and public communication, cultural studies, the history and theory of rhetoric, aesthetic theory, and the function of language in creating community. As a continuing lecturer in the Department of Drama and Speech Communication she will teach courses including Interpersonal Communication, Leadership, Intercultural Communication, Public Communication, and Conflict Management. She will also contribute to central service areas in the Speech Communication program and the department, including administrative oversight of a multiple-section introductory speech communication course.

PACI, Tim (BA 1993 and MA 1994 McMaster University), Lecturer, Department of Drama and Speech Communication, January 1, 2014. Mr. Paci’s research interests include public speaking and other forms of public discourse, as well as the influence of stories on meaning making. In the Department of Drama and Speech Communication he has taught and will continue to teach interviewing, leadership, interpersonal communication, organizational communication, and crisis communication. As a continuing lecturer he will also provide service to the program and department related to coordinating a multi-section course in public speaking and other essential areas.

TSEDRYK, Kanstantsin (BA Minsk State Linguistic University 2003, MA University of Western Ontario 2004), Lecturer, Department of French Studies, September 1, 2013. Mr. Tsedryk joined the Department of French Studies in 2008 as a contractual staff language instructor, and became a
definite-term lecturer in 2009. His expertise in online teaching and online program development will allow the Department of French Studies to develop and maintain state-of-the art intermediate and business French language courses.

**Definite-term Appointment**

LEBREC, Caroline (BA 1994 and MA 1996 Université Paris III-Sorbonne Nouvelle, PhD University of Toronto 2012), Lecturer, Department of French Studies, May 1, 2013 to April 30, 2014. Dr. Lebrec will teach and strengthen the department’s expertise in the areas of popular literature and digital culture.

**Definite-term Reappointments**

BERBERICH, Greg, Lecturer, School of Accounting and Finance, July 1, 2013 to June 30, 2014.

ECCLESTONE, Andrew, Lecturer, School of Accounting and Finance, July 1, 2013 to June 30, 2014.

GEOFFREY, Craig, Lecturer, School of Accounting and Finance, July 1, 2013 to June 30, 2014.

KRAFT, Deborah, Lecturer, School of Accounting and Finance, July 1, 2013 to June 30, 2014.

KROEKER, Ronald, Lecturer, Department of Classical Studies, September 1, 2013 to August 31, 2014.

PSUTKA, Donna, Lecturer, School of Accounting and Finance, July 1, 2013 to June 30, 2014.

ROBINSON, Linda, Lecturer, School of Accounting and Finance, July 1, 2013 to June 30, 2014.

SPROULE, Robert, Lecturer, School of Accounting and Finance, July 1, 2013 to June 30, 2014.

VERT, David, Lecturer, School of Accounting and Finance, July 1, 2013 to June 30, 2014.

**Adjunct Appointment**

*Instruction*

LANGEVIN, Francis, Lecturer, Department of French Studies, May 1, 2013 to August 31, 2013.

**Adjunct Reappointments**

*Instruction*

ADAMS, Russell, Assistant Professor, Department of Anthropology, May 1, 2013 to August 31, 2013.

BRANIFF, Michele, Lecturer, School of Accounting and Finance, May 1, 2013 to August 31, 2013.

CORNING, Gail, Assistant Professor, Department of Drama and Speech Communication, May 1, 2012 to August 31, 2013.

IRVING, Michelle, Lecturer, Department of Fine Arts, May 1, 2013 to August 31, 2013.

MANNING, Thomas, Lecturer, School of Accounting and Finance, May 1, 2013 to August 31, 2013.

O’HARA, Kathleen, Lecturer, Department of Drama and Speech Communication, May 1, 2013 to August 31, 2013.

STACEY, Jeffery, Lecturer, Department of Drama and Speech Communication, May 1, 2013 to August 31, 2013.

THARMALINGAM, Pirapa, Lecturer, Department of Economics, May 1, 2013 to August 31, 2013.
Miscellaneous (research, consultations, etc.)

LESLIE, Laura, Resource Assistant, Department of Fine Arts, May 1, 2013 to April 30, 2014.

SEDRA, Mark, Assistant Professor, Department of Political Science, January 1, 2014 to December 31, 2015.

SMITH, Larry, Associate Professor, Department of Economics, September 1, 2013 to August 31, 2013.

Graduate Student to Part-time Lecturer Appointments

BARR, Nathaniel, Department of Psychology, May 1, 2013 to August 31, 2013.

CLAPPERTON, Robert, Department of English Language and Literature, May 1, 2013 to August 31, 2013.

DOYLE, Jennifer, Department of English Language and Literature, May 1, 2013 to August 31, 2013.

FINKELSTEIN, Mark, Department of French Studies, May 1, 2013 to August 31, 2013.

ROTH, Daniela, Department of Germanic and Slavic Studies, May 1, 2013 to August 31, 2013.

SHAQIRI, Albulena, Department of Psychology, May 1, 2013 to August 31, 2013.

B. ADMINISTRATIVE APPOINTMENTS

AGER, Sheila, Chair, Department of Classical Studies, July 1, 2013 to June 30, 2017.

ILCAN, Suzan, Associate Chair, Graduate Studies, Department of Sociology and Legal Studies, July 1, 2013 to June 30, 2015.

MCCLINCHEY, Barry, Associate Chair, Graduate Studies (Sociology), Department of Sociology and Legal Studies, July 1, 2013 to June 30, 2014.

O'CONNOR, Dan, Associate Chair, Undergraduate Studies (Legal Studies), Department of Sociology and Legal Studies, July 1, 2013 to June 30, 2015.

RUSSELL, Grant, Associate Director, Programs, School of Accounting and Finance, July 1, 2013 to June 30, 2015.

C. RESIGNATION

BROWN, Kareen, Assistant Professor, School of Accounting and Finance, effective June 30, 2013.

D. RETIREMENT DATE CHANGE

NOVAK, Joseph, Associate Professor, Department of Philosophy, from August 1, 2014 to August 1, 2013.

Douglas M. Peers
Dean, Arts
FOR INFORMATION

A. APPOINTMENTS

Visiting Appointments


BOUCHET, Dorian, Scholar, Department of Mechanical & Mechatronics Engineering, April 23, 2013 – August 24, 2013.


CHUNG, Jin-Ho, Assistant Professor, Department of Electrical & Computer Engineering, April 21, 2013 – February 21, 2014.

GUAN, Du-Juan, Scholar, Department of Systems Design Engineering, September 1, 2013 – August 31, 2014.


KIM, Hyung Sun, Scientist, Department of Chemical Engineering, June 1, 2013 – August 31, 2013.

MENGUAL, Mylene, Scholar, Department of Systems Design Engineering, May 1, 2013 – August 31, 2013.

PATEL, Poonam, Scholar, Department of Chemical Engineering, March 7, 2013 – August 31, 2013.


STIEFF, Michael, Scholar, Department of Civil & Environmental Engineering, June 1, 2013 – August 31, 2013.

WANG, Henry, Scholar, Department of Chemical Engineering, May 1, 2013 – August 31, 2013.

Visiting Reappointment

ZOU, Ray, Scholar, Department of Chemical Engineering, May 1, 2013 – May 31, 2103.

Adjunct Appointments

Instruction


JULIATO, Marcio, Lecturer, Department of Electrical & Computer Engineering, May 1, 2013 – August 31, 2013.

WON, Seong-hoon Peter, Lecturer, Department of Mechanical & Mechatronics Engineering, May 1, 2013 – August 31, 2013.
ZARNETT, Jeffrey, Lecturer, Department of Electrical & Computer Engineering, May 1, 2013 – August 31, 2013.

Graduate Supervision
HU, Jun, Professor, Department of Chemical Engineering, May 1, 2011 – May 31, 2013.

LIU, Hong-Lai, Professor, Department of Chemical Engineering, May 1, 2011 – May 31, 2013.

OBEIDI, Amer, Assistant Professor, Department of Systems Design Engineering, July 1, 2013 – June 30, 2016.

Graduate Supervision and Research
BIGLARI, Mazda, Assistant Professor, Department of Chemical Engineering, May 1, 2013 – April 30, 2016.

HABERKAMP, Jens, Professor, Department of Civil & Environmental Engineering, May 1, 2012 – April 30, 2015.

Research
OBEIDI, Amer, Assistant Professor, Department of Management Sciences, July 1, 2013 – June 30, 2016.

SCHWARTZ, Shimon, Professor, Department of Systems Design Engineering, May 1, 2013 – April 30, 2016.

Adjunct Reappointments
Instruction
ALLARAKHIA, Minna, Lecturer, Department of Management Sciences, May 1, 2013 – August 31, 2013.

BLAKE, Clifford, Lecturer, Department of Management Sciences, May 1, 2013 – August 31, 2013.

CHUNG, So-Ra, Lecturer, Department of Systems Design Engineering, January 1, 2013 – April 30, 2013.

DEMAN, Andrew, Lecturer, Department of Systems Design Engineering, May 1, 2013 – August 31, 2013.

GRIFFITHS-FULTON, Karl, Lecturer, Department of Systems Design Engineering, May 1, 2013 – August 31, 2013.

MATHER, David, Lecturer, Department of Mechanical & Mechatronics Engineering, May 1, 2013 – August 31, 2013.

NGUYEN, Tam, Lecturer, Department of Mechanical & Mechatronics Engineering, May 1, 2013 – August 31, 2013.

Graduate Supervision and Research
KARAN, Mehmet (Matt), Professor, Department of Civil & Environmental Engineering, March 1, 2013 – February 28, 2015.
Cross Appointment
MAKAROV, Vadim, Research Assistant Professor, IQC/Physics and Astronomy to Department of Electrical & Computer Engineering, March 1, 2013 – March 1, 2017.

Graduate Student to Part-time Lecturer Appointments

HOSSEINKHANI, Yasin, Department of Mechanical & Mechatronics Engineering, May 1, 2013 – August 31, 2013.

MORTON, Chris, Department of Mechanical & Mechatronics Engineering, May 1, 2013 – August 31, 2013.

Postdoctoral Fellow to Part-time Lecturer Appointment
KASHEF, Rasha, Department of Management Sciences, May 1, 2013 – August 31, 2013.

B. ADMINISTRATIVE APPOINTMENT
AUCOIN, Mark, Academic Director, WatPD-Engineering, Dean of Engineering Office, May 1, 2013 – April 30, 2016.

ADMINISTRATIVE REAPPOINTMENT
FIEGUTH, Paul, Chair, Department of Systems Design Engineering, September 1, 2013 – August 31, 2017.

C. RESIGNATION
BIGLARI, Mazda, Assistant Professor, Department of Chemical Engineering, effective April 30, 2013.

D. SABBATICAL LEAVES
For Approval by the Board of Governors
DIMITROV, Stanko, Assistant Professor, Department of Management Sciences, November 1, 2013 – April 30, 2014 at 100% salary.

REVINGTON, Dereck, Associate Professor, School of Architecture, September 1, 2013 – August 31, 2014 at 94.7% salary.

SAFAYENI, Frank, Professor, Department of Management Sciences, September 1, 2013 – August 31, 2014 at 100% salary.

E. SPECIAL LEAVE
JERVIS, Eric, Professor, Department of Chemical Engineering, May 1, 2013 – August 31, 2013, unpaid leave of absence.

Pearl Sullivan
Dean, Engineering
FOR INFORMATION

A. APPOINTMENTS

Adjunct Appointments

Instruction

CRAIG, Brian, Lecturer, Department of Environment and Resource Studies, May 1, 2013 to August 31, 2013.

FORD, Victoria, Lecturer, School of Environment, Enterprise and Development, May 1, 2013 to August 31, 2013.

HERREMANS, Irene, Professor, School of Environment, Enterprise and Development, May 1, 2013 to August 31, 2013.

HOOYKAAS, Amanda, Lecturer, Department of Environment and Resource Studies, May 1, 2013 to August 31, 2013.

JOAKIM, Erin, Lecturer, Faculty of Environment, September 1, 2013 to April 30, 2014.

Graduate Supervision

HUANG, Lei, Assistant Professor, School of Environment, Enterprise and Development, January 1, 2013 to December 31, 2015.

Change in Appointment

PARKER, Paul, Professor, partial transfer from the Department of Geography and Environmental Management (100%) to the School of Environment, Enterprise and Development (51%) and the Department of Geography and Environmental Management (49%), effective May 1, 2013.

B. ADMINISTRATIVE APPOINTMENT

PLAISANCE, Kathryn, Undergraduate Officer, Centre for Knowledge Integration, September 1, 2013 to August 31, 2014.

C. SABBATICAL LEAVE

For Approval by the Board of Governors

LIN, Haiying, Assistant Professor, School of Environment, Enterprise and Development, September 1, 2013 to February 28, 2014.

André Roy
Dean, Environment
A. APPOINTMENTS

Probationary-term Appointment

BATTY, Christopher (BSc, 2004, University of Manitoba; PhD, 2010, University of British Columbia), Assistant Professor, David R. Cheriton School of Computer Science, September 1, 2013 – June 30, 2016. Dr. Batty is currently a Banting Postdoctoral Fellow at Columbia University. His research concerns the development of computational models and algorithms to simulate the motion of fluids, solids, and complex material such as granular flows and porous objects. His numerical and algorithmic techniques both respect and exploit the geometry and physics of the materials being simulated. He has applied his research to computer animation (Dr. Batty has received a film credit on Superman Returns), and to computational physics. His presence will strengthen the school, most notably in the area of scientific computing.

Probationary-term Reappointment


Visiting Appointments


ROSELLI, Vincenzo, Scholar, David R. Cheriton School of Computer Science, May 1, 2013 – August 31, 2013.


Adjunct Appointment

Instructor

ROEGIEST, Adam, Lecturer, David R. Cheriton School of Computer Science, May 1, 2013 – August 31, 2013.

Adjunct Reappointments

Instructor

ALWAN, Mohamad, Lecturer, Dept. of Applied Mathematics, May 1, 2013 – August 31, 2013.

LANCTOT, Kevin, Lecturer, David R. Cheriton School of Computer Science, May 1, 2013 – August 31, 2013.

Research


Cross Reappointments

CORY, David, Professor, Dept. of Chemistry to Dept. of Applied Mathematics, November 1, 2013 – October 31, 2016.
LAFLAMME, Raymond, Professor, Dept. of Physics to David R. Cheriton School of Computer Science, July 1, 2012 – June 30, 2015.

LEMIEUX, Christiane, Associate Professor, Dept. of Statistics and Actuarial Science to David R. Cheriton School of Computer Science, April 1, 2013 – June 30, 2016.

Graduate Student to Part-time Lecturer Appointment

Postdoctoral Fellow to Part-time Lecturer Appointment

Postdoctoral Fellow to Part-time Lecturer Reappointment

B. ADMINISTRATIVE APPOINTMENT

ADMINISTRATIVE REAPPOINTMENTS


C. SABBATICAL LEAVES
For Approval by the Board of Governors
CHAN, Timothy, Professor, David R. Cheriton School of Computer Science, September 1, 2013 – August 31, 2014 with 100% salary.

LI, Pengfei, Assistant Professor, Dept. of Statistics and Actuarial Science, November 1, 2013 – April 30, 2014 with 100% salary.

SIEGEL, David, Professor, Dept. of Applied Mathematics, September 1, 2013 – August 31, 2014 with 85% salary.

TESKE-WILSON, Edlyn, Associate Professor, Dept. of Combinatorics and Optimization, September 1, 2013 – August 31, 2014 with 85% salary.

VAVASIS, Stephen, Professor, Dept. of Combinatorics and Optimization, September 1, 2013 – August 31, 2014 with 85% salary.

Ian P. Goulden
Dean, Mathematics
FOR INFORMATION

A. APPOINTMENTS

Adjunct Appointments

Graduate Supervision

HWANG, Hyoun-Tae, Assistant Professor, Department of Earth and Environmental Sciences, February 1, 2013 to January 31, 2016.

Graduate Supervision and Research

BELL, David S., Professor, Department of Chemistry, May 1, 2013 to August 31, 2016.

FRANK, Richard A., Assistant Professor, Department of Biology, April 1, 2013 to March 31, 2016.

Adjunct Reappointments

Undergraduate Instruction

BEECHINOR, Danette, Lecturer, School of Pharmacy, January 1, 2013 to August 31, 2013.

Graduate Supervision and Research

JACOBSON, Christian, Associate Professor, Department of Biology, July 1, 2013 to June 30, 2016.

VANDERKOOG, John, Professor, Department of Physics and Astronomy, January 1, 2013 to December 31, 2016.

Cross Appointments

DMITRIENKO, Gary Igor, Associate Professor, Department of Chemistry to School of Pharmacy, May 1, 2013 to December 31, 2015.

McCONKEY, Brendan, Associate Professor, Department of Biology to School of Pharmacy, May 1, 2013 to December 31, 2015.

Postdoctoral Fellow to Part-time Lecturer Appointment

MARTIN-MARTINEZ, Eduardo, Lecturer, Department of Physics and Astronomy, September 1, 2013 to December 31, 2013.

B. SABBATICAL LEAVES

For Approval by the Board of Governors

BIZHEVA, Kostadinka, Associate Professor, Department of Physics and Astronomy, September 1, 2013 to February 28, 2014, 100% salary arrangement.

FLANAGAN, John, Professor, School of Optometry and Vision Science, September 1, 2013 to August 31, 2014, 100% salary arrangement.

LAKSHMINARAYANAN, Vasudevan, Professor, School of Optometry and Vision Science, September 1, 2013 to August 31, 2014, 94% salary arrangement.
For approval

Undergraduate Council Appointment

Motion: To approve the appointment of Tom Brenner, academic dean, Renison University College, as the affiliated university colleges representative, term to 30 April 2015.
Senate Graduate & Research Council met on 13 May 2013 and agreed to forward the following items to Senate for approval. These items are recommended for inclusion in the regular agenda.

Further details are available at: www.adm.uwaterloo.ca/infosec/Committees/senate/sgrc.htm

FOR APPROVAL

CURRICULAR MODIFICATIONS

Physics

1. **Motion:** To approve the deactivation of the graduate co-op option in Physics for the program offered by the Department of Physics and Astronomy in the Faculty of Science, as described in Attachment 1.

   **Rationale:** This option has been removed from the program application for several years, and the change formalizes the de facto termination of the option.

Tourism

2. **Motion:** To approve the change in degree names from Master of Environmental Studies, Tourism Policy and Planning to Master of Environmental Studies, Tourism, and from Master of Arts in Tourism Policy and Planning degree name to Master of Arts in Tourism, and to approve the change in degree requirements for the programs offered jointly by the Department of Recreation and Leisure in the Faculty of Applied Health Sciences and by the Department of Geography and Environmental Management in the Faculty of Arts, as described in Attachment 2.

   **Rationale:** The change to the degrees’ names seeks to better reflect the scope of the program and broaden the appeal of the Degree. The change to the degree requirements substitutes a seminar course requiring guest lecturers with course content on emerging areas of concern to tourism scholarship, including sustainability and political/institutional arrangements.

Diploma on Green Energy

3. **Motion:** To approve the type 3 graduate diploma in green energy offered by the Department of Mechanical and Mechatronics Engineering in the Faculty of Engineering, as described in Attachment 3.

   **Rationale:** The department has already obtained approval to offer the graduate diploma as a type 1 and type 2. In offering the type 3 diploma, the department would be able to admit students directly into the standalone diploma program.

George Dixon       Sue Horton  
Vice-President, University Research  Associate Provost, Graduate Studies
Faculty: Science  
Effective term: Term/Year Spring 2013  

Course  □ New  □ Revision  □ Inactivation  ✗  
Milestone  □ New  □ Revision  □ Inactivation  

New milestone title: Choose an item.  
For course revisions, indicate the type(s) of changes: Inactivation of the Physics Co-op Program (e.g. consent, description, title, requisites)  

Course Subject code:  
Course number:  
Course Title (max. 100 characters incl. spaces):  
Course Short Title (max. 30 characters incl. spaces):  
Grading Basis: Choose an item.  
Course Credit Weight: Choose an item.  
Course Consent Required:  □  Choose an item.  
Course Description:  

New course description (for revision only):  

Meet Type(s): Choose an item.  
Primary Meet Type: Choose an item.  
Antirequisite(s) Corequisite(s) Prerequisite(s):  
Special topics course:  Yes  □ No  □  
Cross-listed:  Yes  □ No  □  

Course Subject(s) to be cross-listed with and approval status:  
Sections combined/held with:  
Rationale for request: Program has not been used for many years.  

Prepared by:  
Date: 23-Apr-13
From Faculty Council (April 26, 2013)

To Senate Graduate Council

1. ACADEMIC PROGRAM CHANGES

1.1 Recreation and Leisure Studies

1.1.1 To change the Master of Arts in Tourism Policy and Planning degree name to Master of Arts in Tourism, effective September 2014.

Rationale: The title change reflects the broader content of the courses as well as faculty expertise. The new name represents a broader approach to the study of tourism and thus could appeal to a wide range of students.

1.1.2 To change the degree requirements for the Master of Tourism degree as follows, effective September 2014.

Students can enroll in either the Faculty of Environment for the Master of Environmental Studies (MES) degree or the Department of Recreation and Leisure Studies for the Master of Arts (MA) degree.

Five graduate level courses are required over the course of the two-year program. Courses are taken from both the Department of Recreation and Leisure Studies and the Faculty of Environment. Students will be required to write a thesis and will have an option to undertake an internship/practicum for credit.

Students will be required to complete at least one of the two research methods courses. TOUR 601 and TOUR 602 and TOUR 603 will provide the students with a foundation in conceptual, empirical, and methodological issues specific to tourism.

Students must successfully complete at least five courses plus a thesis, as specified below:

Core Courses/Thesis Milestone

- TOUR 601, TOUR 602, TOUR 603
- Milestone: Thesis (normally supervised by Core or Supporting Faculty)

Data Analysis Elective - one of the following:

- REC 672, REC 673

Substantive Electives - two of the following:

- REC 615, REC 630, REC 680, REC 685, TOUR 603, TOUR 604, REC 609/TOUR 609, REC697/TOUR 675
- One open elective from any Master's level program.

Rationale: Given the nature of the course, TOUR 603, “Sustainable Tourism” (see motion below regarding course title change), will replace TOUR 601 as a required course. A separate motion decoupling GEOG 423 and TOUR 601 will be brought to the Geography and Environmental Management department for approval.
Tourism Policy and Planning Motions

Motion 1: Change the Degree Name from Master of Environmental Studies, Tourism Policy and Planning to Master of Environmental Studies, Tourism

Rationale: To better reflect the scope of the Program. The current title is somewhat specific and is appealing only to students who are interested in tourism planning and policy issues. The name change is proposed to attract students interested in general aspects of tourism (management, sustainability, impacts) rather than specific thematic areas. Current courses offered within the Program are reflective of the generalized aspects of tourism, and have limited “policy and planning” content. Reviewers of the OCGS Appraisal Brief (TPP) submitted in 2007 noted this inconsistency.

Motion 2: Change the Degree Requirements for the Master of Environmental Studies, Tourism degree as follows, effective September 2014, by replacing current core course, TOUR 601, with current elective course, TOUR 603, making TOUR 603 a core course, and making TOUR 601 an elective course:

<table>
<thead>
<tr>
<th>Core Courses</th>
<th>and either of</th>
<th>and two of</th>
<th>plus Milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOUR 601, TOUR 602, TOUR 603</td>
<td>REC 672 or REC 673</td>
<td>REC 615, REC 630, REC 680, REC 685, TOUR 601, TOUR 604, TOUR 609/REC 609, TOUR 675/REC 697 (substitutions will be considered by a request to the Graduate Officer)</td>
<td>a master’s thesis</td>
</tr>
</tbody>
</table>

Rationale for replacing TOUR 601 with TOUR 603 as a core course: Tour 601 has been taught as a seminar course, based on guest lectures by scholars of various backgrounds from various institutions. Given the general nature of the course, and limited funding to bring in external speakers, we are removing TOUR 601 as a core requirement. Tour 603 will replace Tour 601 as a core course. This covers an emerging area of concern to tourism scholarship. Sanjay Nepal will develop new course content reflecting the three pillars of sustainability, and political/institutional arrangements necessary to support sustainability.
UNIVERSITY OF WATERLOO

GRADUATE EXPEDITED PROPOSAL
OF THE
GRADUATE DIPLOMA (TYPE 3) IN GREEN ENERGY
IN
MECHANICAL AND MECHATRONICS ENGINEERING

Submitted to the
Ontario Universities Council on Quality Assurance
[March 2013]

VOLUME I – PROPOSED BRIEF
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1. Brief Description and Rationale

The Graduate Diploma in Green Energy is a for-credit graduate program offered to domestic and international students to advance their professional knowledge and skills in the growing discipline of green energy engineering. It is an online, course-based, professional development program for practicing engineers interested in expanding and updating their knowledge in the areas of green energy engineering.

Currently, the Department of Mechanical and Mechatronics Engineering (MME) offers Graduate Diploma Type 1 and 2 in Green Energy in conjunction with the Master of Engineering in Mechanical Engineering which have been approved as Diplomas by the Ontario University Council on Quality Assurance. The proposed Type 3 standalone Diploma has the exact same courses as the existing Type 1 and Type 2 Diplomas. The difference is that they are being offered online and to a different group of students.

The proposed program will be open to international students whereas only domestic students are eligible for admission to existing graduate diplomas. Due to the growing need for green energy expertise in many industries such as power generation, automobile, manufacturing, transportation, medical care, agriculture, the demand for a focused program with remote participation capabilities is increasing. The online offering of the proposed program allows practitioners with busy schedules to participate. It will also enable the MME department to address the request from international institutions to have their experts attend the program remotely. The program is offered for part-time and full-time study.

MME currently offers a general MEng in Mechanical Engineering program as well as MEng in Mechanical Engineering with Graduate Diplomas/Certificates in Green Energy, Fire Safety and Design, respectively. All three certificates have recently been approved by the Ontario Quality Council.

The MEng in Mechanical Engineering with Green Energy Certificate is the most successful specialization in the Department with over 55 graduates since its launch in 2007. However, the MEng programs in MME have traditionally been limited to students with Canadian or Permanent Resident status, with increasing demand for energy generated from clean, natural and renewable resources to replace fossil fuels, the need for mechanical engineers with training in green energy is expected to grow significantly. MME has a team of faculty with expertise in key technologies for harvesting renewable energies and for improving efficiencies. The courses offered in the program range from renewable energy sources such as solar, wind, biomass and fuel cells to energy efficient buildings. As the renewable engineering sector is expanding and scaling up globally, we anticipate considerable interest in this Graduate Diploma program both from the domestic and international engineering practitioners.
2. Objectives of the program

According to the University of Waterloo Strategic Research Plan, “The University of Waterloo’s mission is to advance learning and knowledge through teaching, research and scholarship in an environment of free inquiry and expression. The University fulfills this mission by: offering undergraduate and graduate students the best possible educational experience in selected regular, co-operative and professional programs; engaging in basic and applied research and scholarly activity that is recognized nationally and internationally; and providing service to society through the transfer of knowledge and cultural enrichment.”

The proposed Graduate Diploma in Green Energy aligns with the mission of the university by offering graduate students the best possible educational experience for working professionals who wish to upgrade their education in an emerging area of global importance. The program will engage practitioners with topics on the science of renewable energy generation, best practices, technology trends, and new research directions. As the renewable energy industry continues to expand globally, the program will strengthen the knowledge base of the engineering work force in the renewable energy and building construction sectors. The extension of the offering to international students will lead to the recognition of the University of Waterloo as a center of excellence for expertise in green energy engineering. In summary the objectives are:

- To educate engineers with more specialized technical training in the emerging field of Green Energy
- To offer a course-work professional development graduate program for practicing engineers to be formally trained in the area of Renewable Energies
- To provide new immigrants and foreign-trained engineers, external to the University, a degree program that facilitates earlier entry to the Canadian workforce in the globally growing field of Green Energy
- To provide newly graduated engineers an opportunity to pursue graduate education in Green Energy

The proposed program may be taken by full-time candidates and those who wish to study on a part-time basis while remaining in full-time employment, external to the University. The candidate in this program is expected to be financially self-supporting.

The outcomes of the program are listed in Table 1. These outcomes have been mapped against Graduate Degree-Level Expectations (GDLE) as shown in the table.
### Table 1: Green Energy Graduate Diploma Program Outcomes Mapped to the GDLE

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<tbody>
<tr>
<td>To develop more breadth and depth of knowledge about the technical, economic,</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>environmental, political, and social issues related to green energy and energy</td>
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<td>conservation</td>
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<tr>
<td>To be up-to-date on advancements in green energy sciences and technologies</td>
<td>x</td>
<td>x</td>
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</tr>
<tr>
<td>To have a strong understanding of the role that conservation and low energy</td>
<td>x</td>
<td>x</td>
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<tr>
<td>systems play in successfully implementing alternative energy technologies</td>
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<tr>
<td>To be able to effectively select, design, and implement suitable alternative</td>
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<td>x</td>
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<tr>
<td>energy and energy conservation solutions</td>
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<td>To develop the ability to effectively communicate with individuals working on</td>
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<td>x</td>
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<tr>
<td>the design and/or implementation of green energy technologies</td>
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<tr>
<td>To highly motivate individuals in use of alternative energy and energy</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>conservation technologies</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>To have conducted critical analysis of novel issues or new applications related</td>
<td></td>
<td></td>
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<td></td>
<td>x</td>
</tr>
<tr>
<td>to green energy or energy conservation</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>To recognize limits of knowledge and continue to learn</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
2) Admission Requirements

The admission requirements are the same as those admitted to master’s program, [http://www.mme.uwaterloo.ca/grad/prospective.html#admission](http://www.mme.uwaterloo.ca/grad/prospective.html#admission), which are summarized as follows:

- An honours Bachelor's degree (or equivalent) in an acceptable discipline, from a university of recognized standing, with at least a B (75%) standing or equivalent for international applicants,
- Two letters of reference, from professors (one must be academic)
- Proof of competency in English (if applicable). A score of at least 550 is required in the Test of English as a Foreign Language (TOEFL), along with a minimum score of 4.0 in the Test of Written English (TWE).

3. Degree Requirements

The proposed program degree requirements are as follows:

- Four, one-term graduate level courses (or courses acceptable for graduate credit). They would include the mandatory course, ME 760: Special Topics in Thermal Engineering: Energy & the Environment, plus three courses from the Green Energy core courses listed in Table 3.

- Additional Faculty regulations concerning Master's degree requirements are:
  - the candidate must obtain a passing grade in all courses credited to his or her program, with a minimum overall average of no less than 70%

4. Program Structure

The normal graduation requirements for this program include accumulating a total of four courses. The program entails one mandatory core courses and three elective courses.

The candidates who are registered in the proposed program are expected to complete the minimum amount of courses in one to four academic terms. Full time students can complete four courses in two terms, and part time students may take courses on an on-and-off basis, but they are expected to complete all four courses in six terms.

The appropriateness of the programs structure to meet specific outcomes reported in Table 1 is demonstrated through mapping the program outcomes versus the program courses. Table 2 shows the mapping.
### Table 2: Green Energy Courses and Key Learning Experiences

<table>
<thead>
<tr>
<th>Course/Learning Experience</th>
<th>ME 760</th>
<th>ME 738</th>
<th>ME 751</th>
<th>ME 753</th>
<th>ME 760</th>
<th>ME 760</th>
<th>ME 760</th>
<th>ME 765</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ma-major development of outcome</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
</tr>
<tr>
<td>Mi-minor development of outcome</td>
<td>Ma</td>
<td>Ma</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
</tr>
<tr>
<td>Blank-outcome not addressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>To develop more breadth and depth of knowledge about the technical, economic, environmental, political, and social issues related to alternative energy and energy conservation</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
</tr>
<tr>
<td>To be up-to-date on advancements in alternative energy sciences and technologies</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Mi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To have a strong understanding of the role that conservation and low energy systems play in successfully implementing alternative energy technologies</td>
<td>Ma</td>
<td>Mi</td>
<td>Ma</td>
<td>Ma</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To be able to effectively select, design, and implement suitable alternative energy and energy conservation solutions</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
</tr>
<tr>
<td>To develop the ability to effectively communicate with individuals working on the design and/or implementation of alternative energy technologies</td>
<td>Ma</td>
<td>Mi</td>
<td>Mi</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Mi</td>
</tr>
<tr>
<td>To highly motivate individuals in use of alternative energy and energy conservation technologies</td>
<td>Ma</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
</tr>
<tr>
<td>To have conducted critical analysis of novel issues or new applications related to alternative energy or energy conservation</td>
<td>Mi</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
<td>Ma</td>
</tr>
<tr>
<td>To recognize limits of knowledge and continue to learn</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
<td>Mi</td>
</tr>
</tbody>
</table>

*Mi= Minor Impact  MA=Major Impact*
5. Green Energy Core Courses

The Green Energy core courses are listed in Table 3, and their offering schedule is in Table 4.

Table 3: Green Energy Core courses

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 760*</td>
<td>Special Topics in Thermal Engineering: Energy &amp; the Environment</td>
</tr>
<tr>
<td>ME 738</td>
<td>Special Topics in Materials Engineering: Hydrogen Storage Materials</td>
</tr>
<tr>
<td>ME 751</td>
<td>Fuel Cell Technology</td>
</tr>
<tr>
<td>ME 753</td>
<td>Solar Energy</td>
</tr>
<tr>
<td>ME 760 a</td>
<td>Special Topics in Thermal Engineering: Building Energy Performances (1)</td>
</tr>
<tr>
<td>ME 760 b</td>
<td>Special Topics in Thermal Engineering: Low Energy Building Systems (2)</td>
</tr>
<tr>
<td>ME 760 c</td>
<td>Special Topics in Thermal Engineering: Air Pollution and Green House Gases Emission Control</td>
</tr>
<tr>
<td>ME 765</td>
<td>Special Topics in Fluid Mechanics: Wind Energy</td>
</tr>
</tbody>
</table>

*Mandatory course

Table 4: Green Energy courses offering schedule (C= compulsory, E=Elective)

<table>
<thead>
<tr>
<th></th>
<th>Year 1*</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat. #</td>
<td>F</td>
<td>W</td>
<td>S</td>
<td></td>
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</tr>
<tr>
<td>ME 760</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 738</td>
<td>E4</td>
<td>E4</td>
<td>E4</td>
<td>E7</td>
<td>E7</td>
</tr>
<tr>
<td>ME 751</td>
<td>E1</td>
<td>E1</td>
<td>E1</td>
<td>E1</td>
<td>E1</td>
</tr>
<tr>
<td>ME 753</td>
<td>E5</td>
<td>E5</td>
<td>E5</td>
<td>E5</td>
<td>E5</td>
</tr>
<tr>
<td>ME 760 a</td>
<td>E2</td>
<td>E2</td>
<td>E2</td>
<td>E2</td>
<td>E2</td>
</tr>
<tr>
<td>ME 760 b</td>
<td>E3</td>
<td>E3</td>
<td>E3</td>
<td>E3</td>
<td>E3</td>
</tr>
<tr>
<td>ME 765</td>
<td>E6</td>
<td>E6</td>
<td>E6</td>
<td></td>
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</tbody>
</table>

Total courses: 4 2 0 4 2 1 4 2 1 4 3 1 4 3 1
New courses: 4 2 0 0 0 1 0 0 0 0 0 0

*Academic year

Course Descriptions are as follows:

ME 760* Special Topics in Thermal Engineering: Energy & the Environment
Introduction to energy situation, impact of energy and energy paradox, basic principles of global energy, energy policy and energy production/consumption such as growth rate, doubling time, and Hubert Theory. Issues related to fossil fuels and
solar balance. Conventional and novel heating systems, efficiency measurement, Rankin cycle and Decision making (local and system view). Technical issues related to direct and indirect energy conversion, Energy conversion technologies and nuclear energy.

ME 738 Special Topics in Materials Engineering: Hydrogen Storage Materials
Motivation for the hydrogen economy (crude oil depletion, CO₂ increase, availability of PEM fuel cells); operating conditions of PEM fuel cells in relation to the solid state hydrogen storage requirements-as an example the Andromeda fuel cell); three fundamental methods of hydrogen storage—advantages/disadvantages; targets for automotive hydrogen storage-DOE old and most recent targets; hydrides available for solid hydrogen storage-calculations of theoretical gravimetric capacity; reversibility problems and off board recharging; how can we improve properties of available hydrides-nanostructuring and nanosized catalytic additives and catalytic precursors; methods of nanostructuring; milling processes and equipment; mechanisms of nanostructuring; stresses and deformation in ball milling; elastic and plastic deformation; nanostructure formation; Hall-Petch relationship; estimations of nanograins size (XRD; Scherrer; Williamson-Hall); hydrogen interaction with nanostructure; thermodynamics of hydrogen storage (calculations of enthalpy of hydrogen desorption/absorption); kinetics of hydrogen desorption/absorption (calculations of activation energy for hydrogen desorption/absorption); selected examples of solid state hydrogen storage materials. Team project: Design of a Hydrogen Storage Reservoir for a re-designed Toyota Prius utilizing the following methods and materials: 1. Gaseous H₂ at 35MPa; 2. Gaseous H₂ at 70MPa; 3. Liquid H₂; 4. Solid hydride MgH₂ catalyzed with nano Ni particles heated to 300°C by an electric coil heater; 5. NaAlH₄ catalyzed with metal chlorides heated to the suitable temperature; 6. LiAlH₄ catalyzed with metal chlorides.

ME 751 Fuel Cell Technology

ME 753 Solar Energy
Terrestrial and extra-terrestrial solar radiation; radiative and optical properties of materials; basic and advanced flat plate solar thermal converters, focusing converters, solar-electric converters, solar photovoltaic cells, thermal storage; applications to building heating and cooling systems, industrial heat and central electric plants.

ME 760 a: Special Topics in Thermal Engineering: Building Energy Performances (1)
An overview of energy use in buildings, including technical, economic, and environmental considerations: basic calculations of energy flows through exterior
envelope; basic energy calculations for mechanical/electrical equipment and systems, including HVAC, water heating, and lighting; aspects of energy-use benchmarking, energy-auditing, and building energy simulation. Additional topics may include: integrated design process; building energy codes; “green building” rating systems; measurement of energy use; building commissioning.

ME 760 b: Special Topics in Thermal Engineering: Low Energy Building Systems (2)
An overview of concepts for designing energy-efficient HVAC systems for buildings: design for efficient operation at part-load; variable-flow hydronic systems; ventilation heat-recovery systems; high-efficiency heating and cooling equipment; waste-heat recovery; aspects of air- and ground-source heat-pump systems. Additional topics may include: aspects of building energy management systems; considerations for integration of future energy sources (i.e. solar-energy, cogeneration systems).

ME 760 c: Special Topics in Thermal Engineering: Air Pollution and Green House Gases Emission Control
This course is designed for graduate students with mechanical, chemical and environmental engineering background. It covers the following topics (time permitting): introduction to air, air quality and air pollution, impact of air pollution and greenhouse gases on health and climate change energy and air pollution. Fundamentals of fossil fuel combustion and combustion related air pollution, and properties of air pollutants. Pre-combustion emission control strategies: fossil fuel cleaning/refinery and green energy, in-combustion emission control, post-combustion air pollution control. GHG emission control technologies.

ME 765: Special Topics in Fluid Mechanics: Wind Energy
This course will attempt to survey the wind energy field with a particular emphasis on the fluid mechanic and aerodynamic aspects of wind energy. The course covers wind energy history, background, current state of the art, Canadian development. The Wind as an Energy Source: energy extraction, boundary layers, turbulence, experimental measurements, instrumentation, wind modeling. Fundamentals of Wind Machines: Dimensionless groups, scaling, performance parameters. Aerodynamics: Momentum and Disc theory, Blade Geometry, Stall, Blade Design, Aeroacoustics, wind farm development. The course will involve lectures, group discussion, guest lectures, independent study, laboratory demonstrations.

6. Mode of Delivery
This program will be delivered online, via an interactive video facility. Domestic students may choose to take courses on campus, but international students are only allowed to participate in the classroom lectures remotely. Students will be able to interact with the instructor and classroom in real time, or learn by video on demand.

The state-of-the-art E5-Live facility has already been installed in the MME department. The use of smart boards along with multi-point interactive video conferencing in this facility will provide an immersive, real-time experience where
students seamlessly participate with the class. The facilities allow the use of any smart mobile device such as the Blackberry and iPhone.

The proposed system will enable remote access lectures in the following three ways:

a. “Fully Interactive Experience”: allows students to watch and participate in the course live including asking questions at any time.

b. “Partially Interactive Experience”: allows the users to watch the live session and call into the bridge where a moderator will monitor any questions asked.

c. “On Demand”: allows users to watch a pre-recorded session.

7. Assessment of Teaching and Learning

- Teaching Assessment

High standard of teaching excellence and quality learning experience is the key to uWaterloo education and reputation. Teaching evaluation and student feedback will be collected to evaluate this quality. Like other courses, the Faculty of Engineering Course Evaluation Questionnaire will be employed to assess the teaching quality. In addition to the quality indicators therein, the students will be given an opportunity to evaluate the online education experiences with an open-ended question. Surveys will be generated and analyzed at the departmental level, through the Office of Graduate Studies to ensure each student’s anonymity and encourage honest feedback. Results will not be released until final marks have been reported to the Office of the Registrar. Data will be used by Course developers and instructors to improve course content and presentation,

- Learning Assessment

All the policies applied to the in-class on-campus graduate students will apply to the remote students. Each individual instructor will be given the power to evaluate the students based on his/her best judgment of the students' performances. In addition, depending on the individual instructor, the evaluation methods may also rely more on the online tools. Students will be evaluated by taking part in: online quizzes, complete virtual laboratory activities where applicable, participate in online group discussions, online assignments and projects, and final exam. Students are encouraged to share their technical experiences while giving them opportunities to exchange information amongst class-mates. These online class activities are considered to be an effective tool for the assessment of students' learning.

The University of Waterloo’s Center for Extended Learning will coordinate the proctoring of final exams for remote students in their exam centers nationally and internationally.

8. Resources for All Programs
Human Resources

There are at least nine experienced tenure-track faculty members and consulting engineers (Category 1) who are competent in teaching in the program. Faculty members who will be the core instructors of the proposed program are Professors Mike Collins, Roydon Fraser, David Johnston, Xianguo Li, Fue-Sang Lien, Zhongchao Tan, Robert Varin, John Wen, and John Wright. MME also engages professional engineers to be instructors (e.g. David Mather) particularly in the courses related to energy efficient buildings and technologies with applications to smart building to save energy and the environment. Table 5 presents faculty members who will participate in the program (CV's of Category I faculty members are provided in Volume II of this proposal). Professors Kyle Daun, George Davidson, David Mather, Carolyn Ren, Armaghan Salehian, Gerry Schneider, Beth Weckman, and Mustafa Yavuz will provide necessary support to the proposed program as Category 2 faculty members; In addition, Professors, Baris Fidan, Soo Jeon, and Gordon Stubley are Category 3 professors who will provide support to the Program.

The proposed new Graduate Diploma program has been carved out of the existing MEng in Mechanical Engineering Green Energy Certificate which has been offered since 2007 by the complement of the above named faculty. Therefore, no new human resources are needed to launch the program.

Table 5: Core faculty members involved in the program

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>Home Unit</th>
<th>Supervisory Privileges</th>
<th>Rank</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mike Collins</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Associate Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td>Roydon Fraser</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td>David Johnston</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Associate Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td>Xianguo Li</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td>Fue-Sang Lien</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td>Zhongchao Tan</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Associate Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td>Robert Varin</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td>John Wen</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Assistant Professor</td>
<td>Tenure-track</td>
</tr>
<tr>
<td>John Wright</td>
<td>M</td>
<td>MME</td>
<td>Yes</td>
<td>Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td><strong>Category 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyle Daun</td>
<td>M</td>
<td>MME</td>
<td>YES</td>
<td>Associate Professor</td>
<td>Tenured</td>
</tr>
<tr>
<td>David Mather</td>
<td>M</td>
<td>MME</td>
<td>No</td>
<td>Lecturer</td>
<td>Definite-term</td>
</tr>
</tbody>
</table>
As documented in their CVs, the faculty members have a proven record of accomplishments, in both teaching and research. They have been actively involved in curriculum developments through novel pedagogies while being committed to utilize active learning methods in their lectures. Their commitment to teaching has resulted in outstanding evaluations in their courses when some have received teaching excellence awards and teaching recognition letters from the Office of the Dean.

As well, they have been fully engaged in cutting-edge renewable energies research programs ranging from bio-fuels and bioenergy, sustainable buildings, fuel cells, solar and wind energies, and many more as highlighted in their CVs.

- Financial Resources

Existing human and financial resources have been in place to support the MEng Mechanical Engineering with Green Energy Certificate (type 1 and 2 Graduate Diplomas). To launch this new program, MME has installed new state-of-the-art classrooms equipped with interactive video facilities, while the University of Waterloo has installed specialized main server facilities to support video interactive teaching and video archiving capabilities. All installations are already in place and ready to support the proposed program.

  - Teaching Assistants

The Department will provide each course with 0.5-1TA to assist the instructor in online delivery of the course and assessing the learning outcome.

  - Compensation to instructors

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Compensation, as detailed in financial plan and/or arranged by the department Chair, will be offered to the key instructors who teach the core courses of Green Energy courses.

- Funding for program promotion

The Department will provide funding for local and global advertisement in international conferences, domestic and international newspapers, and travel to international institutes.

- License expansion of E5-Live Link

Currently the available licenses for remote connection to the state-of-the-art facilities in E5-Live Links are 20. As the program expands this number needs to increase by purchasing extra software/hardware licenses. Based on the projected student cohort/intake the extra license should be in place by the end of the second year of the program.

9. Quality and Other Indicators

The proposed program is structured to ensure each student acquires theoretical, practical and professional skills commensurate with a graduate degree program, as indicated in learning outcomes and its mapping to the course structure (see Table 1 and Table 2).

The department of Mechanical and Mechatronics Engineering has a unique team of faculty with expertise in key technologies for harvesting renewable energies and for improving efficiencies. The expertise cover a wide range of renewable energy sources such as solar, wind, biomass and fuel cells to energy efficient buildings (see Vol II of this proposal). The appropriateness of the collective faculty expertise is evidence that they are able to contribute substantively to the success and quality of the proposed program.

10. Projected Enrollment

Table 4 presents the projected number of part-time and full-time students enrolled in this program over the next six years. It is estimated that a steady annual course enrolment of 80 enrollments can be reached. Full-time students are expected to finish in 2 terms and part-time students are expected to finish in 4 terms.
Table 6: Projected intake and course enrollments of part- and full-time students*

<table>
<thead>
<tr>
<th>Year</th>
<th>Term</th>
<th>Full time</th>
<th>Part time</th>
<th>Total Students (term)</th>
<th>Total Enrollment (term)</th>
<th>Total Students</th>
<th>Total Enrollment</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CPR Intake</td>
<td>CPR Enrolment</td>
<td>Int'l Intake</td>
<td>Int'l Enrolment</td>
<td>CPR Intake</td>
<td>CPR Enrolment</td>
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<tr>
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<td>0</td>
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<td>6</td>
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<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

*Four terms are considered for completion of the program for part-time and two terms for full-time students.
10. PROMOTION PLAN

Upon approval of this proposal, the program will be advertised in the publications of domestic and international professional societies and newspapers etc. It will also be delivered to our own graduates; as some of them may want to continue their part time education. Faculty members are encouraged to travel to international conferences and other countries to promote the program.

11. FINANCIAL PLAN

Please see attached spread sheet detailing a financial plan for the first five years up to the steady state enrollment.
Senate Undergraduate Council met on 14 May 2013 and agreed to forward the following item to Senate for approval. Council recommends that this item be included in the regular agenda. Items recommended for inclusion in the consent agenda are contained within a separate report.

Further details are available at: uwaterloo.ca/secretariat/committees-and-councils/senate-undergraduate-council.

FOR APPROVAL

NEW ACADEMIC PROGRAM
► Faculty of Arts
  Bachelor of Arts (Economics and Mathematical Economics 2+2 Programs) [effective 1 September 2014]

1. Motion: To approve 2+2 programs in economics and mathematical economics with Shandong Normal University.

Rationale: The Faculty of Science has a successful 2+2 program with Shandong Normal University in China involving several disciplines: biology, biochemistry, biomedical science, chemistry, computational science, environmental science, earth sciences, mathematical physics, nanoscience & materials, and physics. The Faculty of Arts proposes to add economics and mathematical economics to the agreement. Students will attend Shandong Normal University for the first two years of their programs and will attend Waterloo for the last two years. Both universities will work together to select students to participate; admission decisions are the responsibility of Waterloo. Students who successfully complete the programs will be awarded Honours BA degrees. Students enrolled in the programs will be required to achieve a grade of at least 75% in English for Academic Success Level 400 in order to proceed to full-time studies at Waterloo. Students who require additional language training will have their enrollment deferred for up to one term until their English skills meet the necessary standard.

/kjj
18 May 2013

Mario Coniglio
Associate Vice-President, Academic